United States
Environmental Protection
Agency

EPA Region 3
Philadelphia, PA

Public Comment Compendium: Mountaintop Mining/Valley Fills in Appalachia Final Programmatic Environmental Impact Statement

October
2005

Volume I

Table of Contents

VOLUME I

VOLUME II

VOLUME III

SECTION B INDEX

Introduction

The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Office of Surface Mining, and West Virginia Department of Environmental Protection prepared a Draft Programmatic Environmental Impact Statement (DPEIS) on mountaintop coal mining and associated valley fills in Appalachia.

The Notice of Availability of the DPEIS for public review and comment appeared in the Federal Register dated May 30, 2003 (68FR32487). The notice announced a 90-day comment period ending August 29, 2003. The period for receipt of comments was extended 130 days to January 6, 2004 and then an additional two weeks to January 21, 2004, based on several requests from stakeholders. Comment period extensions were published in the Federal Register, announced in news releases, and noted on the agencies' web pages. Requesters for comment period extension were notified by e-mail of the extension. The public review period was scheduled to provide concerned agencies and the public an opportunity to review the DPEIS and to offer comments on its adequacy.

The Federal Register notice announced that the DPEIS was available on the Internet at http://www.epa.gov/region3/mtntop/index.htm. The other agencies maintained prominent links to the EPA website. The EPA has distributed copies to known interested parties and organizations, local agency offices, and public libraries as indicated in the document at Chapter VII: Distribution List. An EPA Region 3 toll-free EIS request telephone hotline was in operation during the comment period to allow persons to request copies of the DPEIS. Approximately 140 hard copies and 600 CDs of the DPEIS were distributed to agencies and to interested members of the public.

The Corps of Engineers led a communications team for the agencies and distributed a press release on May 29, 2003 to the Associated Press and United Press International. The news release was posted on each agency's web site. A press teleconference was held with twenty national and local media contacts. Follow-up interviews were conducted with other press contacts that could not participate. Wide national coverage of the availability of the DPEIS occurred in print and broadcast media. The news release announced the release of the DPEIS, summarized the DPEIS recommendations, provided brief background information, the libraries where the DPEIS was distributed and contact persons for additional information.

The public was invited to provide written comments during the comment period and oral comments during the two public hearings. Written comments were accepted through the mail or by placing them in a 'comment box' during the public hearings. Comments were also accepted through e-mail at: mountaintop.r3@epa.gov . The first hearing was held on July 22, 2003 at The Forum at The Hal Rogers Center, 101 Bulldog Lane, Hazard, KY 41701. The second hearing was held on July 24, 2003 at the Charleston Civic Center-Little Theater, 200 Civic Center Drive, Charleston, WV 25301. Each hearing had two sessions: the first from 2:00 p.m. to 5:00 p.m. and the second on the same day from 7:00 p.m. to 11:00 p.m. Notices of the public hearings were mailed by the Corps of Engineers to persons who mailed comments to the EPA during the NEPA scoping process.

During the public review period, 712 letters were received from individuals and organizations. One letter was received from a group of members of the United States Congress. Three letters were received from Federal agencies. Nine letters were received from state or commonwealth agencies. One hundred seventy six (176) people provided oral comments at the Public Hearings. Eighty three thousand ninety five (83,095) form letters were received. This document presents the complete text of the public comment letters and e-mails in Section A and the complete public hearing transcripts in Section B. Each of the seventeen different form letters is presented once in Section A with a notation of the number received.

Each letter, e-mail, form letter, and oral statement was reviewed and evaluated. Changes or additions to the text of the DPEIS made in response to comments are incorporated into the Final EIS through an errata sheet.

To effectively and efficiently evaluate and respond to the large number of comments, each written and oral comment was grouped into a numbered category. Paragraphs within a letter, e-mail, post card or oral statement were identified by a set of numbers that correspond to the numbered category. For example, a paragraph stating a preference for Alternative 3 was given the number 1-4.

These following categories/subcategories were assigned to paragraphs (or as needed to sentences) within comment letters, e-mails, post cards or oral statements. The notation on the comment letter is the major category number and the subcategory number, plus the second subcategory number when applicable (for example 1-1, or 5-1-2). The first four major categories do not have second subcategories. The remaining categories have subcategories and second subcategories. The notation 1-1 indicates category 1 Alternatives and an additional notation of a preference for the no action alternative. The notation 5-1-2 indicates category 5 water resources and an additional notation of surface water use as a resource, adequacy of analysis. The notation 5-5-2 indicates category 5 water resources and an additional notation of water quality, adequacy of analysis.

Major Category

Subcategory

Second subcategory

1. Alternatives

1. Preference for No Action Alternative
2. Preference for Alternative 1
3. Preference for Alternative 2
4. Preference for Alternative 3
5. Disagree with all alternatives presented
6. The Agency Preferred Alternative should be modified in a specific way
7. Preference for an alternative considered in the EIS but not evaluated in detail
8. Suggestion of an alternative not considered or evaluated in the EIS
9. Opposition to MTM/VF
10. Opposition to easing environmental regulation, including opposition to changing or eliminating the Stream Buffer Zone rule
11. Support of MTM/VF
12. Support of no additional regulation
13. Other

2. Role of the General Public

1. Local Citizens\communities
2. Nationwide Citizens\Communities
3. Specific interest groups
4. Other

3. **Public Involvement**

1. Adequacy/Availability of Information
2. Outreach/Agency Communication Efforts
3. Use of Public Involvement/Comment
4. Public Meetings
5. Adequacy of Public Comment Period
6. Other

4. **Adequacy of EIS (NEPA)**

1. Adequate
2. Inadequate

5. **Water Resources**

1. Surface Water Use as a Resource
2. Groundwater Use as a Resource
3. Riparian Areas and Wetlands
4. Water Quantity
5. Water Quality
6. Watershed Condition
7. Direct Stream Loss
8. Other

6. **Aquatic Fauna and Flora**

1. Non-game
2. Game
3. Avifauna
4. Invertebrate and Insect
5. Aquatic Flora
6. Other

7. **Terrestrial Fauna and Flora**

1. Non-game
2. Game
3. Avifauna
4. Invertebrate and Insect
5. Terrestrial Flora
6. Other

8. **T&E, Candidate, and Species of Concern**

1. Federal Threatened, Endangered, or Candidate
2. Species of Concern
3. Other

9. **Cumulative Impacts**

1. Terrestrial Ecosystem/Habitat Composition and Function / Fragmentation and Connectivity/Deforestation
2. Environmental Quality and Ecosystem Integrity/ Biodiversity /Environmental Values
3. Aquatic Cumulative. Aquatic Ecosystem/Habitat Composition/Integrity
4. Social and Economic cumulative
5. Other

10. **Social Values**

1. Population Parameters (i.e. number and age structure)
2. Community / Cultural
3. Urbanization and Development
4. Quality of Life
5. Public Health and safety
6. Aesthetic Values (visual, noise, etc)
7. Environmental Justice
8. Other

11. **Economic Values**

1. Employment
2. Business Viability
3. Private Property Values
4. Tax Base and Payment to states
5. Non-traditional forest products economic issues
6. Traditional forest products economic issues
7. Tourism and recreation economic issues
8. Coal industry economic issues
9. Other

12. **Government Efficiency**

1. Permitting
2. Other

13. **Excess Spoil Disposal**

1. Fill Minimization
2. Fill Stability
3. Other

14. **Stream Habitat and Aquatic Functions**

1. Assessing
2. Mitigating
3. Other

15. **Air Quality**

1. Blasting dust and fumes
2. Other

16. **Blasting (Excluding blasting dust and fumes)**

1. Vibration
2. Fly rock
3. Other

17. **Flooding**

1. Flooding Evaluation
2. Fear of Flooding
3. Other

18. **Invasive Species**

1. Used in reclamation
2. Increased opportunity for invasives to spread
3. Other

19. **Reclamation**

1. Contemporaneous reclamation
2. Reclamation with trees
3. Other

Secondary Subcategories

Each subcategory comment was further categorized into the following secondary subcategories. Except for subcategories under Major Categories 1-4, which have no secondary subcategories.

1. Legal
2. Adequacy of analysis or statement of impact
3. Monitoring or mitigation
4. Specific edit
5. Factual material provided to include in EIS

Section A

The public was invited to provide written comments on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement during the public comment period. The Federal Register Notice of Availability dated May 30, 2003 announced a 90 day comment period ending August 29, 2003. The public comment period was subsequently extended an additional 130 days to January 6, 2004, and then an additional two weeks to January 21, 2004. These letters were made available for public review on the EPA website http://www.epa.gov/region3/mtntop/index.htm.

The written comments were reviewed and evaluated. Comments were grouped into different numbered categories. The comments are presented half size with applicable numbered categories identified adjacent to the comment. Form letters are presented once with the number of signatories.

The written comments are presented in the following order:

- **Elected Officials**
- **Federal Agencies**
- **State or Commonwealth Agencies**
- **Organizations**
- **Citizens**
    - Individual Letters
    - Form Letters

An index of a author's name and the page number where the Comments are presented is included at the end of this document. An index of organizations and the page number where comment letters are presented is included at the end of this document.

Elected Officials

Congress of the United States
Washington, DC 20515

June 19, 2003

Christine Todd Whitman, Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

Les Brownlee, Acting Assistant
Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, D.C. 20310-0108

Steven A. Williams, Director
U.S. Fish and Wildlife Service
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240

Jeffery Jarrett, Director
U.S. Office of Surface Mining
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240

Dear Administrator Whitman, Acting Assistant Secretary Brownlee, Director Williams and Director Jarrett:

We are writing to express our opposition to the Mountaintop Mining/Valley Fill Draft Environmental Impact Statement (EIS) released May 29, 2003 by the Environmental Protection Agency (EPA), Army Corps of Engineers (Corps), Office of Surface Mining (OSM), U.S. Fish and Wildlife Agency (FWS), and the West Virginia Department of Environmental Protection. We ask you to reconsider the suggested "preferred alternative" contained in the Draft EIS, and to evaluate and select a more appropriate measure that would limit the environmental destruction caused by mountaintop removal coal mining that was documented in the studies accompanying the Draft EIS.

The preferred alternative advocated in the Draft EIS would attempt to combine the Surface Mining Reclamation and Control Act (SMCRA) and Clean Water Act (CWA) permitting processes, in a move that the agencies advocate as a streamlining and efficiency measure. However, many of the intended benefits of the CWA regulations would be largely undermined by this new approach, which would give the OSM a greater role in CWA permitting decisions — a responsibility and authority granted by Congress to EPA, not OSM. Given the EPA's familiarity and expertise in the CWA permitting process, it seems inefficient and unnecessary to decrease their role and transfer this responsibility to the OSM.

In addition, the "preferred alternative" directs the Corps to decide whether to require a general Nationwide Permit (NWP 21) or a more stringent individual Permit (IP) for proposed mining activities on a case-by-case basis, heavily relying upon SMCRA information provided by the applicant. The CWA, however, prohibits the granting of a NWP for actions that cause more than a minimal impact to the waters of the U.S. Given the results of the Cumulative Impact Study (CIS) performed in the course of the EIS, it is clear that mountaintop removal mining and valley fill activities individually and cumulatively *do* constitute more than minimal impacts and therefore should no longer be treated as eligible for general permits. We also understand that the preferred alternative would go so far as to eliminate the interim prohibition on using NWPs for valley fills greater than 250 acres in size that has been in effect in West Virginia since 1998. This appears to completely ignore the findings that the larger valley fills are the most environmentally harmful.

Additionally, the scientific and technical studies performed in the course of the EIS clearly demonstrate that small (e.g. 35 acre) drainage basin restriction sizes were the least damaging to terrestrial, riparian and aquatic resources within the study area. The scenarios with unconstrained drainage basin impact areas produced the largest negative effect upon the study area.

These findings regarding drainage basin size restrictions led to the inclusion of alternatives in the January 2001 Preliminary Draft EIS that compared the relative benefits and costs of limiting the maximum size of valley fills. Specifically, the Preliminary Draft detailed scenarios in which valley fill size would be capped between 0 to 75 acres or 76 to 250 acres. However, the May 29, 2003 Draft EIS contains no alternatives regarding valley fill size restrictions.

The original purpose of this programmatic EIS was to develop policies and procedures to *"minimize, to the maximum extent practicable,* the adverse environmental effects to waters of the United States and to fish and wildlife resources from mountaintop mining operations, and to environmental resources that could be affected by the size and location of fill material in valley fill sites" 68 FR 5800 (emphasis added). Yet, it appears that the primary goal of the May 29, 2003 Draft EIS was streamlining the permitting process, rather than minimizing environmental impacts. The impacts of mountaintop removal mining were proven to be significant and will not go away simply by combining the federal permitting processes, nor by weakening existing federal environmental protections.

The CIS included in the EIS states that "if mining, permitting, and mitigation trends stay the same, an additional 1000 miles of *direct* impacts could occur" in the next decade. The accompanying studies demonstrate that the harm to the region's natural resources, and the human communities and wildlife species that depend on these resources, is significant, largely irreversible, and of national consequence. For example, between 1985 and 2001, nearly 6,700 valley fills were approved in the study region, which included West Virginia, Kentucky, and parts of Virginia and Tennessee. These valley fills have already buried over 700 miles of streams and degraded water quality over a total of 1200 miles of streams -- and the studies confirm that the direct burial of stream segments is permanent. This is to say nothing of the *indirect* effects of these mining and fill activities, which would certainly exacerbate the environmental harm. Due to the immense biodiversity (riparian, terrestrial, and aquatic) of the southern Appalachian region, the biological impacts of valley fills will have a "disproportionately large impact on the total aquatic genetic diversity of the nation."

The CIS further asserts that, "based on permits issued in the last ten years and an assumption of similar permits in the next ten years, mountaintop [removal] mining has the potential to adversely impact 380,547 acres of forest in the four-state study area." This is equivalent to 594 square miles — an area equivalent to about ten cities the size of the District of Columbia. While the agencies are to be commended for preparing and releasing the CIS and the dozens of other technical, scientific and economic studies conducted as part of the Draft EIS, they fail to draw the conclusion from these reports that mountaintop removal coal mining is seriously jeopardizing the future of the Appalachian region as well as rapidly destroying natural resources of national importance.

We are most concerned that, despite the well-demonstrated need to take immediate measures to limit the destruction caused by mountaintop removal mining, the final EIS neither evaluates nor proposes measures to address the significant environmental problems raised in the CIS and other reports. Rather, the EIS evaluates primarily procedural, authority-driven changes in the agencies' permitting processes and information sharing policies. Furthermore, the Draft EIS's preferred alternative even suggests weakening existing environmental standards that apply to mountaintop removal coal mining. This is exactly the opposite response warranted by the thousands of pages of studies accompanying the EIS.

Another recommendation in the EIS is to finalize changes to the SMCRA buffer zone regulation. This rule, adopted by the Reagan Administration in 1983, prohibits surface mining disturbances within 100 feet of a perennial stream or intermittent stream, unless there is a finding that the activity will meet water quality standards and not cause adverse environmental effects on stream water quality or quantity. The proposed new rule, however, would specifically allow for the dumping of excess spoil directly into these streams, with the only requirement being that the mining companies have " minimized the creation of excess spoil to the maximum extent practicable." This rule change would effectively remove the "buffer" from the buffer zone rule to create an illegal and unwarranted exception for valley fills. This hands an advantage to coal mining companies that would continue to increase, not minimize, the harmful environmental effects of mountaintop removal mining.

We urge you to reconsider the recommendations in the Draft EIS to conform to the evidence produced by your studies. Mountaintop removal mining and the dumping of excess spoils into valley fills are incredibly destructive activities that have wreaked havoc upon an entire ecosystem, and will continue to do so without the enforcement of existing laws like the buffer zone rule and the adoption of additional limits on these practices. This Draft EIS tips the scales too heavily in favor of the coal mining industry and againstthe resources and people of the region. Accordingly, your agencies should implement procedures that, at the very least, strike the required statutory balance of environmental and mining interests.

Sincerely,

Frank Pallone, Jr.
FRANK PALLONE, JR.
Member of Congress

CHRISTOPHER SHAYS
Member of Congress

Wayne T. Gilchrest
WAYNE GILCHREST
Member of Congress

Barney Frank
BARNEY FRANK
Member of Congress

Tammy Baldwin
TAMMY BALDWIN
Member of Congress

Betty McCollum
BETTY McCOLLUM
Member of Congress

Michael Honda
MICHAEL HONDA
Member of Congress

Sheila Jackson Lee
SHEILA JACKSON LEE
Member of Congress

Edward J. Markey
EDWARD MARKEY
Member of Congress

Lois Capps
LOIS CAPPS
Member of Congress

Jim McDermott
JIM McDERMOTT
Member of Congress

Rush Holt
RUSH HOLT
Member of Congress

Jerrold Nadler
JERROLD NADLER
Member of Congress

Nancy L. Johnson
NANCY JOHNSON
Member of Congress

RAUL GRIJALVA
Member of Congress

ANNA ESHOO
Member of Congress

EARL BLUMENAUER
Member of Congress

ELIOT ENGEL
Member of Congress

NITA LOWEY
Member of Congress

Federal Agencies

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 20192

REC'D JAN 0 9 2004

Reply Refer To:
Mail Stop 423

JAN 0 6 2004

MEMORANDUM

To: U.S. Environmental Protection Agency
Philadelphia, Pennsylvania

From: James F. Devine
Senior Advisor for Science Applications

Subject: Review of Draft Programmatic Environmental Impact Statement for the Mountaintop Coal Mining and Associated Valley Fills in Appalachia.

The U.S. Geological Survey (USGS) has reviewed the subject Draft Programmatic Environmental Impact Statement (DPEIS) and offers the following comments.

GENERAL COMMENT:

The Draft Programmatic Environmental Impact Statement does not use any USGS coal quality data. The data in USGS Professional Paper 1625-C (2001) could be helpful in evaluation of the resource.

SPECIFIC COMMENTS:

Page ES-4, Executive Summary, Chapter Technical Studies, third bullet point:

The third sentence is internally inconsistent. As written, the sentence contrasts stream storm response to "low-frequency storms" with response to "larger rainfall events;" low-frequency storms are by definition large storms. A correction that would improve the meaning of this sentence would be to change the phrase "low-frequency" to "low-intensity." The USGS recommends that the sentence be replaced with the following sentence: "During slow, soaking storms, peak unit runoff from a mined watershed generally does not exceed that from an unmined watershed; however, during highly intense summer thunderstorms, peak unit runoff from a mined watershed generally equals or exceeds that from an unmined watershed." 17-1-4

Page II. C-28 to II. C-29, Chapter II Alternatives; Section C Detailed Analyses of the Actions to Address Issues; Subsection 2, Government Efficiency, Sub-Issue: Consistent/Compatible Definitions for Stream Characteristics and Analyses; Subsection a., No Action Alternative; Subsection a.2, SMCRA; last sentence:

The following typographical error should be corrected as it is part of a definition: "For instance, in West Virginia, the point where the stream segment changes from ephemeral to intermittent is located by a fie) contributing to a watershed tributary." 5-8-4

Page II. C-29, Chapter II Alternatives; Section C, Detailed Analyses of the Actions to Address Issues; Subsection 2, Government Efficiency, Sub-Issue: Consistent/Compatible Definitions for Stream Characteristics and Analyses; Subsection b, Alternatives 1, 2, and 3; second paragraph:

The document states in Action 2 that "Federal and state regulatory authorities will work with... stakeholders to establish science-based methods for definition and delineation of stream characteristics...." A study addressing this point has been completed by the USGS in cooperation with the Office of Surface Mining and the U.S. Environmental Protection Agency (Paybins, 2002).

Pages III. N-1 to III. N-7, Chapter III Affected Environment And Consequences of MTM/VF; Section N. Past And Current Mining In The Study Area:

The coal production figures cited in this section end with 1998 data and should be updated to reflect more current (2000) coal production statistics (USGS, 2001). 11-8-4

Page III. O-4, Figure III. O.1 - Chapter III Affected Environment And Consequences of MTM/VF; Section O, The Scope of Remaining Surface-Minable Coal in the Study Area; Extent of Potential Mountaintop-Minable Coal:

An explanation (color legend) is needed for Figure III.O.1.

Page III. C-1 to III. C-22, Chapter III Affected Environment And Consequences of MTM/VF; Section C., Appalachian Aquatic Systems:

Overall, this section focuses too narrowly upon carbon assimilation and transport. Although these headwater processes are very important, they are not the only processes occurring in headwater streams. Processing of litter inputs is more than the sequential fragmenting and reprocessing of carbon; there are changes in the availability of nutrients, uptake, sequestration and release. The USGS recommends that the section be expanded to include discussion of the additional processes. 6-6-4

In the discussion of fish in Appalachian headwater streams, mention is made of typical cold-water species inhabiting these reaches. Some of the species mentioned are not specifically cold-water species, but pioneer species adapted to live in ephemeral environments. This should be noted in the section.

The statement that the river system in the MTM/VF study area has a unique fisheries system, which is important in the evolution and speciation of North American freshwater fishes, needs to be clarified. It is a rather important statement and merits further discussion.

The discussion of lentic environments seems rather long, considering the relative paucity of these features in the landscape of the study area. Instead of an environment affected by MTM/VF, wetlands and ponds in the study area are much more likely an environment resulting from MTM/VF and should be discussed in more detail.

The listing of the potential benefits of ponds in the study area makes no mention of the transient nature of the benefits, as the ponds are very commonly removed at the completion of reclamation. Sediment pools made available by the removal of pond dams could result in the pulse transport of large sediment loads. These sediments are of unknown composition and may contain elevated concentrations of metals and trace elements. This topic should be further discussed in the text.

Page III.C-17, Chapter III Affected Environment and Consequences of MTM/VF; Section C, Appalachian Aquatic Systems, Subsection 2. Lentic (Non-flowing) Aquatic Systems and Wetlands, Subsection e. Ecosystem Function: 6-6-4

The statement that "This lake is anticipated to be similar to natural ponds found in the study area." is inconsistent with the statement that "...there are no natural lakes and ponds in West Virginia... [and] virtually all lentic systems in the study area have been formed by impounding flowing water systems" (page III.C-13). The USGS recommends that the statements be reconciled so the document states unambiguously whether natural ponds exist in the study area.

Page III.C-20, Chapter III Affected Environment and Consequences of MTM/VF; Section C, Appalachian Aquatic Systems, Subsection 2. Lentic (Non-flowing) Aquatic Systems and Wetlands, Subsection f. Wetlands in the Study Area:

The USGS recommends that the discussion on engineered ponds and wetlands in mined areas include information about accumulation of sediment. Most of these ponds are designed to trap sediment, which they do effectively. Because the ponds fill up with sediment, the functions they perform change through time; specifically, the function of providing fish habitat is performed less effectively by ponds filled with sediment.

The statement that "Functions of man made ponds and wetlands exist and may be considerable... [and] have their own inherent values." (p. III.C-20) seems overly broad and vague, considering that mitigation projects for stream loss have included the "...creation of palustrine or pond-type wetlands or linear, drainage ditch-type wetlands...." (p. IV.B-9). If some measurements of ecological structure and function for these mitigation wetlands have been made and are available, then specific information should be presented in section C; and if not, the absence of such measurements should be noted.

Page III. D-1, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to the Headwater Streams from Mountaintop Mining, second paragraph:

In the description of potential impact factors, the statement is made that all eight of the impact factors are related to headwater stream function. In many instances, it appears that these factors are most strongly related to physical disturbance of the drainage basin. The USGS recommends that the statement be rewritten; if the statement is kept in its present form, it should explain, for example, how changes in downstream sedimentation are related to headwater function or downstream thermal regime.

Page III. D-3, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection b.2, Studies in the MTM/VF Study Area: 6-6-4

The study cited as USGS, 2002-Draft was released in May 2003. Please delete the USGS 2002 Draft citation and use "USGS, 2003." The full citation is given in the References section.

The USGS report did not use the "E-point, P-point" abbreviations, instead referring to "ephemeral points" and "perennial points." Referring to this study as "their 'E-point, P-point study" could be confusing, even to readers familiar with the report. The USGS recommends that the "E-point, P-point" terminology be changed.

Page III. D-4, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection c., Loss of Upstream Energy from Buried Stream Reaches:

The USGS recommends that a sentence such as the following be added: "Although recognized from the beginning of the DPEIS process as an important issue, loss of energy from buried stream reaches was never studied, and therefore the DPEIS cannot directly address this issue."

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection d., Changes in Downstream Thermal Regime:

The USGS recommends that the paragraph clarify that the site below the valley fill was at the toe of the valley fill.

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1, Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection d., Changes in Downstream Thermal Regime, first paragraph:

The second to last sentence of this paragraph states "It is difficult to predict the possible impacts of this moderated thermal regime on the downstream aquatic communities." There is a body of literature describing the effects of thermal regimes upon invertebrate communities. Many physiological processes are temperature dependent and many key life cycle events are cued by temperature. Alteration of the thermal regimes may result in a reduction of fitness at an organismal level or alter the synchronization of invertebrate life cycles with other seasonal events. A good review of the thermal ecology of aquatic invertebrates can be found in Ward and Stanford (1982). It is interesting to note that on page III.D-14, a study by Arch Coal indicated that a moderated thermal regime may result in the early emergence of certain stonefly taxa. The USGS recommends that the paragraph be rewritten to incorporate some of the conclusions of these studies. 6-6-4

Overall, there is a lack of synthesis across topical areas. Not one of these factors has an effect entirely separate from the others. In particular, chemistry and hydrology are intimately linked, especially in their effect upon downstream reaches. Increased flow during low-flow periods can help sustain populations, but if the elevated flow is also elevated in contaminants, there is a simultaneous decrease in one stressor (low-flow) and increase in another (exposure to contaminant). The USGS recommends that the document include discussion of these interactions across all the listed factors.

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection e. Changes in Downstream Flow Regime:

The USGS suggests that two reports on the Ballard Fork gages (Messinger, 2003; Messinger and Paybins, 2003), which were produced by USGS West Virginia District as part of the EIS process, be discussed in this section. Both reports contain noteworthy information on total flows, stormflow characteristics, and seasonal evapotranspiration losses.

Page III. D-7, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection f, Changes in Downstream Chemistry; Subsection f.2, Summary and Conclusions, first paragraph, second sentence:

Sulfate, total dissolved solids, hardness, specific conductance, and manganese are not cations. The USGS recommends that the word "cations" be replaced with "constituents and properties" or otherwise be rewritten.

Page III. D-9, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection h, Effects to Downstream Biota, Subsection h1, Summary of Results from Upstream-Downstream Comparison-Type Studies, second paragraph:

The USGS recommends the word "metrices" be changed to "metrics." 6-6-4

Page III. D-11, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection h4., Studies of Macroinvertebrate Communities in Stream Sites Located Downstream from Mined or Mined/Valley Filled Areas in Comparison to Reference Locations, first paragraph:

The introductory paragraph refers to a single study; however, the second sentence refers to "...these studies...." The USGS recommends that the document clarify that only one study is used.

Page III. D-15, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection i., Impacts of MTM/VF on Fish Assemblages, second paragraph:

The USGS National Water Quality Assessment fish community study (USGS 2001b) should not be characterized as extensive, because fish were only collected at a dozen sites in the coalfields and 20 sites overall.

Page III. D-18, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection d., Limiting Factors for In-Kind Mitigation Projects:

The USGS recommends that the discussions of stream creation include additional information on watershed hydrology, such as the Variable Source Area Concept (Hewlett and Hibbert, 1967), that is, that water seeps downhill through soil until it reaches a confining layer, that streams form in saturated soil areas on the land surface, and that the area of saturated soil that contributes to streamflow is variable through time. In light of the principles of watershed hydrology, stream creation is very difficult and may not be practical, at least if only natural channel design is to be applied to ditch construction.

Page III. D-19 (third paragraph) and III. D-20 (third paragraph), Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.1., Onsite:

Are the habitat quality indicators actually scored from 0 to 1? Or is this a typographical error? Please verify. 6-6-4

For nutrient cycling, it is well known that aquatic insects play a role in all aquatic ecosystems because all living organisms cycle nutrients. A more reasonable question that should be addressed in this section is whether nutrient cycling in such nutrient-poor systems are important to areas larger than the created wetlands.

Page III. D-21, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.1, Onsite, top of page, lines 7-9:

The statement "However, it is not known whether the organic matter processing that occurs in created wetlands would mimic the processing found in a natural stream system." does not consider much information that is known about the nature of wetlands compared to the nature of streams. Wetlands, by their nature, trap and conserve organic matter, and function as organic matter sinks; whatever organic material wetlands retain, the material tends to be dissolved, rather than undissolved. Streams, by virtue of flowing, tend to transport organic matter (and whatever else they contain) downstream. Thus, it is unlikely that organic matter processing in created wetlands would provide processing similar to that provided by small streams. The USGS recommends that the statement be modified to emphasize these differing roles of streams and wetlands.

A major question in the context of mitigation is not whether constructed ponds and wetlands have functions with inherent value, but whether they have functions that provide value equal to that of the streams they replace. One of the ways this can be assessed would be by quantifying their relative effects on downstream aquatic systems through a designed Before-After, Control-Impact study. The USGS recommends that the document describe how it will be determined that the functions of the created ponds and wetlands will be equal to those of the surface water features they replace.

Page III. D-21, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.2., Offsite, second paragraph, sixth sentence: 6-6-4

The USGS recommends that the document explain what a high water mark is and how it is determined.

Page III. E-3, Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2, Coal Mine Drainage, second paragraph:

For clarity, USGS recommends that the term circumneutral be replaced with a more conventional way of saying that values were close to pH of 7.

Page III. E-3, Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2, Coal Mine Drainage, Subsection a., Indicator Parameters:

The USGS recommends that the discussion of alkalinity in mine drainage place greater emphasis on the importance of reclamation and mine-drainage treatment as a significant source of increased alkalinity. Water-quality amendments used to elevate pH and precipitate Fe and Mn in mine drainage before discharging to receiving waters also increase both alkalinity and specific conductance; this should be stated in the discussion.

5-5-4

Page III. E-6 Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2., Coal Mine Drainage, Subsection 2b., Effects of Coal Mine Drainage:

This section states that coal-mine drainage contains metals and trace elements that precipitate to the sediments of receiving streams, which consequently elevates their corresponding concentrations in the sediments. The USGS recommends that the section also stress the role of flocculants and precipitates in cementing substrates and contributing to streambed armoring.

9

Page III. H-2, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 2., Pre-mining Appalachian Groundwater Flow System; first paragraph:

Variation in permeability in consolidated bedrock is more strongly related to occurrence and density of fractures or secondary permeability as opposed to lithology differences. Consolidation of the overburden does not relate to hydraulic conductivity at depth. Hydraulic conductivity decreases with depth due to increasing confining pressures limiting fracture apertures. The USGS recommends the paragraph, and in particular the third-to-last sentence, be corrected to more clearly emphasize the importance of fractures in determining permeability.

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection a., Conceptual Model of MTM / VF, second paragraph, last sentence:

MTM does not simply eliminate the pre-mining perched aquifer. It creates an aquifer of fill at the active mine site, effectively creating a man-made perched aquifer system resting atop the valley bedrock. Additional complexity is added when fracturing of bedrock adjacent to the mine is considered. The USGS recommends the paragraph be corrected to reflect the creation of the fill aquifer at the mine site. 5-4-4

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection a., Conceptual Model of MTM / VF, third paragraph:

Valley fills do not join two aquifer systems, rather it is the creation of a new aquifer consisting of unconsolidated fill atop fractured bedrock. Flow to the premining fractured bedrock system is greatly disrupted. The USGS recommends that the paragraph emphasize that flow in the fractured bedrock after fill placement is not the same as during premining conditions.

The USGS recommends that the paragraph also mention that groundwater flow velocities in the fill are highly variable and localized and in some cases channelized; residence times of water in the fill materials also vary spatially.

10

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b., MTM/VF Impacts to the Physical Ground Water System, first paragraph:

Hydraulic gradients are not derived from hydraulic conductivity or storativity. Rather, they are derived from head relationships established by aquifer boundary conditions. The USGS recommends the definition of hydraulic gradient in the fourth sentence of this paragraph be corrected.

Page III. H-4, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b. MTM/VF Impacts to the Physical Ground Water System, first and second full paragraphs:

Runoff decreases in the VF site have to be weighed against the increased runoff from the active mining site. Without vegetative or soil cover, little water will infiltrate the area. The USGS recommends that the document state that total runoff from the site may be decreased, but runoff from the entire system inclusive of diversions is greater. 5-4-4

Discharge volumes cannot be applied aerially to calculate infiltration rates. The highly channelized nature of the fill and varying fill materials does not lead to spatially even distribution of infiltration. Calculating percentage of outflow attributed to precipitation assumes no interaction with fractured bedrock and accounts for no diversion of runoff. The USGS recommends that this misleading calculation be qualified or deleted.

Page III. H-5, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b. MTM/VF Impacts to the Physical Ground Water System, first full paragraph:

Storage volumes are better represented using a range of effective porosities to account for the various lithologies. Increases in storage does not increase flow velocities. Higher velocities do not decrease hydraulic head, rather hydraulic gradients. The USGS recommends that the section be revised to reflect the above comments.

Page III. H-5, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity; Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection c., Impacts to Valley-Bottom Groundwater Recharge from MTM/VF, first paragraph:

No justification is provided for the assertion in the second sentence of this paragraph that MTM/VF impacts on valley bedrock aquifers would be limited. The justification requires proof that VF aquifers do not interact with the underlying fractured bedrock. The USGS recommends that citations justifying the conceptual models be provided, or the paragraph be rewritten to emphasize the uncertainty of the models and the possibility for interaction between the VF aquifers and the underlying bedrock. 5-4-4

Page III. H-7, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 4, Impacts to Groundwater Chemistry from MTM/VF; Subsection a., Geochemical Reactions, first full sentence: 5-5-4

The USGS recommends the sentence be reworded to emphasize that mineral concentrations in outflowing waters from fills may decrease over time but may remain at unacceptable levels.

Page III. K-38 through III. K-46, Chapter III Affected Environment and Consequences of MTM/VF; Section K., Excess Spoil Disposal, Subsection 4., Trends in Watershed Size:

Most of the comparative discussions on the data provided in this entire section are brief and cursory. The reader is left to discern differences in trends and interpretations that could give more meaning to the data. The significance of the information in the tables and figures should be provided in text. What does the information mean, and why is it important? 13-3-4

The document states that trend analysis is very useful for evaluating and predicting impacts on the environment; however, no information is provided on how the trend analysis is useful or what the impacts are specifically. The USGS recommends that this additional information be provided in this section.

Page III. K-47, Chapter III Affected Environment and Consequences of MTM/VF; Section K., Excess Spoil Disposal, Subsection 5., Trends on Stream Impact Under Fill Footprints: 5-7-4

1. The analyses in subsection 5 seem to be based on the use of data that differs from data based on impacted watershed areas upstream of a fill toe to assess the total length of direct stream. Perhaps, this should be stated explicitly in the text.

2. The reason for the choice of 30-acre watersheds used in the delineation of the synthetic stream network is not explicitly stated within section III-K, other than that the synthetic network is less subjective than the topographic map stream delineation. A discussion somewhere in this section about the accuracy of the underlying data seems necessary, given that the National Elevation Dataset data includes digital elevation models of multiple resolution and vintage.
3. The term "stream loss" was used to describe the synthetic streams that are buried by fills, but no mention is made as to whether the streams were assumed to be intermittent or perennial. This information should be provided in text. 5-7-4
4. No comment in this brief section alludes to trends as compared to watershed area impacted by fills; for example, although WV had only 1.73 miles of synthetic streams buried in 2001 (table III. K-8), the average watershed area impacted by a valley fill was 3 times greater (97.28 acres) than that for the 30-acre watershed. Does this suggest that 30-acre watersheds may be too dense a network? Are watershed areas under a fill actually intermittent or ephemeral? Should medians for watershed area be used in trend analysis, so as to improve information about central tendency of data?
5. It is not clear if the valley fill footprint data used in this analysis is the total number of fills approved or the number of fills constructed. This would seem a crucial point, as up to half of the permitted fills may not be constructed, according to information provided in section III. K-2.

Page IV. B-3, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B, Aquatic Resources, Subsection 1., Consequences Common to No Action Alternative and Alternatives 1, 2, and 3; Subsection a., Direct Stream Loss from MTM/VF, second paragraph:

The contribution of fine and coarse organic matter represents one of the most important effects of large surface mines, and should be measured or estimated, if possible. 6-6-4
Although widely-accepted, standardized testing procedures for quantities of fine and coarse organic matter in streams may not exist in a regulatory context, regulatory methods didn't exist for some of the other impacts studied in the DPEIS process. Several classic studies (Fisher and Likens, 1973, for instance) would serve as excellent models for a defensible study for measuring this contribution of headwater streams in the study area.

Page IV. B-3, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B, Aquatic Resources, Subsection 1., Consequences Common to No Action Alternative and Alternatives 1, 2, and 3; Subsection a., Direct Stream Loss from MTM/VF, fifth paragraph: 6-6-4

The statement "It is also not evident to what degree reclamation and mitigation (e.g. drainage control and revegetation) offset this organic nutrient reduction." requires further explanation; is there some component of drainage control that is thought to directly offset this loss? If so, it was not adequately discussed in this section of the DPEIS. Similarly, the statement "Existing CWA programs indirectly address these effects...." does not appear to be well supported because the programs mentioned address different effects that may or may not have ecological importance equal to that of organic-matter processing. Whether the ecological importance is equal can only be determined if organic-matter processing is measured in the study area. The USGS suggests that additional information, if available, be provided to bolster support for the noted statements. If information is not available, then this lack of information should be explicitly stated in text. 6-6-4

Page IV. B-5, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B. Aquatic Resources, Subsection 1, Consequences Common to No Action Alternative and Alternatives 1, 2, and 3, Subsection b., Indirect Stream Impacts, first full sentence at top of page:

The first full sentence may not accurately describe the intended meaning of the passage. Zinc, sodium, and sulfate concentrations would be expected to be positively correlated with fish and invertebrate impairments instead of negatively correlated. The USGS suggests that the intended meaning of the passage be verified.

Page IV. D-5, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section D, Fish and Wildlife, Subsection 1, Consequences Common to No Action Alternative and Alternatives 1, 2, and 3, Subsection d., Fish Populations:

This section is brief and not very informative regarding mining impacts on fish populations. The USGS suggests that additional information (topic material or concepts) be provided in the section. Coverage of the topic should be similar to that provided in section b. (page IV. D-2). 6-1-4

Appendix C Regional Setting Supporting Information:

Page C-45, Table C-17 General Groundwater Composition of Virginia Coalfields (Hufschmidt, 1981):

Table C-17 is incorrect. The table with the correct groundwater composition of Virginia information (from Hufschmidt, 1981) needs to be included here. 5-5-4

Page C-51, Table C-19 Comparative Groundwater Quality Data for Southwestern West Virginia (Ehlke, 1982):

Table C-19 is not cited in text discussion.

Thank you for the opportunity to review and comment on this DEIS.

REFERENCES:

Black, P.E., 1991, Watershed hydrology: Prentice Hall, Englewood Cliffs, N.J., 408 pp.

Ehlke, 1982, Hydrology of Area 9, Eastern Coal Province, West Virginia: U.S. Geological Survey Open-File Report 81-803.

Fisher, S. G. and Likens, G. E., 1973. Energy flow in Bear Brook, New Hampshire: an integrative approach to stream ecosystem metabolism: Ecol. Monogr. 43(2):421-439.

Hewlett, J.D., and Hibbert, A.R., 1967, Factors affecting the response of small watersheds to precipitation in humid areas, pp. 275-290 in Sopper, W.E., and Lull, H.W., eds., Forest hydrology: Pergamon, New York.

Hufschmidt, 1981, Hydrology of Area 16, Eastern Coal Province, Virginia and Tenessee: U.S. Geological Survey Open-File Report 81-204, p. 68.

Messinger, Terence, 2003, Comparison of storm response of streams in small, unmined and valley-filled watersheds, 1999-2001, Ballard Fork, West Virginia: U.S. Geological Survey Water-Resources Investigations Report 02-4303, 22 p.

Messinger, Terence, and Paybins, Katherine S., 2003, Relations between precipitation and daily and monthly mean flows in gaged, unmined and valley-filled watersheds, Ballard Fork, West Virginia, 1999-2001: U.S. Geological Survey Water-Resources Investigations Report 03-4113, 51 p.

Paybins, 2002, Flow origin, drainage area, and hydrologic characteristics for headwater streams in the mountaintop coal-mining region of southern West Virginia, 2000-01, USGS Water-Resources Investigations Report 02-4300.

U. S. Geological Survey coal database. http://energy.cr.usgs.gov

U.S. Geological Survey, 2003, Flow origin, drainage areas, and hydrologic characteristics for headwater streams in the mountaintop coal-mining region of southern West Virginia, 2000-2001: U.S. Geological Survey Water-Resources Investigations Report 03-4300.

Ward, J.V., and J. A Stanford, 1982, Thermal responses in the evolutionary ecology of aquatic insects: Annual Reviews in Entomology, v. 27 p 97-117.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control and Prevention (CDC)
Atlanta GA 30333

September 2, 2003

Mr. John Forren, US EPA (3EA30)
2650 Arch Street
Philadelphia, Pennsylvania 19103

REC'D SEP 0 8 2003

Dear Mr. Forren:

We have reviewed the Mountaintop Mining/Valley Fills in Appalachia Draft Programatic Environmental Impact prepared by the U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. fish and Wildlife Service, and the West Virginia Department of Environmental Protection. We are responding on behalf of the Department of Health and Human Services (DHHS), U.S. Public Health Service.

We believe the DEIS has identified the appropriate potential human health impacts that may result from these mining operations. If the mitigation measures described in this document are followed and enforced, there should be minimal impacts to human health. 10-5-3

Thank you for the opportunity to review and comment on this document. Please send us a copy of the Final EIS when it becomes available

Sincerely yours,

Paul Joe

Paul Joe, DO, MPH
Medical Officer
National Center for Environmental Health (F16)
Centers for Disease Control & Prevention

USGS
science for a changing world

Water Resources Division
Western Region
345 Middlefield Road, MS 435
Menlo Park, CA 94025

December 29, 2003

TO: John Forren, U.S. Environmental Protection Agency, Region 3, Philadelphia, Pennsylvania

FROM: Theresa Presser
U.S. Geological Survey, Water Resources Division, National Research Program, Menlo Park, California

SUBJECT: Technical Comments on the Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills in Appalachia concerning Selenium Sources, Monitoring, and Prediction of Ecosystem Effects

SUMMARY

The Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills (MTM/VF) in Appalachia is critically deficient because 1) supporting documentation failed to adequately quantify and analyze the effects of selenium on aquatic life: and 2) proposed alternatives failed to address the protection of aquatic life from potential adverse effects of selenium. Although extreme Se contamination causes death in adult organisms, the responses of greatest concern are impairment of reproductive success (e.g. failure of eggs to hatch) and teratogenesis (deformities in juveniles) in birds and fish. Streamlining the permitting process and monitoring the decline in water quality and ecological health in affected watersheds do nothing to reduce selenium concentrations or limit impacts. Proposed control measures to neutralize coal mine drainage (CMD) with alkaline addition may exacerbate the mobility of selenium and hence it's loading to the environment. All alternatives require mitigation of unavoidable impacts to waters of the United States. Proposed mitigation measures in the DPEIS, specifically sedimentation ponds and associated wetlands, likely would allow elevated selenium risk environments for birds and fish because of increased opportunities for Se biomagnification in food webs. 5-5-2

The DPEIS has left out 1) fundamental data on selenium concentrations in sediment, invertebrates, fish tissue, and bird eggs; and 2) information on dietary pathways and vulnerable predator species. These data are necessary to assess potential impacts from bioaccumulation of selenium in the areas of mountaintop mining and valley fills. However, based solely on selenium concentrations in streams and sedimentation ponds receiving discharges from valley fills, adverse ecological effects from selenium are likely to occur in the DPEIS study area. The median selenium concentration in streams at *filled* sites was approximately two-fold above the toxicity threshold for protection of aquatic life (5 μg Se/L) and concentrations at individual sites were as much as ten-fold above (Appendix D, Stream Chemistry Final Report, 4/8/02). Sediment control ponds at the base of *fills* contained some of the highest selenium concentrations (up to 42 μg Se/L).

GENERAL COMMENTS

Several components of documented field case studies may be applicable to selenium mobilization in Appalachia. In contrast to many other contaminants, sources of selenium and significant environmental damage due to selenium have been well documented (Lemly, 1985; Presser, et al., 1994; Lemly, 1997; Hamilton, 1998; Skorupa, 1998; Presser and Piper, 1998; Lemly, 2002; Seiler et 5-5-5

USGS
science for a changing world

Water Resources Division
Western Region
345 Middlefield Road, MS 435
Menlo Park, CA 94025

December 29, 2003

TO: John Forren, U.S. Environmental Protection Agency, Region 3, Philadelphia, Pennsylvania
FROM: Theresa Presser
U.S. Geological Survey, Water Resources Division, National Research Program, Menlo Park, California
SUBJECT: Technical Comments on the Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills in Appalachia concerning Selenium Sources, Monitoring, and Prediction of Ecosystem Effects

SUMMARY

The Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills (MTM/VF) in Appalachia is critically deficient because 1) supporting documentation failed to adequately quantify and analyze the effects of selenium on aquatic life; and 2) proposed alternatives failed to address the protection of aquatic life from potential adverse effects of selenium. Although extreme Se contamination causes death in adult organisms, the responses of greatest concern are impairment of reproductive success (e.g. failure of eggs to hatch) and teratogenesis (deformities in juveniles) in birds and fish. Streamlining the permitting process and monitoring the decline in water quality and ecological health in affected watersheds do nothing to 5-5-5
reduce selenium concentrations or limit impacts. Proposed control measures to neutralize coal mine drainage (CMD) with alkaline addition may exacerbate the mobility of selenium and hence it's loading to the environment. All alternatives require mitigation of unavoidable impacts to waters of the United States. Proposed mitigation measures in the DPEIS, specifically sedimentation ponds and associated wetlands, likely would allow elevated selenium risk environments for birds and fish because of increased opportunities for Se biomagnification in food webs.

The DPEIS has left out 1) fundamental data on selenium concentrations in sediment, invertebrates, fish tissue, and bird eggs; and 2) information on dietary pathways and vulnerable predator species. These data are necessary to assess potential impacts from bioaccumulation of selenium in the areas of mountaintop mining and valley fills. However, based solely on selenium concentrations in streams and sedimentation ponds receiving discharges from valley fills, adverse ecological effects from selenium are likely to occur in the DPEIS study area. The median selenium concentration in streams at *filled* sites was approximately two-fold above the toxicity threshold for protection of aquatic life (5 µg Se/L) and concentrations at individual sites were as much as ten-fold above (Appendix D, Stream Chemistry Final Report, 4/8/02). Sediment control ponds at the base of *fills* contained some of the highest selenium concentrations (up to 42 µg Se/L).

GENERAL COMMENTS

Several components of documented field case studies may be applicable to selenium mobilization in Appalachia. In contrast to many other contaminants, sources of selenium and significant environmental damage due to selenium have been well documented (Lemly, 1985; Presser, et al., 1994; Lemly, 1997; Hamilton, 1998; Skorupa, 1998; Presser and Piper, 1998; Lemly, 2002; Seiler et

DPEIS leaves in doubt whether mining and mitigation can proceed while controlling environmental selenium concentrations within protective ranges.

The DPEIS cumulative effects analysis also may need to consider the combined effect of other environmental stressors imposed by a general decrease in water quality and ecological health in watersheds impacted by mining when evaluating selenium risk (DPEIS Appendix I). Environmental selenium data and ecological risk thresholds may be applicable as part of the proposed action to build a database (Action 12, DPEIS II C-69) to determine if a scientific basis for a cumulative-impact-threshold can be identified in the future.

A recommended selenium monitoring program would include a mass balance or budget through affected watersheds (i.e., inputs; fluxes and storage within environmental media; and outputs); food web analysis; life cycle analysis of vulnerable predators; and identification of elevated risk areas and seasons (Presser and Piper, 1998; Luoma and Presser, 2000). Studies of the documented, (DPEIS IIIC-17) well-developed, and predictable food web of pond systems and impoundments may be particularly important. Those species feeding on benthic and emergent aquatic invertebrates such as salamanders, Acadian Flycatcher, and Louisiana Waterthrush may warrant specific monitoring. Cattail wetlands suggested as mitigation to increase productivity, water quality, and biodiversity may require increased control measures and monitoring (DPEIS I-14).

Results of a comprehensive monitoring approach could be used to forecast ecological effects of selenium under an array of scenarios that could result from different resolutions of waste management issues. Effects-analysis to calculate risk would take into account not only reproduction, but also reduced growth and immuno-suppression. Source rock and waste analysis may show that some mining areas contain less selenium and that some mitigation measures have less risk in terms of mobility of selenium in food webs. Climatic and hydrologic effects and the progression of acid mine drainage may be attenuating variables.

Given below are specific technical comments and further recommendations for monitoring that may help provide a basis for understanding the biotransfer of selenium in the ecologically rich and diverse watersheds of Appalachia. Attachment 1 is a summary of background information for the DPEIS.

SPECFIC COMMENTS AND DOCUMENTATION

Water Quality, Valley Fills, and Sedimentation Ponds

The DPEIS documents that *selenium concentrations from the filled category sites were found to exceed AWQC for selenium at most (13 of 15) sites in this category*; and *the existence of selenium concentrations in excess of AWQC at most filled sites indicates a potential for impacts to the aquatic environment and possibly to higher order organisms that feed on aquatic organisms* (DPEIS Page III D-6, 7, and 10). Data mainly are given in Appendix D: 5-5-4

Appendix D, Stream Chemistry Final Report, 4/8/02
AWQC (Water Quality Criterion), 5 µg Se/L
Five watersheds in the Primary Region of Mountaintop/Valley Fill Coal Mining
Sampling period, August 2000 through February 2001
Filled category (15 sites), 66 violations at 13 sites
Range 1.5 to 49 µg Se/L
Median at un-mined sites, 1.5 µg Se/L
Median at filled sites, 11.7 µg Se/L
Appendix D, Fisheries Study, 10/02

3

Water chemistry analysis detected selenium in five of the eight sites in the Mud River watershed associated with valley fills (page 18).
Range 9.5 to 31.5 μg Se/L

The DPEIS (page I-9) documents for the study areas that:

1) During 1985 to 1998 a) an average of 365 *fills*/year were constructed; and b) 5,168 acres of *fill* in 15,733 acres of watershed were approved.
2) During 1999 to 2001 a) an average of 217 *fills*/year were constructed; and b) 3,016 acres of *fill* in 26,570 acres of watershed were approved.

No other category of streams (i.e., streams in *un-mined areas* or streams in *mined areas without valley fills*) had violations of the selenium limit. 5-5-4

Sedimentation ponds for drainage from fills also were sampled as part of the *Stream Chemistry Final Report* (Figure Se-1, 24 to 42 μg Se/L), but were not illustrated as a separate category. Drainage from all valley fill areas is required to past through a sedimentation pond, and additional ponds may be on a mine site where needed to control sediment and runoff from other disturbances (DPEIS III J-7). If treatment is necessary, the sedimentation ponds are normally used as treatment basins and may be constructed in a series. Mitigation wetlands also may be constructed at the toe of *filled* areas.

Ecological Effects of Selenium

Little information and data also are given to help assess or predict selenium's current exposure and effects in the DPEIS study area or as a result of future mining activities. For example, selenium concentrations in *fill* material, sediment, invertebrates, fish tissue, bird eggs, or plants are not available.

Bioaccumulation and uptake via food is the most important route of transfer to upper trophic level species. Upper trophic level predators are more at risk than their prey, making it difficult to use traditional methods to predict risk from environmental concentrations alone. Skorupa (1998) described field case studies showing different degrees of selenium effects in a variety of wetlands and reservoirs with identified sources of selenium. An especially well documented case study exists for Belews Lake, North Carolina where selenium contamination resulted in local extinctions of most fish populations in a cooling water reservoir used to dispose of coal fly-ash (Lemly, 1985; 1997). The most well known case of selenium poisoning in a field environment is at Kesterson National Wildlife Refuge in the San Joaquin Valley, California (Presser and Ohlendorf, 1987). There, teratogenesis was widespread in populations of water birds and reproductive failure occurred in populations of fish because of agricultural drainage practices. 9-2-5 A more recent case of acute selenium poisoning of livestock in Idaho has resulted in the death of more than 300 sheep who fed on forage grown on reclaimed waste dumps (Piper et al., 2000). Comprehensive reviews of the effects of Se in birds and fish are given in Skorupa and Ohlendorf, 1991; Heinz, 1996; USDOI, 1998; Skorupa, 1998; Lemly, 2002; Hamilton and Hoffman, 2003; Ohlendorf, 2003.

As noted previously, based on established guidelines and the current understanding of selenium biogeochemistry, ecological effects from selenium in areas of valley fills are likely to occur. Sedimentation ponds may be of greatest concern. Selenium-contaminated impoundments appear to present greater risks to wildlife than selenium contaminated streams and rivers (Skorupa, 1998). Protective guidelines also are calculated that establish concern for the environment at 2 μg Se/L for freshwater (USFWS and NMFS, 2000). A 2-μg Se/L criterion is in place at evaporation ponds and wetland channel in the San Joaquin Valley, California. Additionally, USEPA is redefining selenium criteria for the protection of wildlife and aquatic life to take into account exposure from food webs (USEPA, 1998).

Human Health Advisories for Selenium

A national drinking water standard of 50 μg Se/L also has been developed based on concentration of selenium. Guidelines for public health warnings based on selenium in the diet have been developed in areas of the western United States (USDOI, 1998). Advisories were issued in California when selenium concentrations in fish muscle reached or exceeded 2 μg Se/g, wet weight (6-12 μg Se/g dry weight, assuming 65-85% moisture). Consumption was not to exceed 112 grams of flesh per one- or two-week period or 20 grams of fish or bird muscle per day in addition to the regular daily intake. 10-5-5 Children (less than age 15) and pregnant women were advised not to consume any fish or game from the posted areas. When edible tissues exceeded 5 μg Se/g on a wet weight basis, a complete ban on human consumption of fish was recommended. In the San Joaquin Valley of California, the postings are provided in several languages because a subsistence lifestyle provides the greatest risk.

Vegetation as Diet

In general, substantive risk to aquatic life occurs at selenium concentrations in diet > 7 μg Se/g, dry weight (USDOI, 1998; Presser et al., 2004). Marginal risk to aquatic life from diet occurs at 3 μg Se/g. Various federal and state agencies recommend less than 5 μg Se/g in terrestrial forage as an action 6-1-5 level of regional grazing level (U.S. Forest Service and the Idaho State Veterinarian Office). The chronic toxicity range for horses and sheep starts at 5 μg Se/g in forage (Puls, 1988).

Sources of Selenium

Coal is a recognized source of selenium both through selenium enriched particulates from the burning of fossil fuel and fly-ash disposal in aquatic environments (Lemly, 1985; 1997; 2002). Available data on a whole-coal basis for trace elements in coal samples from West Virginia show an average selenium concentration of 4.2 μg Se/g, with a range of 2.8 to 21.3 μg Se/g (DPEIS Appendix D, *Stream Chemistry Final Report, 4/8/02;* West Virginia Geological and Economic Survey, www.wvgs.wvnet.edu). The *Stream Chemistry Report* also states that *disturbing coal and soils during mining could be expected to result in violations of the stream limit for selenium* (page 74).

This range of selenium concentrations in West Virginia coals is comparable to that in source rocks of the Coast Ranges of California, but is lower than the range occurring in phosphorites of southeast Idaho. Processing activities in these problem areas call attention to anthropogenic connections to the environment (irrigation drainage, oil refining effluents, waste shale production), in addition to surface processes (weathering, erosion, and runoff) and hydrologic factors (aridity, drainage progression), that can ultimately mediate contamination.

Shales associated with coals that are displaced at the time of mining and consequently concentrated 5-5-5 at *fill* sites may be a source of selenium to areas downstream of valley fill construction. In general, selenium sources to the environment are linked to organic-enriched sedimentary rocks—black shales, petroleum source rocks, phosphorites (Presser et al., 2004). Their global distribution is dependent on the fundamental role of essential elements such as selenium in determining primary productivity in ancient depositional environments. Coals are included as a subset of petroleum source rocks (Klemme and Ulmishek, 1991). As illustrated by the case of phosphorites in Idaho, waste shale in comparison to ore, is more enriched in selenium (80 μg Se/g v. 50 μg Se/g) (Presser et al., 2004).

Examples from the San Joaquin Valley, California and waste-rock sites at phosphate mines, Idaho highlight a present-day mechanism of selenium mobility in the environment that involves exposure of organic carbon-rich rock to the oxic conditions of the atmosphere and surface and ground water. Selenium is oxidized from relatively insoluble selenide (Se^{2-}) and elemental Se^0 to soluble oxyanions, selenite (SeO_3^{2-}) and selenate (SeO_4^{2-}) under alkaline conditions (Presser, 1994; Piper et al., 2000). Organic selenium (operationally defined as organic selenide) also can exist in the dissolved phase.

Oxidizing, Alkaline Environments

Acid mine drainage is traditionally of concern in mining areas, as it is in the DPEIS study area. However, methods of controlling coal mine drainage (CMD) with alkaline addition (page III E-9) may exacerbate the mobility of selenium and hence its loading to the environment. Selenium contamination problems have been associated with oxidizing, alkaline environments since the 1940's when studies focused on the potential toxicity of seleniferous open-range plants in arid and semi-arid western states (National Research Council, 1989; Presser et al., 1994). As a result, grazing was terminated on large areas of western rangeland. In the 1980s, the sources and mechanism of contamination in the San Joaquin Valley, California served as a prototype to develop criteria for selecting study sites for the National Irrigation Water Quality Program (Presser et al., 1994; Seiler et al., 2003). Among the six criteria contributing to selenium contamination was an oxidized, alkaline environment that promotes the formation of selenate, the mobile form of selenium. 5-5-2

MONITORING RECOMMENDATIONS

1) Expand Current Selenium Monitoring

2) Forecast Selenium Effects Under an Array of Management Scenarios

Determination of a Se mass balance or budget for the DPEIS watersheds and Se cycling through the components of the watershed's ecosystems are crucial because of Se bioaccumulation. A comprehensive linked approach would include all considerations that cause systems to respond differently to Se contamination. Comparison to multi-media guidelines could be made to assess exposure and risk. Results of a comprehensive monitoring approach then could be used to forecast ecological effects of selenium under an array of scenarios that could result from different resolutions of waste management issues.

The critical media to be monitored are water, particulate material, and prey and predator tissue. Because selenium is a reproductive toxin, selenium concentrations in fish and bird eggs also provide assessments for risk management that incorporate and concentrate many confounding site variabilities. Knowledge of potentially optimal indicators (e.g., benthic invertebrates) in pond systems would be necessary to fully explore feeding relations and document predator exposure. Variables to be addressed in a linked food web approach to include: 1) hydrologic units; 2) vulnerable predators; 3) elevated risk periods; 4) suspended particulate material patterns; 5) contaminant concentrations and speciation in sources that most influence bioavailability; 6) seasonality of invertebrate food webs; 7) food assimilation capacities and reactivities; 8) life cycles of predator species that inhabit each hydrologic unit; and 9) nesting habitats. 5-5-39

3) Ensure Selenium Methodology with a 0.4 µg Se/L Detection Limit

The detection limit for the methodology used in the DPEIS stream study was noted as 3 µg Se/L (Appendix D, Stream Chemistry Final Report, 4/8/02, Table 2), but was further noted that the *estimated detection limit for Se in water using Method 200.8, Inductively Coupled Plasma-Mass Spectrometer, was around 5 µg Se/L (USEPA Methods Manual, 1983)*. This methodology and detection limit (3-5 µg Se/L) may not be sufficient in view of a USEPA criterion of 5 µg Se/L and ecological effects being of concern at levels of 2 µg Se/L. Guidance provided by USEPA requires a detection limit of 0.6 µg Se/L) (*Interim Chemical/Biological Monitoring Protocol for Coal Mining Permit Application*, 11/19/00).

4) Continue Study of Selenium in Streams

Quality controls issues were resolved concerning analysis of selenium in streams. However, results from *Lab 1* were discarded mainly because of elevated levels in *Blanks*. Duplicating this study with improved methodology and detection limit for selenium may prove informative. 5-5-3

Thank you for the opportunity to provide technical comments on several aspects of selenium chemistry and exposure in the environment as they relate to the DPEIS. If you have questions or need copies of referenced documents, please do not hesitate to call (650-329-4512, tpresser@usgs.gov).

Attachments: (1)

cc: Marc A. Sylvester, USGS, WRD, Menlo Park, CA
Keith G. Kirk, USGS, WRD, Menlo Park, CA

12/29/03 Transmitted via 1) email to forren.john@epa.gov and 2) FedEx to John Forren, U.S. Environmental Protection Agency (3EA30), 1650 Arch Street, Philadelphia, PA 19103

REFERENCES

Hamilton, S.J., 1998, Selenium effects on endangered fish in the Colorado River basin, *in* Frankenberger, W.T., Jr., and Engberg, R.A., eds., Environmental Chemistry of Selenium: New York, Marcel Dekker Inc., p. 297-313.

Hamilton, S.J. and Hoffman, D.J, 2003, Trace Element and Nutrition Interactions in Fish and Wildlife, *in* D.J. Hoffman, B.A. Rattner, G.A. Burton Jr., and J Cairns Jr., eds., Handbook of Ecotoxicology, Lewis Publishers, Washington D.C. p. 1197-1235.

Heinz, G.H., 1996, Selenium in Birds, *in* W.N. Beyer, G.H. Heinz, and A.W. Redmond-Norwood eds., Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations, CRC Press, p. 447-458.

Klemme, H.D. and Ulmishek, G.F., 1991. Effective petroleum source rocks of the world: stratigraphic distribution and controlling depositional factors: American Association of Petroleum Geologists Bulletin, v. 75, p. 1809-1851.

Lemly, A.D., 1985, Toxicology of selenium in a freshwater reservoir: Implications for environmental hazard evaluation and safety: Ecotoxicology and Environmental Safety, v.10, p. 314-338.

Lemly, A.D., 1997, Ecosystem recovery following selenium contamination in a freshwater reservoir: Ecotoxicology and Environmental Safety, v. 36, p. 275-281.

Lemly, A.D., 2002, Selenium Assessment in Aquatic Ecosystems: a Guide for Hazard Evaluation and Water Quality Criteria: Springer, New York, 161 p.

Luoma, S.N. and Presser, T.S., 2000, Forecasting selenium discharges to the San Francisco Bay-Delta Estuary: ecological effects of a proposed San Luis Drain extension, U.S. Geological Survey Open-File Report 00-416, 358 p (water.usgs.gov/pubs/ofr/ofr00-416).

National Research Council, 1989, Irrigation-induced water quality problems: What can be learned from the San Joaquin Valley experience: Washington, D.C., National Academy Press, 157 p.

Ohlendorf, H.M., 2003, Ecotoxicology of Selenium, *in* D.J. Hoffman, B.A. Rattner, G.A. Burton Jr., and J Cairns Jr., eds., Handbook of Ecotoxicology. Lewis Publishers, Washington D.C., p. 465-500.

Piper, D., Skorupa, J., Presser, T., Hardy, M., Hamilton, S., Huebner, M., and Gulbrandsen, R., 2000, The Phosphoria Formation at the Hot Springs Mine in southeast Idaho: a source of trace elements to ground water, surface water, and biota: U.S. Geological Survey Open-File Report 00-050, 73 p.

Presser, T.S. and Ohlendorf, H.M., 1987. Biogeochemical cycling of selenium in the San Joaquin Valley, California, USA: Environmental Management, v. 11, p. 805-821.

Presser, T.S., Sylvester, M.A., and Low, W.H., 1994, Bioaccumulation of selenium from natural geologic sources in the Western States and its potential consequences: Environmental Management, V. 18, No. 3, p. 423-436.

Presser, T.S. and Piper, D.Z., 1998, Mass balance approach to selenium cycling through the San Joaquin Valley, sources to river to bay, *in* W. Frankenberger and R.A.Engberg, eds., Environmental Chemistry of Selenium, Marcel Dekker Inc., New York., p. 153-182.

Presser, T.S. and Skorupa, J.P., 2003, Linking Selenium Sources to Ecosystems: Local and Global Perspectives, Abstracts of the Annual Meeting of American Association for the Advancement of Science, Seattle, Washington, February 13-16, 2004 (www.aaas.org/meetings/).

Presser, T.S., Piper, D.Z., Bird, K.J., Skorupa, J.P.,Hamilton, S.J., Detwiler, S.J. and Huebner, M.A., 2004, The Phosphoria Formation: a model for forecasting global selenium sources to the environment, *in* J. Hein, ed., Life Cycle of the Phosphoria Formation: From Deposition to the Post-Mining Environment, Elsevier, New York, 38 p. (January, 2004 publication)

Puls, R., 1988. Mineral levels in animal health: Diagnostic Data, (2nd edn.). Sherpa International, Clearbrook, British Colombia, Canada, 356 p.

Seiler, R.L., Skorupa, J.P., Naftz, D.L. and Nolan, B.T., 2003, Irrigation-induced contamination of water, sediment, and biota in the western United States—synthesis of data from the National Irrigation Water Quality Program: U. S. Geological Survey Professional Paper 1655, 123 p.

Skorupa, J.P. and Ohlendorf, H.M, 1991, Contaminants in drainage water and avian risk thresholds, in A. Dinar and D. Zilberman, eds., The Economics and Management of Water and Drainage in Agriculture, Kluwer Academic Publishers, Boston Massachusetts, p. 345-368.

Skorupa, J.P., 1998, Selenium Poisoning of Fish and Wildlife in Nature: Lessons from Twelve Real-World Examples *in* W. Frankenberger and R.A.Engberg, eds., Environmental Chemistry of Selenium, Marcel Dekker Inc., New York., p. 315-354.

(USDHHS) U.S. Department of Health and Human Services, 1996, Toxicological profile for selenium: Agency for Toxic Substances and Disease Registry, Public Health Service, US Department of Health and Human Services, Atlanta, Georgia, 185 p.

(USEPA) U.S. Environmental Protection Agency, 1998, Report on the peer consultation workshop on selenium aquatic toxicity and bioaccumulation: U.S. Environmental Protection Agency, Washington, D.C., 59 p.; Appendices A-F.

(USFWS and NMFS) U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1998 and amended 2000, Biological opinion on USEPA's proposed rule for the promulgation of water quality standard: establishment of numeric criteria for priority toxic pollutants for the state of California: U.S. Fish and Wildlife Service and National Marine Fisheries Service, 260 p.

(USDOI) U.S. Department of the Interior (U.S. Fish and Wildlife Service, Bureau of Reclamation, Geological Survey, Bureau of Indian Affairs), 1998, R.A. Engberg (ed), Guidelines for interpretation of the biological effects of selected constituents in biota, water, and sediment: National Irrigation Water Quality Program, U.S. Department of Interior, Bureau of Reclamation, Denver, Colorado, p. 139-184 (www.usbr.gov/niwqp/guidelines/index.htm).

ATTACHMENT 1, Summary of Background Information

Location and Coal Production

The study area of the DEIS is located within the Appalachian Coalfield Region of the Appalachian Plateau physiographic province and Bituminous Coal Basin (DEIS I-5). The study area encompasses approximately 12 million acres and extends over portions of West Virginia, Kentucky, Virginia, and Tennessee. Surface coal mining production (million short tons) in the study area for 1998 was: southern West Virginia's 48.6; eastern Kentucky's 49.6; Virginia, 8.5; and Tennessee, 1.6 (DEIS III N-3 & 4). Ninety-five percent of the surface mining in southern West Virginia would be classified as MTM/VF mining as covered under this DEIS (DEIS III N-1). Estimated remaining years of surface production in West Virginia is 49 and in Kentucky is 108.

Mountaintop Removal and Valley Fills

For large scale mountaintop mining to occur and excess spoils to be generated two factors must be coincident: 1) steep terrain and 2) sufficient coal reserves located close to the tops of mountains and ridges (DEIS III A-1). Removal of rock above and between coal seams results in waste material (spoils) being placed in disposal sites adjacent to mining. Typical locations for excess spoil disposal sites are valleys, known as heads-of-hollows or headwater stream reaches (DEIS I-1). The study area covers the region where valley fills have been constructed or will be constructed in the future as a result of coal mining activities.

Ecosystems

Hydrologic conditions and geologic processes in the DEIS study area are such that most of the major rivers and tributaries east of the Mississippi River originate in the mountains of the Appalachian regions (DEIS III A-1&2). Some headwater streams are intermittent or ephemeral. Impounded water and wetlands also provide aquatic habitat in the DEIS study area (DEIS III D-1).

Ecoregions in the study area are unique because they combine characteristically northern species with their southern counterparts, and thus boast enormous richness and diversity (DEIS, III A-1). Headwater stream populations have the greatest potential for natural selection processes that may result in development of new species/subspecies.

The southern Appalachians have one of the richest salamander fauna in the world (IIIC-21). Many species of birds, such as the Cerulean Warbler, Louisiana Waterthrush, and Acadia Flycatcher, depend on large areas of relatively unbroken forest (93% forest cover, DEIS II C-62) and headwater stream habitats (IIIC-22). The DEIS study area is unique and important in the evolution and speciation of North American freshwater fishes (IV D-5). Fifty-six species of fish are present in the DEIS watersheds, with small headwater streams harboring populations with unique genetic diversity.

Impacts

A decline in water quality is predicted in areas of surface mining because of the exposure of coal and overburden materials and increasing rates of oxidation of sulfur-bearing minerals such as pyrite (DEIS III D-6 & E-1). From historic data, streams classified as *filled* had lower numbers of total species and benthic species than un-mined streams. *Actions 5* and *6* (DEIS II C-43) address evaluating effects of mining operations on chemistry and biology and refining science-based protocols for assessing ecological function, making permit decisions, and establishing mitigation requirements.

Cumulative Impacts

Landscape-scale cumulative impact studies indicate that watersheds subjected to mining drop in rank, signaling a decrease in ecological health (DEIS Appendix I). However, several alternatives restricting cumulative impacts to waters of the United States (e.g., prohibiting fills in one out of every two first order streams) were dismissed because limiting the loss of headwater streams to conserve the

health of the watershed ecosystem has not been proven (DEIS II D-6). According to the DEIS, existing data do not show that an across-the-board cumulative-impact-threshold could replace case-specific evaluations of all MTM/VF and other disturbances within a defined Cumulative Impact Area/watershed.

The DEIS proposes an action to build a database to determine if a scientific basis for a cumulative-impact-threshold can be identified in the future (*Action 12*, DEIS II C-69). Further associated actions would involve developing an interagency, interdisciplinary approach for NEPA and Clean Water Act aquatic cumulative impact assessments, including definition of the cumulative impact area for each resource of significance.

Mitigation and Compensation

All alternatives require mitigation of unavoidable impacts to waters of the United States (DEIS IV B-8). Mitigation would compensate for functions lost by filling headwater streams. These practices include stream construction or enhancement, wetland construction, riparian habitat restoration or enhancement (DEIS IV B-8). Cattail wetlands, for example, have been suggested to increase productivity, water quality, and biodiversity (DEIS I-14). Off-site compensatory projects may be necessary because of limitations to functional replacements on reclaimed mine areas.

Mitigation areas often include *fill* sites and the drainages below *fill* sites (toes of fills). Valley fills act as reservoirs and provide a reliable stream of water downstream due to increased base flow in *filled* areas (DEIS I-14). The net effect is that stream segments that were once ephemeral and that supported only sporadic benthic life before mining, now flow perennially and support benthic life throughout the year. Topsoil substitution or replacement with re-vegetation is also a part of reclamation. The top ten feet of oxidized subsoil is loosely dumped to promote rooting and tree productivity (DEIS page III J-19).

Monitoring

The *Interim Chemical/Biological Monitoring Protocol for Coal Mining Permit Application* (11/19/00), a guidance document, requires analyzing selenium to a detection limit of 0.6 µg Se/L as part of chemistry monitoring during the assessment of baseline conditions. Biological monitoring emphasizes quantitative surveys of organisms and physical habitat characterization.

State or Commonwealth Agencies

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

PHIL BREDESEN
GOVERNOR

BETSY CHILD
COMMISSIONER

December 1, 2003

Mr. John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Programmatic Draft Environmental Impact Statement concerning Mountaintop Mining / Valley Fills in Appalachia

Dear Mr. Forren:

Please find enclosed the detailed comments from our technical staff to the Mountaintop Mining Programmatic DEIS. Please consider these comments as the official and complete response on behalf of the State of Tennessee.

I am writing to emphasize one point. All of the alternatives you are evaluating represent different ways of managing the interface between the federal Clean Water Act and the Surface Mining Control and Reclamation Act. In Tennessee since we do not have a state mining program, we respond to such issues guided by our state Water Quality Control Act and the federal NPDES program. From this standpoint, it has been and will continue to be the position of the Department that we do not allow disposal of spoil or fill material from coal mining in streams as defined by our state regulations. This policy will remain unaltered whether you choose the preferred alternative or go with one of the others being evaluated. Thank you for this opportunity to comment. 5-7-1

Sincerely,

Betsy L. Child EMS
Betsy L. Child

BLC: AML

Enclosures

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Pollution Control, Mining Section
Suite 220, State Plaza
2700 Middlebrook Pike
Knoxville, Tennessee 37921
Telephone: (865) 594-6035

November 24, 2003

Mr. John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Programmatic Draft Environmental Impact Statement concerning Mountaintop Mining / Valley Fills in Appalachia

Dear Mr. Forren:

The U.S. Office of Surface Mining issues and inspects Surface Mining Control and Reclamation Act permits for coal mining in Tennessee, our Division of Water Pollution Control – Mining Section is responsible for NPDES permits for discharge of treated waste water and inspection of those permitted facilities for coal and non-coal mining in Tennessee. Since coal mining is considered a primary industry by the U. S. Environmental Protection Agency, their approval as well as OSM's Mining Permit issuance is necessary prior to issuance of NPDES permits to coal facilities.

The only coal mine excess spoil fills currently authorized for the discharge of waste water in Tennessee involve the placement of fill material in locations outside waters of the state. Only when the clearly planned objective has been restoration of damaged streams have we authorized the use of waters for fill or sediment control. The fills outside waters of the state of Tennessee have most often been referred to as "head-of-hollow" fills. Fills within waters of the state of Tennessee are not currently allowed and will not be allowed in the future. 12-1-1

In Chapter 2, Alternatives, II. C. DETAILED ANALYSES OF THE ACTIONS TO ADDRESS ISSUES, the EIS makes reference to in lieu fee arrangements for stream mitigation activities. Such an arrangement has been discussed as a tool for mitigation of loss of waters of the state/U.S. as a result of federally funded highway projects. There is not an in lieu fee agreement which can be applied to mining projects in Tennessee. 5-7-3

The EIS also alludes to finalization of regulations and coordination between agencies to clarify buffer zone requirements. That clarification is sorely needed and only coordination between the various agencies will accomplish it. 12-1-2

1

Sincerely,

Paul Schmeierbach by AML

Paul Schmeierbach
Water Pollution Control, Knoxville Office

● Page 2

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Natural Heritage
14th Floor L&C Tower
401 Church Street
Nashville, Tennessee 37243-0447
Phone 615/532-0431 Fax 615/532-0231

AUG 15 PM 9:01

August 4, 2003

Mr. John Forren
U. S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

The Division of Natural Heritage, Tennessee Department of Environment and Conservation, appreciates the opportunity to review and provide comment on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement (DEIS). The DEIS identifies a number of proposed actions to improve agency programs at the state and federal levels, which aim to enhance environmental protection and agency coordination during permit reviews under SMCRA and CWA consistent with the primary goal of minimizing adverse environmental impacts from mountaintop mining and excess spoil valley fills in Appalachia. The Tennessee Division of Natural Heritage (DNH) has reviewed the information submits the following comments for consideration.

With regard to the protection of rare, threatened, and endangered species, the DEIS described programmatic changes which would minimize adverse environmental impacts to federally listed species, however, gave inadequate mention to state-listed species. One report cited in the DEIS stated that, "surface coal mining and reclamation operations conducted in accordance with properly implemented state and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species" (IVD-5, 6). 8-3-4

This is not necessarily absolute. One federally threatened land snail in Tennessee is limited to fewer than 12 linear miles of the Cumberland Plateau escarpment in Franklin County. Were this or similarly restricted species subjected to MTM/VF, the continued existence of that species could be jeopardized under permitted mining activities.

Additionally, the cumulative effects of MTM/VF could negatively impact other species of concern, including state listed species. In fact, many of the state listed species from the DEIS impact area are less common in Tennessee than some of the federally listed species. Conservation of these rare species will in part depend on whether they are given sufficient consideration when planning for future MTM/VF locations. The DNH requests that the DEIS give consideration to all state- listed plants and animals, regardless if such species are likely to become federally listed. 8-2-2

Among the CWA/SMCRA program improvements envisioned that could help minimize incidental takes of state and federally listed species is the development of a comprehensive baseline data collection system (ES-4). The DNH supports any and all plans that would emphasize rare species inventory and monitoring. 8-3-3

Another programmatic change, which the DNH supports and is common throughout each of the proposed alternatives, is the development of state-of-the science BMP's for reclamation techniques, revegetation species, and success measurement techniques for accomplishing post-mining land uses involving trees (ES-8, IVC-7). Regarding revegetation species, the DNH advocates planting and restoring the affected area with native trees, shrubs, forbs and warm and cool season grasses, which are compatible with hardwood reforestation. Revegetation of the area with plants listed by the Tennessee Exotic Pest Plant Council as harmful exotic plants should be prohibited. In the past, autumn olive, bicolor lespedeza, sericea lespedeza, fescue and other plants listed by the TNEPPC as invasive have been used in mine reclamation throughout this area. This has resulted in extensive degradation of native plant communities and wildlife habitat throughout the region. 18-1-3

In addition to supporting programmatic changes that emphasize inventory, monitoring, and conservation of rare species, the DNH also supports programmatic changes that would enhance ESA, CWA and SMCRA compliance. However, emphasis on compliance was not stressed in the document. The DNH feels that this is a critical part of the solution to minimizing adverse environmental impacts resulting from MTM/VF and needs to be better addressed in the EIS. 8-3-4

Thank you for the opportunity to comment on this proposal and for considering Tennessee's rare species throughout the planning of this DEIS. Should you have any questions, please do not hesitate to contact me at (615) 532-0434.

Sincerely,

Reginald G. Reeves
Director

C: Alan Leiserson

DONALD S. DOTT, JR.
DIRECTOR

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
KENTUCKY STATE NATURE PRESERVES COMMISSION
801 SCHENKEL LANE
FRANKFORT, KENTUCKY 40601-1403
(502) 573-2886 VOICE
(502) 573-2355 FAX

November 26, 2003

Mr. John Forren, U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

This letter serves as comment by the Kentucky State Nature Preserves Commission concerning the Draft Environmental Impact Statement for the reduction of adverse environmental impacts of mountaintop mining operations and excess spoil valley areas in Appalachia.

The Commission has three major concerns with the environmental impacts resulting from this method of coal mining extraction. First is the loss and fragmentation of a significant area of relatively mature, upland forest communities. This impact has the most potential to directly impact several endangered and threatened species including Indiana bat (*Myotis sodalis* – 8-1-2
USFWS Endangered) and Cerulean warbler (*Dendroica cerulea* – USFWS Species of 8-2-2
Management Concern). Second is the loss of perennial "blue line" and ephemeral headwater stream segments through the use of the upper portions of ravines for placement of spoil material. 5-7-2
Third is the negative impact to water quality of streams downstream from these activities. The Commission believes that adoption of the Preferred Alternative (Alternative 2) will serve to reduce these impacts and we are in support of its implementation. 1-3

Thank you for the opportunity to comment on the Draft EIS at this time. Please feel free to contact me if any further comment is desired.

Cordially,

Donald S. Dott, Jr.
Director

EDUCATION PAYS

AN EQUAL OPPORTUNITY EMPLOYER M/F/D

REC'D JUN 30 2003

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

June 20, 2003

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, Pennsylvania 19103

RE: EPA, DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT, MINING/VALLEY FILLS IN APPALACHIA, UNINCORPORATED, MULTI COUNTY

Dear Mr. Forren:

At your request, our office has reviewed the above-referenced Draft Programmatic Environmental Impact Statement in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). We concur that the proposed program has the potential to affect historic properties. In accordance with the document, all Tennessee projects undertaken within the proposed program must be submitted to our office for review and comment. 10-2-1

Questions and comments regarding project review may be addressed to Jennifer M. Barnett, 615-741-1588, ext. 17.

Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jmb

REC'D SEP 15 2003

HENRY C. LIST
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
ROBERT W. LOGAN
COMMISSIONER
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

September 9, 2003

John Forren
US EPA (3ES30)
1650 Arch St.
Philadelphia, PA 19103

Dear Mr. Forren:

The Kentucky Department for Environmental Protection would like to offer the following comment concerning the Summary of Proposed Alternatives contained in your mountaintop removal Environmental Impact Statement (EIS) document.

In your upcoming deliberations on how to modify current SMCRA and Clean Water Act (CWA) permitting of stream loss due to coal mining waste disposal sites, please keep in mind that normally the states have a role in the 404 permitting process under Section 401 of the CWA. In the case of Kentucky, state legislation passed in 1994 has limited the role of the state 401 program in regulating stream loss covered under Nationwide 404 permit #21. 5-7-1

While this agency did not request and does not agree with the language contained in KRS 224.16-070 (attached), we are compelled to abide by it. In order for Kentucky to resume its 401 involvement in the processing of nationwide 21 permits, KRS 224.16-070 must be changed. To accomplish this, the Environmental Protection Agency (EPA) will need to incorporate this issue into its programmatic discussions with the coal industry on possible changes to the existing 404 permitting process.

Sincerely,

Robert W. Logan
Commissioner

RWL:mw

Attachment

EDUCATION PAYS

APPENDIX I

224.16-070 Water quality certifications for surface coal mining operations for applicants eligible for Nationwide Permit 21 or 26.

(1) This section shall apply to the cabinet's issuance, waiver, or denial of water quality certifications for surface coal mining operations, as defined in KRS 350.010, if:

(a) The applicant for the water quality certification has applied to the cabinet for a permit in accordance with KRS Chapter 350 and the administrative regulations promulgated pursuant thereto;

(b) The applicant for the water quality certification is eligible for Nationwide Permit 21 or 26 issued in accordance with 33 U.S.C. 1344 and 33 C.F.R. Part 330, Appendix A;

(c) The applicant's surface coal mining operation will not impact waters of the Commonwealth designated by the cabinet in its water quality standards as outstanding state or national resource waters or as cold water aquatic habitat; and

(d) The applicant's surface coal mining operation will not impact waters of the Commonwealth which are wetlands one (1) acre or more in size.

(2) If the watershed above the toe of the farthest downstream permanent structure authorized pursuant to Nationwide Permit 21 or 26 is less than four hundred eighty (480) acres for the surface coal mining operation meeting the criteria of subsection (1) of this section, the cabinet shall issue a water quality certification containing only the standard conditions set out in paragraphs (a) to (e) of this subsection.

(a) All earthwork operations shall be carried out so that sediment runoff and soil erosion to waters of the Commonwealth are controlled and minimized. Best management practices for water pollution control shall be used by the surface coal mining operation.

(b) Heavy equipment, such as bulldozers, backhoes, and draglines, shall not be used or operated within waters of the Commonwealth outside of the boundaries of a permanent structure, unless that use cannot be avoided. If use of heavy equipment within waters of the Commonwealth outside the boundaries of a permanent structure is unavoidable, then the work shall be performed so as to minimize resuspension of sediments and disturbance to substrates, banks, or riparian vegetation.

(c) Measures shall be taken to prevent and to control spills of fuels, lubricants, and other materials from entering waters of the Commonwealth.

(d) Any fill or riprap shall be of a composition that shall not cause violations of water quality standards by adversely affecting the biological, chemical, or physical properties of waters of the Commonwealth. If riprap is used, it shall be of a weight and size that bank stress or slump conditions shall not occur.

(e) Removal of riparian vegetation outside the boundaries of a permanent structure shall be minimized.

(3)(a) If the watershed above the toe of the farthest downstream permanent structure authorized pursuant to Nationwide Permit 21 or 26 is greater than or equal to four hundred eighty (480) acres for the surface coal mining operation meeting the criteria of subsection (1) of this section, the cabinet may require a water quality certification containing conditions in addition to those standard conditions identified in subsection (2) of this section for the purpose of protecting water quality.

(b) The water quality certification may require mitigation at a maximum ratio of one (1) acre of mitigation area for every one (1) acre of permanent loss of waters of the Commonwealth on the permitted area, except for waters of the Commonwealth isolated as a result of the permanent structure.

(c) For waters of the Commonwealth isolated as a result of a permanent structure, the maximum mitigation ratio shall be five-tenths (0.5) acre of mitigation area for every one (1) acre of those isolated waters.

(d) The cabinet shall accept mitigation on the permitted area, mitigation off the permitted area, mitigation banking of waters of the Commonwealth, or any combination thereof, or any other mitigation measure acceptable to the cabinet.

(e) Upon completion of all mitigation work required by the water quality certification required by this subsection, the surface coal mining operation shall obtain a certification from a registered professional engineer that all mitigation work has been completed in accordance with the conditions of the water quality certification. The surface coal mining operation shall promptly submit the professional engineer's certification to the cabinet. The cabinet shall promptly review the certification and provide to the surface coal mining operation written notice that all mitigation work has been successfully completed, or that further mitigation work is necessary to meet the conditions imposed by the water quality certification.

(4) The cabinet shall not require a water quality certification for a road crossing on the permitted area impacting less than two hundred (200) linear feet of waters of the Commonwealth.

(5) The cabinet shall confer with representatives of the surface coal mining industry and representatives of environmental organizations with an interest in water quality in developing a manual of approvable options for mitigation on permitted areas, mitigation off permitted areas, mitigation involving banking of waters of the Commonwealth, and removal of temporary sediment structures at surface coal mining operations as a mitigation option.

(6)(a) The cabinet shall have ten (10) working days to make a determination that an application for a water quality certification is administratively complete or to notify the applicant of specific deficiencies.

(b) The cabinet shall have forty (40) working days to review an administratively complete application for a water quality certification, to issue or waive that certification, or to deny that certification with specific deficiencies identified, and to notify the applicant of the final determination. If the cabinet has not notified the applicant of its final determination within forty (40) days of receiving an administratively complete application, the water quality certification shall be deemed waived.

(7) Nothing in this section shall be construed as abrogating the cabinet's ability to require water quality certifications for surface coal mining operations that do not meet the criteria of subsection (1) of this section.

12 13

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

REC'D SEP 0 2 2003

RECEIVED AUG 22 2003 Region III The Comptroller

RECEIVED AUG 25 2003 Office of Watersheds EPA Region III

August 18, 2003

U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103

Re: Draft Environmental Impact Statement
Mountaintop Mining/Valley Fills
Appalachia

Dear EPA:

The Tennessee Wildlife Resources Agency provides the following comments and recommendations on the programmatic DEIS.

- Placement of spoil material in waters of the state of Tennessee or in such a manner as to adversely impact waters of the state is a violation of both the Tennessee Water Quality Control Act and the Wildlife Code (Tennessee Code Annotated).
- Current requirements for buffer zones around streams are grossly inadequate for mountainous terrain. The minimum riparian protection zone for coal mining should be 200 feet on either side of Appalachian mountain streams. | 5-7-1
- Remining and reclamation of abandoned mine lands should be required as mitigation for all surface mining activity. | 19-3-3
- Reclamation for surface mine impacts on Appalachian and Cumberland Mountain hardwood forest must include compensatory mitigation and/or reforestation. | 19-2-3
- This document does not further protection or conservation of aquatic resources and exhibits near total disregard for the spirit, intent, and letter of federal water pollution law. | 4-2

Sincerely,

Aubrey D. McKinney, Chief
Environmental Services Division

ADM:bg

The State of Tennessee

AN EQUAL OPPORTUNITY EMPLOYER

REC'D DEC 2 9 2003

COMMONWEALTH *of* VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
www.deq.state.va.us

Robert G. Burnley
Director
(804) 698-4000
1-800-592-5482

December 24, 2003

Mr. John Forren
U.S. Environmental Protection Agency
Mail Stop 3EA30
1650 Arch Street
Philadelphia, Pennsylvania 19103

RE: Draft Programmatic Environmental Impact Statement, Mountaintop Mining/ Valley Fills in Appalachia
DEQ-03-106F

Dear Mr. Forren:

The Commonwealth of Virginia has completed its review of the above-referenced document. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. The following agencies and localities joined in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Agriculture and Consumer Services
Department of Conservation and Recreation
Department of Health
Marine Resources Commission
Department of Mines, Minerals, and Energy
Buchanan County
Lee County
Wise County.

In addition, the following agencies, planning district commissions, and localities were invited to comment:

Department of Historic Resources
Department of Forestry

Mr. John Forren
Page 2

Lenowisco Planning District Commission
Cumberland Plateau Planning District Commission
Russell County
Scott County
Tazewell County.

Project Description

The Environmental Protection Agency, the Army Corps of Engineers, and two agencies of the Department of the Interior (Fish and Wildlife Service and Office of Surface Mining) joined with the West Virginia Department of Environmental Protection to consider new or revised program guidance, policies, and regulations to minimize adverse environmental effects of mountaintop mining and valley fill (hereinafter "MTM/VF") operations within the Appalachian study areas in West Virginia, Virginia, Kentucky, and Tennessee. (In Virginia, these include the six counties listed above.)

As stated in the Draft Programmatic Environmental Impact Statement (hereinafter "Draft EIS"), the removal of overburden (rock above coal seams) and interburden (rock between coal seams) during mountaintop surface mining results in excess spoil, because the rock will not fit back into the mining pit. The excess spoil is placed in disposal sites. Typical locations for these are valleys, also known as heads-of-hollows or uppermost (headwater) stream reaches. The spoil is placed in engineered earth and rock structures known as excess spoil disposal areas, or valley fills (page I-1).

According to the Draft EIS, the study area was chosen because it includes watersheds where excess spoil fills, otherwise known as valley fills, have been constructed or are likely to be constructed in the future (page I-5, section E).

The Draft EIS describes and analyzes a no-action alternative, which is maintenance of the present regulatory programs and processes, and three action alternatives. The summary pages present these alternatives in some detail; highlights follow (pages ES-5 through ES-8):

- *Action Alternative 1*: Initial determination by the Army Corps of Engineers, through the individual permit process pursuant to section 404 of the federal Clean Water Act, of the size, number, and location of valley fills in waters of the United States and reliance on the Corps by the Office of Surface Mining (Department of the Interior) and other regulatory agencies; reliance in the other direction in the case of individual permits; Corps as lead agency for Endangered Species Act consultation; other regulatory programs defer to Corps on Section 404 approval. In this alternative, the Corps would accomplish appropriate National Environmental Policy Act analysis,

Mr. John Forren
Page 3

determining whether an Environmental Assessment or an Environmental Impact Statement is required.

- *Action Alternative 2 (preferred alternative)*: Cooperative determination of size, number, and location of valley fills allowed in waters of the United States; Office of Surface Mining rules would make the stream buffer zone more consistent with the Clean Water Act and Surface Mining Control and Reclamation Act; excess spoil rules would be modified to provide for minimization and alternatives analysis, similar to the Section 404(b)(1) Guidelines. The Corps would make decisions on nationwide versus individual permits, and accomplish NEPA review of individual permits. With regard to Nationwide No. 21 permits, the surface mining agency (in Virginia's case, the Department of Mines, Minerals, and Energy) would take the lead on Endangered Species Act coordination. As with Alternative 1, the Corps would accomplish appropriate National Environmental Policy Act analysis, determining whether an Environmental Assessment or an Environmental Impact Statement is required.

- *Action Alternative 3*: The Corps would begin processing mountaintop mining and valley fills as Nationwide No. 21 permits and few projects would require individual permits. The surface mining agency would take the primary role of joint application review. The Corps would base its Clean Water Act authorizations largely on the surface mining review, adding off-site mitigation. Federal agencies (the Office of Surface Mining Reclamation and Enforcement) and state agencies with regulatory authority would develop guidance for consistent definitions, refine the uniform protocols for assessing ecological function and making permit decisions, and undertake other activities related to the regulation of mountaintop surface mining.

General Comments on the Draft EIS

According to the Department of Mines, Minerals, and Energy (DMME), the Draft EIS presents information, and is based on analysis, not equally applicable or relevant to the states affected by the proposed or alternative regulatory program. Specifically, the Draft EIS recommends a federal mandate, binding on Virginia that stems from conditions and a legal agreement in West Virginia (Draft EIS, pages I-8 and I-9). The Draft EIS should not assume that the processes agreed to with West Virginia are also necessary in other states, or that Virginia, at least, would follow them (enclosed DMME comments, page 4). 1-6

Similarly, the Draft EIS makes assertions that do not take Virginia conditions into account. For example, it dismisses wetlands created by mining as non-jurisdictional (Draft EIS, page ES-4), overlooking the fact that in Virginia, isolated wetlands are regulated and protected under state law (*Virginia Code* section 62.1-44.15:5) unless they are determined to be small and of limited ecological value. DMME states that for this 5-3-4 reason, any conclusions based on the assumption that such wetlands are not regulated would be unfounded (DMME comments, page 1). The Draft EIS also refers to a number of stream studies in assessing environmental consequences of the proposed program (Chapter IV); however, none of these studies took place in Virginia, and the resulting findings may not apply here (DMME comments, pages 9-10). 5-3-1

DMME's overall conclusion is that the Draft EIS process should be stopped in favor of selecting a "true no-action alternative" that leaves the existing regulatory program in place (DMME comments, page 1). 1-1 If the EIS process is not stopped, then Alternative 3 should be adopted. DMME disagrees with some of the information presented in the Draft EIS. 1-4 Detailed comments from DMME are enclosed. (See also "Environmental Impacts and Mitigation," items 2 and 5, below.)

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Virginia Department of Conservation and Recreation (DCR) functions to preserve and protect the Commonwealth's environment and advocate the wise use of its scenic, cultural, recreational, and natural heritage resources. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, significant geologic formations, and similar features of scientific interest.

The southern Appalachian mountains were identified, by the Nature Conservancy in 2000, as one of the six biodiversity hot spots for species rarity and richness in the United States. This designation was generally based on the rich freshwater fauna (especially fish and mussels) found in this area, which are dependent on the region's rivers and streams (Stein, *et al*, 2000). The Upper Tennessee River drainage in Virginia, 8-2-2 including the Clinch, Holsten, and Powell Rivers, supports a very diverse assemblage of fish and mussels, including many species that are globally rare and critically imperiled. Mining operations in a significant portion of the Appalachian coalfields of extreme southwestern Virginia are conducted in and near the uppermost (headwater) stream reaches of the Tennessee River drainage. DCR states that the placement of excess spoil from mining operations in valleys, or head-of-hollows, in these watersheds, could potentially impact downstream fish and mussel populations (as well as other aquatic organisms.)

While DCR expresses concern for the aquatic resources downstream of the mining operation, DCR also recognizes the benefits associated with reclamation activities associated with abandoned mined lands and reconnection of cut-off headwater streams to their lower reaches. DMME reports that 70-80% of areas currently being mined in Virginia are previously mined lands (DMME comments, pg. 12.)

The Department of Conservation and Recreation's Biotics Data System documents that a number of listed endangered and threatened species can be found in the proposed mountaintop mining area. Specifically, according to the listings and abbreviations provided by DCR (enclosed), there are nine (9) species listed as endangered by the federal government and sixteen (16) species listed as endangered by the state government. 8-1-5

The Virginia Department of Agriculture and Consumer Services, which has jurisdiction over state-listed endangered or threatened plant and insect species, acknowledges that the Department of Mines, Minerals and Energy, the regulatory authority in Virginia under the Surface Mining Control and Reclamation Act, will continue to consult with the Fish and Wildlife Service and appropriate state agencies regarding federally- and state-listed endangered and threatened species.

2. Wetlands and Water Quality. DEQ's Water Division agrees that federal and state regulations, policies, and guidance relative to MTM/VF activities should be consistently and fairly applied. The preferred alternative identifies an interim impact threshold of 250 acres. DEQ's Water Division recommends establishment of some reasonable threshold limit for valley fills (such as a certain linear footage of stream impacts) that is protective of the environment by reducing impacts to surface waters from mining activities. Because many valley fill activities occur in headwaters of first-order streams, the activities may have far-reaching implications for downstream water quality. DEQ's Water Division indicates that appropriate technical studies should continue to be conducted before the authorization of any valley fill. These studies should include such subjects as: 5-3-5

- fish assemblages present
- benthic macro-invertebrates
- threatened and endangered species, particularly freshwater mussels (see item 1, above)
- stream geomorphology.

The results of technical studies should be used as a baseline to enable avoidance or minimization of impacts to the aquatic community (as required by Section 404(b)(1) of the Clean Water Act as well as by state law), and to determine the appropriate compensation for unavoidable impacts.

Unavoidable water quality impacts from valley fills will require a Virginia Water Protection Permit from DEQ, and may require a Virginia Pollutant Discharge Elimination System (VPDES) permit for construction. 5-5-5 Point source discharges, if any, may require a VPDES discharge permit. See "Regulatory and Coordination Needs," item 1, below.

Mr. John Forren
Page 6

DEQ's Water Division states that, based upon information provided in the wetland technical report, wetland impacts associated with valley fill activities will be minimal, because wetlands are not found in significant abundance in steep-slope terrain. Most wetlands occurring in these areas are associated with riparian buffers along streams, streams, and some plateau areas. Accordingly, the most significant impacts on aquatic resources from MTM/VF activities will be loss of stream habitat and riparian areas.

Besides direct loss of stream habitat, secondary impacts should be evaluated prior to authorization of valley fills. Technical studies to assess potential secondary impacts should include:

- observable and measurable changes to the downstream geomorphology of the stream;
- degradation of downstream habitat from sediment transport;
- flow rates; and
- changes in water chemistry, including:
  - temperature
  - pH
  - dissolved oxygen
  - conductivity
  - total dissolved solids
  - alkalinity
  - calcium hardness
  - ammonia
  - nitrate
  - phosphate.

Compensation for unavoidable impacts should also take secondary impacts into account.

According to the Department of Mines, Minerals, and Energy (DMME), the EIS concludes that wetlands created by mining are not generally of high quality, and non-jurisdictional from the standpoint of Section 404 regulation under the Clean Water Act (Draft EIS, page ES-4). Also, streams mentioned by name in the EIS do not include any in Virginia, so conclusions relative to Virginia streams may not be valid (DMME comments, page 9). The same is true, according to DMME, for a number of studies described in the EIS (Appendix D), including those on wetland resources on steep slopes in West Virginia, headwater stream values, a benthic survey in Kentucky, and an ecological assessment in West Virginia (DMME comments, page 10). On the other hand, as the DCR indicates, a Virginia study did show negative impacts to the benthic community, consistent with the Kentucky results (enclosed DCR comments, dated December 23, 2003, page 2, item 4).

5-3-5

Mr. John Forren
Page 7

3. Water Supply. According to the Virginia Department of Health's Office of Drinking Water, there are a limited number of water intakes that would be affected by MTM/VF activities. Known intakes include Pennington Gap, St. Paul, Wise County Public Service Authority, and possibly Richlands. Other water treatment plant sources are small mountaintop reservoirs, or larger reservoirs like Pound Lake or Flannagan Reservoir.

The Department of Health's Office of Drinking Water should be given opportunity to comment on applications for any VPDES permits for valley fills, so as to review them for water supply impacts. 5-1-1

In addition, MTM/VF activities proposed in a watershed within 5 miles of a water supply intake should be announced to the Office of Drinking Water and to the waterworks owner. The Office of Drinking Water assumes that runoff ponds and silt fences will be required to contain runoff in order to protect stream water quality.

4. Wildlife Resources Management. Under *Virginia Code* Title 29.1, the Department of Game and Inland Fisheries (DGIF) is the primary wildlife and freshwater fish management agency in the Commonwealth. DGIF has full law enforcement and regulatory jurisdiction over all wildlife resources, inclusive of state and federally endangered or threatened species, but excluding listed insects. The agency maintains a comprehensive system of databases of wildlife resources that is available through the Agency's site at www.dgif.state.va.us, in the "Wildlife" section from the link to "Wildlife Information Online." DGIF determines likely impacts on fish and wildlife resources and habitats, and recommends appropriate measures to avoid, reduce, or compensate for those impacts. For more information on the Wildlife Information Online Service, the proponents may contact DGIF (Kathy Quindlen Graham, telephone (804) 367-9717). 7-2-2

The Department of Game and Inland Fisheries is concerned primarily with potential impacts to endangered and threatened species, trout waters, and other terrestrial and aquatic resources. The existing programs provide for the Department's review of, and comments on, mountaintop mining and valley fills. Provided that this coordination continues, the Department of Game and Inland Fisheries concurs with the recommendation by the Department of Mines, Minerals, and Energy that the EIS process be abandoned (see next item). 6-2-2

5. State-level Management Concerns.

(a) Department of Mines, Minerals, and Energy. The Department of Mines, Minerals, and Energy (DMME) and the Department of Game and Inland Fisheries prefer the current management system of existing programs administered by DMME, the Army Corps of Engineers, and the Environmental Protection Agency. DMME opposes the 1-12

preferred alternative, recommending instead that the EIS process be ended (see the enclosed DMME comments, page 1). 1-12

As mentioned above (see "General Comments..."), DMME indicates that the Draft EIS is predicated on conditions in the coal fields of West Virginia, and that some of its recommendations on the future of the regulatory program are based on a settlement agreement with West Virginia. These conditions differ in Virginia and other states, and the agreement with West Virginia may not be relevant to or needed in Virginia or other states (DMME comments, page 4).

(b) DEQ's Southwest Regional Office. DEQ's Southwest Regional Office indicated that the Norfolk District of the Army Corps of Engineers ("Corps") regulates coal mining activities mainly through the Nationwide Permit No. 21 (NWP-21) for Surface Coal Mining. DEQ does not issue separate Virginia Water Protection Permits for coal mining activities that qualify for the NWP-21. Projects that exceed the NWP-21 threshold are permitted under the DMME's NPDES permit program using guidelines established in the Virginia Water Protection Program.

DEQ's Southwest Regional Office recommends several approaches that might contribute to more effective review of coal mining activities. These include the following. 12-1-5

- Incorporate requirements for minimization of impacts and alternatives analysis for excess spoil disposal into Surface Mining Control and Reclamation Act (SMCRA) permit authorization. Such rule-making would be more consistent with Clean Water Act section 404(b)(1) guidelines and allow agencies to work together instead of trying, sometimes at cross-purposes, to fulfill guidelines separately.
- Develop of advanced identification of disposal sites (ADID) and watersheds unsuitable for fill could encourage alternative valley fill solutions from the beginning of the project. The ADID designation would give permittees a better idea of the viability of a project before their resources are committed.
- Continue rule-making relative to the stream buffer zone rule and excess spoil disposal.

6. Local Comments. Buchanan, Lee, and Wise Counties indicated no comments on the document, and Wise County indicated no objection to the preferred alternative. As indicated above, Russell, Scott, and Tazewell Counties were invited to comment.

Regulatory and Coordination Needs

1. Water Quality Regulation. As mentioned above, valley fill activities may require a Virginia Water Protection Permit and a VPDES permit for construction. The Virginia Water Permit program is administered by DEQ's Southwest Regional Office. VPDES (NPDES) permits for coal mining operations are administered by DMME. As indicated above, Virginia Water Protection Permits are not issued for coal mining activities that qualify for the Nationwide Permit No. 21, which is issued by the Army Corps of Engineers. For information on DMME's NPDES permit program, the Department of Mines, Minerals, and Energy (Steve Walz, telephone (804) 692-3211) may be contacted. Questions on other water permits may be addressed to DEQ's Water Division (Ellen Gilinsky, telephone (804) 698-4375) or DEQ's Southwest Regional Office (Allen Newman, telephone ((276) 676-4804). 12-1-5

2. Subaqueous Bed Encroachment. The Virginia Marine Resources Commission has permit jurisdiction over any encroachments in, on, or over the beds of the rivers, streams, and creeks that are the property of the Commonwealth, pursuant to *Virginia Code* section 28.2-1200 et seq. Accordingly, if any portion of MTM/VF activities involves any encroachments channelward of ordinary high water along natural rivers and streams, a permit may be required from the Commission. Questions on this requirement may be addressed to the Commission (Randy Owen, telephone (757) 247-2200).

3. Water Supply. As mentioned above ("Environmental Impacts and Mitigation," item 3), the Virginia Department of Health's Office of Drinking Water (Alan Weber, telephone (804) 371-2883) should be given opportunity to comment on (1) any MTM/VF activities that are proposed within 5 miles of a water supply intake and (2) any applications for VPDES permits for valley fills.

Review Process

We are grateful for the extension of the comment deadline from August 29, 2003 to January 4, 2004. The added time enabled Virginia agencies to have an extended discussion of the regulatory program and exchange views regarding the proposed changes therein. The Department of Mines, Minerals, and Energy provided extensive comments, which are enclosed. 3-5

Mr. John Forren
Page 10

Thank you for the opportunity to review the Draft EIS. The detailed comments of the reviewing agencies are enclosed.

Sincerely,

Michael P. Murphy, Director
Division of Environmental Enhancement

Enclosures

cc: Derral Jones, DCR
Keith R. Tignor, DACS
Alan D. Weber, VDH
Ellen Gilinsky, DEQ-Water
Alan J. Newman, DEQ-SWRO
Randall Owen, MRC
Brian D. Moyer, DGIF
Ethel R. Eaton, DHR
Steven Walz, DMME
Gerald P. Wilkes, DMME
J. Michael Foreman, DOF
Andrew Chafin, Cumberland Plateau PDC
Ronald C. Flanary, Lenowisco PDC
W. J. Caudill, Jr., Buchanan County
D. Dane Poe, Lee County
Edward L. Sealover, Wise County
James Gillespie, Russell County
John Strutner, Scott County
James Spencer, Tazewell County
Karen L. Mayne, USFWS
J. Robert Hume, ACOE
Ellie L. Irons, DEQ-OEIR

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124

MEMORANDUM

Date: 23 December 2003

To: Charles H. Ellis, III, Virginia Department of Environmental Quality

Derral Jones

From: Derral Jones, Planning Bureau Manager

Subject: DEQ#03-106F: Mountain Top Mining/Valley Fills in Appalachia

The Department of Conservation and Recreation (DCR) functions to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreation and natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, state unique or exemplary natural communities, significant geologic formations and similar features of scientific interest.

The southern Appalachians were identified as one of the six biodiversity hot spots for species rarity and richness in the United States in 2000 by The Nature Conservancy and NatureServe. This designation was generally based on the rich freshwater fauna (especially fish and mussels) found in this area, which is dependent on the region's rivers and streams (Stein et al., 2000). The Upper Tennessee River drainage in Virginia, including the Clinch, Holston, and Powell rivers, supports a very diverse assemblage of fish and mussels, including many species that are globally rare and critically imperiled. Mining operations in a significant portion of the Appalachian coalfields of extreme southwestern Virginia are conducted in and near the uppermost (headwater) stream reaches of the Tennessee River drainage. The placement of excess spoil from mining operations in valleys, or head-of-hollows, in these watersheds, could potentially impact downstream fish and mussel populations (as well as other aquatic organisms). 8-2-5

In reference to the Department of Mines, Minerals and Energy comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement, DCR would like to provide the following comments:

1) On page 5, Chapter III.D –Impact Producing Factors to Headwater Streams from Mountaintop Mining, DMME stated that drainage structures associated with mining can provide benefits that could offset aquatic impacts. The study entitled Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian 6-6-4

Conserving Virginia's Natural and Recreational Resources

Mountains of Virginia and West Virginia by Timothy Merricks concluded that settling ponds would enhance collector filterer populations. The study by Timothy Merricks, although it may be scientifically sound, should not be regarded as the definitive study on the impacts of hollow fill mining in Virginia. Rather, it is the first of many needed studies on this topic. Merricks' study was of short duration (2 years), limited geographic scope (only a few of his study sites were actually in Virginia; others were in West Virginia), and confined to the upper reaches of each watershed. It did not address issues such as the long-term impacts of hollow fill mining, catastrophic events, potential impacts to aquatic biota farther downstream in the watershed, or evaluate a diverse array of study site conditions. 6-6-4

2) On page 6, Chapter III. F-Appalachian Forest Communities DMME states that 85 % of reclaimed mined lands in the study area are returned to forests and most are returned to the approximate original contour including re-establishing drainage patterns. DCR recognizes the benefit of reforestation activities on abandoned mined lands associated with the mountaintop mining process. According to DCR staff, the forests may be restored, however the forest type and cover will be different due to limited soils and forest age difference. 7-5-4

3) On page 9, in reference to page IV.B-1 section titled Consequences Common to the No Action Alternatives and Alternatives 1,2, and 3. DMME stated these alternatives as well as the no action alternative should take into account the headwaters streams are replaced with diversion ditches and drainage systems in and around fills. According to Dr. Roble, these altered systems are very unlikely to support the same biological communities as undisturbed headwater streams. This was also stated by Dr. Bruce Wallace, University of Georgia, at the Headwater Streams Symposium (Mountaintop Mining/Valley Fills in Appalachia-Draft Programmatic Environmental Impact Statement CD). DCR recognizes the benefit associated with reclamation activities associated with abandoned mined lands and reconnection of cut-off headwater streams. 6-6-4

4) On page 10, DMME stated the Kentucky Mountaintop mining benthic maroinvertebrate survey has limited usefulness because it is specific to four counties and limited duration of the study. DMME also stated the conclusion from the Kentucky study that mountaintop mining and valley fill negatively impacted benthic health did not match the Virginia study (Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia). However, according to Dr. Steve Roble the survey sites listed below in the VA study and overall survey results did show a negative impact to the benthic community. 6-4-4

A. A Middle Creek, VA site associated with a recent hollow fill had reduced total species richness, reduced EPT richness and lower % EPT in 1 of 2 years at a recent hollow fill. Hollow fill sites in this drainage that lacked holding or settling ponds had reduced clam growth rates.
B. South Fork of Pound River (SFPR) and Powell River sites with hollow fills had decreased benthic macroinvertebrate richness vs. reference sites
C. Overall elevated metal (Al, Cu) levels in hollow fill drainages, especially in the absence of settling ponds.
D. Some hollow fill streams were acutely toxic to test organisms
E. Hollow fill drainages were characterized by a more tolerant biotic community (lower total species richness, lower EPT richness, lower % EPT and elevated Chironomidae populations) than reference streams or sites below settling ponds. 6-4-4

Thank you for the opportunity to comment on these draft comments.

Ellis,Charles

From: Rene Hypes [srhypes@dcr.state.va.us]
Sent: Thursday, December 18, 2003 5:40 PM
To: Ellis,Charles
Cc: J. Chris Ludwig; Steve Roble; Synthia Waymack; Thomas Smith
Subject: Natural Heritage Resources List -Mountaintop Mining

MountaintopMiningTab lsDEQ.xls

Charlie,

Ellie requested I send you a list of the natural heritage resources for the proposed mountaintop mining area by 12/19. I drew the project boundaries from the large scale map included in the EIS to generate the natural heritage resources list. I have attached the list which may be modified if better boundaries are identified for the project area. Please let me know if you need any additional information. As I mentioned to Ellie we are meeting with DMME on Monday(12/19) by conference call to further discuss this project.

Take Care and Have A Nice Holiday!

S. Rene' Hypes
Project Review Coordinator
DCR-DNH
217 Governor Street
Richmond, Virginia 23219
804-371-2708 (phone)
804-371-2674 (fax)
srhypes@dcr.state.va.us <mailto:srhypes@dcr.state.va.us>

1

Aquatic Natural Heritage Resources within the Proposed Study Area for Mountaintop Mining

Common Name	Scientific Name	Federal Status	State Status	Global Rank	State Rank	Fws_soc
Tennessee Clubshell	Pleurobema oviforme			G3	S2S3	
Tennessee Pigtoe	Fusconaia barnesiana		SC	G2G3	S2S3	SOC
Gilt Darter	Percina evides			G4	S2	
Swannanoa Darter	Etheostoma swannanoa			G4	S2	
Oyster Mussel	Epioblasma capsaeformis	LE	LE	G1	S1	
Dusky Darter	Percina sciera			G5	S1S2	
Tennessee Pigtoe	Fusconaia barnesiana		SC	G2G3	S2S3	SOC
Golden Darter	Etheostoma denoncourti		LT	G2	S1	SOC
Tennessee Heelsplitter	Lasmigona holstonia		LE	G3	S1	
Brown Supercoil	Paravitrea septadens		LT	G1	S1	SOC
Black Sculpin	Cottus baileyi			G4Q	S2	
Tan Riffleshell	Epioblasma florentina walkeri	LE	LE	G1T1	S1	
	Mussel concentration site			GNR	SNR	
Fine-rayed Pigtoe	Fusconaia cuneolus	LE	LE	G1	S1	
Slabside Pearlymussel	Lexingtonia dolabelloides	C	LT	G2	S2	
Onyx Rocksnail	Leptoxis praerosa			G5	S1S3	
Fragile Papershell	Leptodea fragilis		LT	G5	S2	
Spiny Riversnail	Io fluvialis		LT	G2	S2	SOC
Hellbender	Cryptobranchus alleganiensis		SC	G3G4	S2S3	
Black Sandshell	Ligumia recta		LT	G5	S2	
Sheepnose	Plethobasus cyphyus		LT	G3	S1	
Black Sculpin	Cottus baileyi			G4Q	S2	
Deertoe	Truncilla truncata		LE	G5	SH	
Rough Rabbits Foot	Quadrula cylindrica strigillata	LE	LE	G3T2	S2	
Purple Bean	Villosa perpurpurea	LE	LE	G1	S1	
Slabside Pearlymussel	Lexingtonia dolabelloides	C	LT	G2	S2	
Shiny Pigtoe	Fusconaia cor		LE	G1	S1	SOC
Little-winged Pearlymussel	Pegias fabula	LE	LE	G1	S1	
River Redhorse	Moxostoma carinatum		SC	G4	S2S3	
Clinch Sculpin	Cottus sp. 4			G1G2	S1S2	SOC
Blotchside Logperch	Percina burtoni		SC	G2	S1	SOC
Bluebreast Darter	Etheostoma camurum		SC	G4	S2	
Channel Darter	Percina copelandi		SC	G4	S2	
Spiny Softshell	Apalone spinifera			G5	S2	
Tennessee Dace	Phoxinus tennesseensis		LE	G3	S1	
Green-faced Clubtail	Gomphus viridifrons			G3	S2	

8-3-5

Aquatic Natural Heritage Resources within the Proposed Study Area for Mountaintop Mining

Stonecat	Noturus flavus		SC	G5	S2	
Fluted Kidneyshell	Ptychobranchus subtentum	C		G2G3	S2	
Snuffbox	Epioblasma triquetra		LE	G3	S1	
Fanshell	Cyprogenia stegaria	LE	LE	G1	S1	
Pimple Back	Quadrula pustulosa		LT	G5	S2	
Cumberland Combshell	Epioblasma brevidens	LE	LE	G1	S1	
Appalachian Monkeyface	Quadrula sparsa	LE	LE	G1	S1	
Elktoe	Alasmidonta marginata		SC	G4	S2	
Slippershell Mussel	Alasmidonta viridis		LE	G4G5	S1	
Spectacle Case	Cumberlandia monodonta		LE	G2G3	S1	SOC
Mudpuppy	Necturus maculosus			G5	S2	

Definition of Abbreviations Used on Natural Heritage Resource Lists of the Virginia Department of Conservation and Recreation

Natural Heritage Ranks

The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHR's," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The primary criterion for ranking NHR's is the number of populations or occurrences, i.e. the number of known distinct localities. Also of great importance is the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals. Other considerations may include the quality of the occurrences, the number of protected occurrences, and threats. However, the emphasis remains on the number of populations or occurrences such that ranks will be an index of known biological rarity.

S1 Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.

S2 Very rare; usually between 5 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.

S3 Rare to uncommon; usually between 20 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.

S4 Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.

S5 Very common; demonstrably secure under present conditions.

SA Accidental in the state.

S#B Breeding status of an organism within the state.

SH Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.

S#N Non-breeding status within the state. Usually applied to winter resident species.

SU Status uncertain, often because of low search effort or cryptic nature of the element.

SX Apparently extirpated from the state.

SZ Long distance migrant whose occurrences during migration are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.

Global ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note that GA and GN are not used and GX means apparently extinct. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "T". The global and state ranks combined (e.g. G2/S1) give an instant grasp of a species' known rarity.

These ranks should not be interpreted as legal designations.

Federal Legal Status

The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

LE Listed Endangered - threatened with extinction throughout all or a significant portion of its range
LT Listed Threatened - likely to become endangered in the foreseeable future
PE Proposed Endangered
PT Proposed Threatened
C Candidate - enough information is available to propose for listing, but listing is precluded by other pending proposals of higher priority
SOC Species of Concern -- species that merit special concern (not a regulatory category)
NF No federal legal status

E(S/A) Treat as endangered because of similarity of appearance
T(S/A) Treat as threatened because of similarity of appearance

State Legal Status

The Division of Natural Heritage uses similar abbreviations for State endangerment.

LE Listed Endangered
LT Listed Threatened
C Candidate
SC Special Concern -- animals that merit special concern according to VDGIF (not a regulatory category)
NS No state legal status

PE Proposed Endangered
PT Proposed Threatened

Definition of Abbreviations Used on Natural Heritage Resource Lists of the Virginia Department of Conservation and Recreation

__Conservation Site Ranks__

Brank is a rating of the significance of the conservation site based on presence and number of natural heritage resources; on a scale of 1-5, 1 being most significant:

B1 - Outstanding significance
B2 - Very high significance
B3 - High significance
B4 - Moderate significance
B5 - of General Biodiversity significance

For information on the laws pertaining to threatened or endangered species, contact:
U.S. Fish and Wildlife Service for all FEDERALLY listed species
Department of Agriculture and Consumer Services Plant Protection Bureau for STATE listed plants and insects
Department of Game and Inland Fisheries for all other STATE listed animals

Literature Cited

Stein, B.A, L. S. Kuther and J.S. Adams. 2000. Precious Heritage; The Status of Biodiversity in the United States. Oxford University Press. Pp. 173 & 190-191.

RECEIVED

JUL 10 2003

DEQ-Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street Address: 355 Deadmore Street, Abingdon, Virginia 24210
Mailing Address: P.O. Box 1688, Abingdon, Virginia 24212-1688
Fax: (276) 676-4899
www.deq.state.va.us

Robert G. Burnley
Director

Michael D. Overstreet
Regional Director
(276) 676-4800

July 7, 2003

Mr. Charles H. Ellis III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, VA 23219

Re: EPA Mountaintop Mining/Valley Fills in Appalachia Environmental Impact Review

Dear Mr. Ellis:

The Department of Environmental Quality (DEQ) Southwest Regional Office received the subject CD on June 17, 2003. The Southwest Regional Office is responsible for implementing regulatory air, water and waste programs in thirteen of Virginia's southwestern most counties. Of these thirteen counties, Lee, Wise, Buchanan, Dickenson, Tazewell and portions of Scott and Russell Counties are located in the Virginia portion of Appalachia where coal mining takes place.

The Norfolk District of Corps of Engineers, regulates coal mining activities mainly through the Nationwide Permit Number 21 (NWP 21) for Surface Coal Mining. Virginia DEQ does not issue separate Virginia Water Protection Permits for coal mining activities that qualify for the NWP 21. By mutual agreement, projects that exceed thresholds for NWP 21, are permitted under the Department of Mines, Minerals and Energy NPDES permit program using guidelines established in the Virginia Water Protection Program. This EIR discusses some issues that these programs work through with each Coal Permit application. With this background in mind, we would like to offer the following comments. 12-1-5

Table II.B-2 Distinctions Among MTM/VF EIS Alternatives, highlights the different focus of each of the permit programs and points to the changes that should be implemented so that a more straight forward review can be accomplished by all parties. For instance, SMCRA permit authorization should incorporate requirements for minimization and alternatives analysis for excess spoil disposal. Rule-making that is more consistent with the Clean Water Act Section 404(b)(1) guidelines would allow agencies to work together instead of trying to fulfill guidelines at cross-purposes. Development of advanced identification of disposal sites (ADID), watersheds generally unsuitable for fill, could encourage alternative valley fill solutions from the beginning of the project. Designation of ADID sites would give the permittee a better idea of the viability of a project before resources are committed. Another action is to continue rulemaking relative to the stream buffer zone rule and excess spoil disposal. 12-1-4

Other actions proposed by the alternatives are consistent with Virginia and Norfolk District Corps of Engineers discussions on how to protect the environment. Develop guidance policies or rule making for consistent definitions of stream characteristics as well as field methods for delineating those characteristics. Refine the uniform, science-based protocols for assessing ecological function, and refine and calibrate the stream assessment protocol to assess stream conditions and to determine mitigation requirements. Assess aquatic ecosystem restoration and mitigation methods. Develop guidelines identifying state of the science BMPs for selecting appropriate growth media, reclamation techniques, revegetation species, and success measurement techniques for post mining land uses involving trees.

In Chapter III, page 18 of 22, mitigation recommendations mirror those of Virginia programs. That is, "replacement of a mined for filled stream by restoration or creation of a similar type of stream would be more in keeping with this policy [in-kind compensatory mitigation] than would replacing stream systems with palustrine wetland systems." Recognition of the functional values of streams and that these values are not replaced by a wetland system is a critical component in valley fill projects. 1-3

Thank you for the opportunity to comment on this document. The studies and recommendations of this report should help to further both the science and policies in relation to mountaintop mining and valley fill projects.

Sincerely,

Allen J. Newman, P.E.
Water Permit Manager

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

RECEIVED
AUG 18 2003
DEQ-Office of Environmental Impact Review

Charles H. Ellis III
CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Statements in the project document concerning endangered species were reviewed and compared to available information. As required in the draft MTM/VF, the SMRCA regulatory authority will continue to consult with U.S. Fish and Wildlife Service and appropriate state agencies regarding federal- and state-listed endangered and threatened species. No additional comments are necessary in reference to endangered plant and insect species regarding this project.

(signed) (Keith R. Tignor) (date) August 13, 2003

(title) Endangered Species Coordinator

(agency) VDACS, Office of Plant and Pest Service

PROJECT # 03-106F 8/98

AUG-12-2003 14:21 DRINKING WATER P.02/03

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

Charles H. Ellis III
CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

See attached

(signed) Alan D. Weber (date) 8-12-03

(title)

(agency) VDH

PROJECT # 03-106F 8/98

Subject: Mountaintop Mining/Valley fills CD
Date: Wed, 06 Aug 2003 11:08:36 -0400
From: Mike Dishman <mdishman@vdh.state.va.us>
To: Jerry Peaks <gpeaks@vdh.state.va.us>
CC: "Puckett,Richard" <rpuckett@vdh.state.va.us>, "Henderson,Dean" <dhenderson@vdh.state.va.us>

You sent us a CD on the subject and asked us to comment. We have very few stream intakes that would even potentially be impacted: Pennington Gap, St. Paul, Wise County PSA, maybe Richlands. The other WTP sources are small mountain top reservoirs or large reservoirs like Pound lake or Flannagan. Our comments are:

1. The report seems to propose VPDES permits for any valley fills. Our comment would be that ODW should review these applications for water supply impacts.

2. Mountaintop mining/valley fill proposed in a watershed within 5 miles of an intake should at least be announced to ODW and the waterworks owner. We assume that runoff ponds and silt fences will be required to contain runoff, in which case the streams should be adequately protected as far as water supply requirements go.

If you were looking for more, let me know.

Mike Dishman, P.E. <mdishman@vdh.state.va.us>
Deputy Field Director
Virginia Department of Health
Office of Drinking Water

1 of 1 8/7/2003 7:19 AM

TOTAL P.03

Memorandum

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
Larry G. Lawson, P.E., Director

RECEIVED AUG 0 8 2003 Office of Environmental Impact Review

To: **Charlie Ellis**
Environmental Program Planner

From: Ellen Gilinsky, Ph. D, PWS
VWP Permit Program Manager

Date: August 7, 2003

Subject: **Mountaintop Mining/Valley Fill Draft EIS**
EPA
Project Number 03-106F

Mountaintop mining considers all types of surface coal mining (mountaintop removal, contour, area, etc.) in the steep terrain of the central Appalachian coalfields. Removal of overburden and interburden (rock above and between coal seams, respectively) during mountaintop mining / valley fills (MTM/VF) operations results in generation of excess spoil, because the broken rock will not all fit back into the mining pit. The excess spoil must be placed in disposal sites adjacent to the mining pits in order to allow for efficient and economical coal extraction. Typical locations for excess spoil disposal sites are valleys, also known as heads-of-hollows or uppermost (headwater) stream reaches. The usual method of disposing of this excess spoil is to place it in engineered earthen and rock structures known as excess spoil disposal areas or colloquially known as head-of-hollow fills, hollow fills or valley fills.

The U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA) share responsibility for implementing different portions of the Clean Water Act (CWA). The COE has the principal authority to regulate the placement of fills into waters of the U.S. under CWA Section 404 while EPA maintains oversight authority. The EPA Office of Surface Mining (OSM) is responsible for the national administration of the Surface Mining Control and Reclamation Act (SMCRA), and has delegated this authority to states in the EIS study area except Tennessee. Delegation of SMCRA authority occurs when states assume primacy for regulating surface coal mining and reclamation by adopting statutes and regulations no less effective than the Federal counterparts.

The COE, EPA, and the OSM propose to establish an integrated surface coal mining regulatory program in steep slope Appalachia. The objective of the coordinated program improvements considered by this EIS is consistent application of the CWA and the SMCRA to improve the regulatory process and effect better environmental protection for MTM/VF operations. To effect this integrated regulatory program, the COE, EPA, and OSM would amend their policies, guidance, procedures, or regulations as necessary. These amendments would result in MTM/VF operations that avoid, minimize, or mitigate, to the maximum extent practicable, significant adverse impacts to the waters of the U.S. and prevent material damage to water resources outside the permit area; would streamline the permitting process; and would coordinate the agencies'

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Please be advised that the Marine Resources Commission, pursuant to Section 28.2-1200 et seq of the Code of Virginia, has jurisdiction over any encroachments in, on, or over the beds of the bays, ocean, rivers, streams, or creeks which are the property of the Commonwealth. Accordingly, if any portion of the subject project involves any encroachments channelward of ordinary high water along natural rivers and streams, a permit may be required from our agency. Thank you for the opportunity to comment.

(signed) ______________ (date) 7-24-03
(title) ENVIRONMENTAL ENGINEER
(agency) VMRC

PROJECT # 03-106F 8/98

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

RECEIVED
JUL 2 2 2003
DEQ-Office of Environmental Impact Review

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

I have reviewed the draft EIS. While I have no substantive comments to offer, at the same time I have no objectives to Alternative 2, the preferred alternative.

(signed) ______________ (date) July 18, 2003
(title) County Administrator
(agency) Wise County

PROJECT # 03-106F 8/98

FAX

DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF ENVIRONMENTAL IMPACT REVIEW

TO: William Caudill

Office: Buchanan County

FAX: (276) 935-4479

RE: Comments on EIS Review

DATE: August 12, 2003

FROM: Charlie Ellis
Dept. of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, 6th Floor
Richmond, VA 23219
Telephone (804) 698-4488

FAX NUMBER: 804/698-4319

TOTAL # OF PAGES INCLUDING COVER: 1

COMMENTS:

Mr. Caudill - I need your comments, if any, on the CD version of the Draft Programmatic Environmental Impact Statement on Mountaintop Mining and Valley Fills in Appalachia (DEQ-03-106F). Thank you.

C Ellis

Charlie Ellis

8-12-03

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE NOTIFY THE SENDER

To: Mr. Ellis

From: W. J. Caudill Jr.

Dear Sir:

I have no comments on the Draft Programmatic Environmental Impact Statement on Mountaintop Mining and Valley fills in Appalachia.

AUG-11-03 MON 11:11 PM W J CAUDILL FAX:1540 935 4479 PAGE 1

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

Charles H. Ellis III

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

None.

(signed) D. Dawke (date) 8/11/03

(title) County Administrator

(agency) Lee County

PROJECT # 03-106F 8/98

Department of Mines, Minerals and Energy Comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement

The Department of Mines, Minerals and Energy (DMME) offers the following comments on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement (EIS). DMME finds that the draft EIS report regularly reflects use of incomplete or inaccurate data. This raises considerable credibility problems with any conclusions drawn from this information. Correcting these problems would take years and substantial budgets. DMME believes the public health and safety will be better protected if the draft programmatic EIS process is ended at this stage and a true no-action alternative is selected. This option would have the existing SMCRA, EPA, and COE programs regulate coal-mining operations as they currently do. This option recognizes that there has been considerable change in the regulatory programs since this EIS process was started that are sufficient to address the problems that lead to the programmatic EIS. 1-12

This differs from the No Action alternative described in the report that proposes actions that differ from the current regulatory practice. For example, current practice does not require SMCRA or EPA programmatic decisions to defer to COE 404 decisions. A true no-action alternative would allow the three regulatory programs to coordinate actions and not set up a single lead program.

DMME also has reviewed the draft EIS and offers the following specific comments.

Executive Summary

General Comment

The authors present this as a Mountaintop Mining/Valley Fill EIS. It should be noted upfront that it addresses much more than mountaintop mining and valley fills. For example, since the EIS began the U.S. Army Corps of Engineers (COE) has revised its procedures and now does not distinguish between fill and backfill. Any recommendations adopted as a result of the EIS would apply to any mining, backfilling and filling operations anywhere in the United States. Since the COE also does not distinguish between coal mining fill operations and other types of fills, any changes to the federal rules implemented as a result of this EIS would also apply to non-mining activities such as *infrastructure construction* activities, highway construction, etc. 13-3-4

Technical Studies

In the list of technical study conclusions, 7th bullet, page ES-4, the EIS concludes that wetlands created by mining are not generally of high quality. No technical studies were done in Virginia to review these types of wetlands. The EPA and COE dismiss these wetlands out of hand as being non-jurisdictional. The EIS fails to note that in Virginia, isolated wetlands are regulated and protected under state law § 62.1-44.15:5 unless they are determined to be a small isolated wetland of minimal ecological value. Therefore, conclusions in the EIS that are based on the assumption that the wetlands would not be regulated in Virginia are unfounded. 5-3-4

In the list of technical study conclusions, last bullet, page ES-4, the phrase "The extraction of coal reserves in the study area could be substantially impacted if fills are restricted to small watersheds" should be changed to "would be substantially impacted". The EIS Mountaintop Technical Team reviewed plans on 11 sites and concluded that there would be a 90.9% reduction in mineable coal. 13-1-4

The above mentioned plan review is the only actual site-specific study in the EIS. Additionally, the Phase I and II, Economic Studies are seriously flawed models as discussed at the October 17, 2002 EIS Economic Meeting in Charleston, WV. Therefore, many parts of this draft EIS are not supported by accurate, fact-based studies. Conclusions drawn in the EIS, and any actions taken in response to these conclusions, may be considered arbitrary and capricious. Any actions taken as a result of this EIS would need to be justified by separate, accurate, fact-based studies and not rely on the information in the draft EIS. 11-9-2

Environmental and Process Benefits

On page ES-8, the No Action Alternative, as well as elsewhere in the EIS, is inaccurately characterized. A true No Action Alternative presents no changes. This is not the case with coal mining regulation. Since 1998 the SMCRA, EPA and COE programs (particularly the COE's requirements) have been changing and continue to change. For example, the COE has informed the Virginia DMME that it intends to develop standard operating procedures to try to achieve some consistency between COE districts. In addition in Virginia the COE and the Nature Conservancy are developing an MOU for an In-Lieu Fee Program for mitigation of stream impact. West Virginia has implemented new state specific laws and regulations that change mining rules in West Virginia but not in other states in the study area. As such it is impossible for the EIS to accurately describe the first option as a No Action Alternative. This option should be recharacterized as an option that would continue the existing SMCRA, EPA, and COE regulatory programs, including past and ongoing amendments to the processes.

1st full paragraph, page ES-9, the reference to the 250-acre limit in West Virginia states that use of the 250-acre limit has reduced the number of valley fills. This statement fails to note that restricting fills to watersheds less than 250 acres resulted in numerous instances of many more fills being proposed in order to stay below the 250-acre threshold. Instead of 3 or 4 large fills a dozen or more smaller fills were proposed. The implication that the 250-acre limit helped reduce the number of fills cannot be supported. 12-2-4

In the next to last paragraph, page ES-10, the EIS states that an MOA would be developed under Alternatives 1, 2 and 3. The EIS does not discuss the difficulty in establishing and implementing such an MOA. It has been the experience of Virginia DMME that obtaining such an MOA is very difficult.

- Approximately three years ago, DMME approached the Norfolk District COE about developing an MOA. The COE declined to enter into discussions on development of an MOA.
- DMME tried unsuccessfully to enter into an MOA with the Virginia Field Office of the U.S. Fish and Wildlife Service (USFWS). The USFWS tried to make all DMME

permitting actions federal undertakings through language in the MOA. This would have lead to a USFWS takeover the state's role in permits involving T&E species on mine sites. When the USFWS was unable to get DMME to agree to this approach they declined to continue working on an MOA.

- The 1996 "Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977" spells out the process to be used for consultation between state SMCRA agencies such as DMME and USFWS. USFWS staff in Virginia do not follow its guidance.

Until the federal agencies show acceptance of existing agreements and flexibility in drafting new agreements that will meet the needs of all parties, the MOA approach is likely to fail and any alternative relying on use of MOAs is questionable.

Actions and Alternatives
In the list of cooperative efforts by the "federal and/or state agencies", 5th bullet, page ES-7, the COE is currently requiring post mitigation monitoring for a period of five years. Under SMCRA areas that are remined are eligible for bond release after two years. The two-year liability period was put into place as an incentive for remining and reclaiming abandoned mined lands (AML). To require all SMCRA permits to implement the five year monitoring and liability period would be counter productive. EPA has documentation that remining and reclaiming AML areas will improve water quality. Any cooperative effort between the agencies should give deference to remining activities as required by the 1992 Energy Policy Act and the Rahall Amendment to the Clean Water Act, and not uniformly incorporate existing COE standards across the whole SMCRA program. 12-2-4

In the list of "OSM and/or state SMCRA regulatory authorities" efforts, 4th bullet, page ES-8, the EIS proposes "if legislative authority is established by Congress or the states, require reclamation with trees as the postmining landuse." The EIS steering committee was advised several times that this is not feasible. Due to multiple mineral and surface ownership issues, and the fact that many permit applicants do not own the surface but rather have a non exclusive right of entry to mine the coal and reclaim the area. The control over the type of vegetation to be replaced will remain primarily with the surface landowner. The EIS is not authorized to intrude into private ownership rights as suggested here. While in Virginia over 85% of mined land is reclaimed to forested use, some Virginia landowners wish to have hayland and pasture as a postmining land use. These sites are actively managed by the landowners and are productive hayland pastures. This recommendation should be removed from the EIS.

Chapter I – Purpose and Need
I.A Introduction
On Page I-1, the EIS goes beyond the true definition of "mountaintop mining". The EIS defines the term "mountaintop" as the "summit of the mountain". In reality, the draft EIS addresses all area from the valley floor to the summit. ("Surface coal mining occurring on mountaintops, ridges, and other steep slopes…). The use of the term "mountaintop mining" in the draft EIS should be changed to reflect the broad effect of actions proposed in the draft EIS.

3

The EIS classifies fills as "valley fills", ignoring the existence of other types of fills such as bench fills and side hill fills. (See also note I. E. – where excess spoil fills, otherwise known as valley fills" - and I. F, 1 on page I-5 – chronology may be misleading if reference to valley fills is also encompassing other types of excess spoil disposal areas.) The EIS should accurately characterize the types of fills it is addressing. Without this characterization, any requirements implemented as a result of this EIS could perversely affect the use of these other types of fills. For example, there are significant environmental benefits from utilizing pre-existing benches for the placement of excess soil - eliminating miles of pre-Act abandoned highwalls.

The EIS was initiated and developed by the federal agencies in partnership with West Virginia. West Virginia was a signatory to the Settlement Agreement; the other primacy states were not. The Introduction section should recognize that the other Appalachian states were not formal parties to this EIS and that the recommendations in the EIS may not be appropriate in these other states.

I.B Proposed Action and I.C Purpose of the EIS 12-2-4
The EIS recommends the OSM, EPA and COE establish a uniform federal mandate in the Appalachian coalfields. This was developed primarily on conditions in West Virginia. The EIS does not recognize the unique differences in the types of coal mining operations in Virginia (and other Appalachian states) as compared to conditions in West Virginia. If the EIS process is continued, the EIS should be revised to reflect the differing conditions among the Appalachian states.

I.D Need for Proposed Action
On page I-3 the opening paragraph states that impacts in the study area are at least as significant as impacts in other areas, and that the measures to address the impacts in the study area would be adequate for other areas. This one-size-fits-all approach does not recognize that the impacts from coal mining are significantly less in some areas and that the proposed measures in the draft EIS are greater than is needed in these areas.

On page I-8, the draft EIS discusses the Bragg 1998 Settlement. This settlement agreement was signed by the federal agencies and West Virginia relative to MTM/VF. However, Virginia and other primacy states in the Appalachian coalfields were not signatories to such and are not bound by the terms and conditions of the agreement. This EIS assumes that the federal agencies, via oversight, would compel other state compliance as a condition of maintaining their regulatory programs. (Note Page I-9 – "to aid in the objective of increased scrutiny of permits.") The federal agencies should not unilaterally implement a voluntary consent agreement in non-signatory states. The draft EIS should not assume that the processes agreed to in the consent agreement are needed in the other states or would be done. 1-6

The 2000-2003 Chronology –states that, "Following the permitting changes instituted pursuant to the *Bragg* settlement agreement and other unrelated factors, the average number of fills/year approved in the EIS study area declined…." The EIS did not note that the decline was due in part to the COE's moratorium on issuing 404 or NWP 21 permits - which resulted in a tremendous backlog of permit applications in West Virginia & thus less fill approvals. Any assumption that the permitting changes instituted pursuant to the Bragg settlement agreement has 13-2-4

4

a positive effect on the number of approved fills per year may not be supported by the actual conditions in the West Virginia regulatory program. 13-2-4

Chapter II
Summary of Alternatives
The EIS process should be ended at this point and the OSM, EPA, and COE programs should be continued as they are in effect today. The action alternatives cannot be supported by the record in the draft EIS. Many of the studies used to develop the EIS are flawed. Conclusions are based on either incorrect or limited data. It would be prohibitively expensive and timely to fix these problems sufficiently to support any action alternative. If the EIS process is not stopped, then the federal agencies should adopt Alternative 3. This would recognize the unique expertise of SMCRA agencies in evaluating the effects of mining operations on the environment, and lead to a more efficient and effective outcome than the other alternatives. 1-4

There are some specific problems with items in Chapter II as outlined below.

On page II.B- in section 3a, there is a regulatory process benefits discussion concerning a joint application form. The EIS concludes that use of common data elements in a joint application form could result in more efficient analytical approaches among agencies. DMME is concerned about the administrative difficulty and costs of developing one joint application form. Different agencies use various software and data capture systems. All electronic permitting systems used by state and federal agencies would have to be compatible to achieve the intended results. This may cause major system modifications for some and use of new systems for others. The draft EIS does not account for the cost or effort needed to harmonize these systems. Such cost may negate the benefits of a consolidation effort. 12-2-4

On page II B-15 b, under Distinguishing Process Benefits, the EIS discusses use of a coordinated regulatory review. This would be efficient only as long as each agency completed reviews in a timely manner. For example, if federal agencies could not meet state regulatory review schedules, state regulatory agencies would be left with a backlog waiting for comments from other agencies. In Virginia, federal agencies have not been able to meet state processing guidelines. The EIS should account for the cost of this type of delay.

Chapter III
Chapter III.C – Appalachian Aquatic Systems
There are errors in grammar, spacing, and organization throughout the draft EIS. Chapter 3 Part C contains several. Generally, the report is fragmented and difficult to follow. Problems with the presentation of material in the EIS, including Chapter 3 Part C, bring into question the reliability of much of the information and conclusions in the report.

Chapter III.D - Impact Producing Factors to Headwater Streams from Mountaintop Mining
Chapter III, Part D states that it has not been determined if drainage structures associated with mining can provide benefits that could offset aquatic impacts. However, study has shown that ponds do provide such benefits. A Virginia Tech graduate study titled Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia by Timothy Merricks with Dr. Donald Cherry concludes that settling ponds input organic enrichment that enhance collector filterer populations, including benthic macroinvertebrates and *in situ* test clams. 6-6-4

Chapter III, Part D, page III.D contains the statement that further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community structure and function are needed. Virginia's Department of Mines, Minerals, and Energy (DMME), through its contractor Map Tech, Inc, has completed two Total Maximum Daily Load (TMDLs) studies that utilize a regression analyses methodology to correlate stream water chemistry and biological health. The work shows linkages between general benthic health scores and a combination of chemical stressors, as well as a particular pollutant and a specific benthic metric. 5-5-5

Chapter III.E – Coal Mine Drainage from Surface Mining
On page III.E-2 of part 2, the definition of Coal Mine Drainage (CMD) as drainage from surface mining that causes water quality problems is unusable. This definition could include drainage from most mined lands through out the study area. Yet Table III.E-1 (page III.E-7) indicates that only 10 CMD sites are identified for all of Kentucky and only 26 CMD sites are identified in Virginia. The Virginia number is from Virginia's AMD inventory and represents long-term pollution discharges. Also, the number of active permits shown in Virginia is incorrect. The 26 sites in Virginia represent all long-term pollution discharges in Virginia from active and non-active sites. 5-5-4

On page III.E-6 in the first paragraph of Part 2 (b), the narrative seems to use CMD and acid mine drainage (AMD) interchangeably. These terms are not interchangeable and should not be used as such.

The draft EIS indicates on page III.E-13 that Virginia is actively working with the EPA in pursuing a regulation change to the Clean Water Act (CWA) for discharges from coal remining sites. Virginia is currently not pursuing a CWA regulation change. EPA promulgated the remining rule January 23, 2002.

Chapter III.F – Appalachian Forest Communities
Page III.F-12 characterizes reclaimed mined lands in the study area as, "... often limited in topographic relief, devoid of flowing water, and most commonly dominated by erosion-controlling, herbaceous communities". This characterization is not accurate for reclaimed mined lands in Southwest Virginia. Eighty-five percent of reclaimed mined lands in Virginia are returned to forests. Most reclaimed mined lands in Virginia are returned to the approximate original contour including re-establishing drainage patterns. 7-6-4

Many of the generalizations made about the study area do not or should not apply to Virginia's coalfields. It is clear that many of the referenced studies included in the Appendix and narrative in Chapter 3 do not include Virginia. It's unclear and, most readers/reviewers will probably be unsure, if Virginia's seven coalfield counties were part of the area actually studies for the EIS.

Chapter III.K.2 - Trends in Valley Fills
Page III.K-36, section d. Virginia Valley Fill Size Trends, the data for Virginia is misleading. During the period of 1998 to 2002, Virginia did not distinguish between backfill and excess spoil designations for multiple seam mining. Spoil placed above the lowest coal seam mined was deemed to be excess spoil if there was a valley fill at that location below the lowest coal seam mined. This resulted in an overstatement of the footprint of valley fills during that period. Beginning in 2002, only excess spoil placed below the lowest coal seam mined on steep slopes was determined to be valley fills as this is the actual definition of excess spoil. Spoil placed above the lowest coal seam mined is now defined as backfill. Therefore, the statements in this section that characterize the total and average valley fill acreage in Virginia are larger than actual, and should not be used. 13-3-4

Chapter III. L - Mine Feasibility Evaluation and Planning
General Considerations:
Page III.L-3 In section c, "Reclamation Bonding" the last full paragraph reads in part "Complete release of reclamation bonds on a given area typically requires five years after completion of reclamation,". This section should also note that areas that are remined are eligible for bond release in two years. 12-2-4

Chapter III. M - Coal Distribution and Markets
Page III.M-7, the last paragraph appears to be inaccurate. Virginia has more than 52 mines and West Virginia certainly has more than 35. It is unclear if this is meant to be the number of surface mines or the combined total of surface and underground mines. In addition VA DMME is incorrectly cited as the source of the information on Kentucky mines or production. DMME did not provide this information. 11-8-4

Chapter III.P – Demographic Conditions
The descriptions of demographics, economic conditions, and historic & archaeological resources do not accurately portray Virginia's coalfields. Some statements could lead one to believe that the writers were not sure of the location of Virginia's coalfields. Examples include placing the Blue Ridge Parkway in Virginia's coalfields and using the Thunderbird Paleo-Indian site in Virginia's Shenandoah Valley as an example of local archaeological resources. The study identifies tourist attractions in Kentucky, West Virginia, and Pennsylvania, but says that none of the Virginia study area counties are tourism destinations. Many examples of tourist attractions equivalent to the ones identified for the other states exist within Virginia's coal counties – like state parks & national forests. The report's errors and failure to highlight known Virginia tourist attractions indicate that the writers were not familiar with the area. These errors add to the lack of credibility of the draft EIS. 10-2-4

Chapter III.Q - Economic Conditions
The socio-economic studies on community impacts do not adequately address the effects that loss of coal-mining jobs would have on communities in the Appalachian coalfields. The EIS should also look at past studies or perhaps do new studies on communities impacted by the loss of or significant reductions in mining. A classic example to study would be communities that were developed by mining companies such as Lynch, KY. When the U.S. Steel mining operation was sold to Arch, the community suffered significant impacts. It had previously been 11-9-2

7

supported almost entirely by the company, U.S. Steel, with even the basic infrastructure being maintained by the company. With the purchase by Arch the community had to start providing this support and maintenance itself.

When communities suffer near or complete loss of mining, a marked change in the demographics of the community eventually occurs. With the loss of the economic base that once supported the community, a loss of younger community members occurs as they leave to find employment in other areas. Eventually the community winds up with an unusually high number of vacant houses - people are unable to sell the houses since the real estate market usually plummets in these areas. The population of the community consists of a majority of elderly retired persons on fixed incomes. The tax base is impacted to such a degree that the community can no longer maintain the infrastructure required for a community, schools, water, sewer, etc. It often takes large infusions of grant money to keep the community intact; even then the demographics do not change. Dante and Trammel are two such communities in Virginia and it is certain that there are many in West Virginia in the same position.

The EIS should address the impact any decrease in mining would have on the federal Abandoned Mined Land (ANL) program and the UMWA Combined Benefit Funds when looking at the potential loss of mining as the result of the EIS alternative. The AML fund receives its revenue from the coal mined by companies, currently at a rate of $ 0.35/ton for surface mined coal. The AML fund is used in part to fund water projects to communities whose water supplies were previously impacted from AML mining. States can use up to 30% of their AML allocation to fund these water projects. Virginia funds two water projects a year from the AML grant. The socio-economic impacts of the loss of all or part of this community water project funding must be considered. The UMWA Combined Benefit Fund receives significant funding from the AML trust fund to make up short falls from company contributions. Reductions in AML fees paid, as the result of restricting mining must be considered. The socio-economic impact of the impact to the UMWA Combined Benefit Fund must be considered. When considering this impact it must be recognized that many if not most of these pensioners live in the communities discussed in the previous paragraphs. 11-9-2

The EIS should consider that significant reductions or loss of the AML fees would also have a significant impact on future land reclamation. State AML programs fund land reclamation construction projects that protect the public health and safety. The socio-economic impact of not having funding to address public safety and health hazards to coal field residents should be addressed.

States are depending upon remining operations to be part of the TMDL implementation plans in the coalfield areas. AML programs lack sufficient funds to reclaim low priority environmental problems (environmental problems are not high priority projects under the AML program) such as what would be included in TMDL implementation plans. Some states also have received approval to use up to 10% of their AML funding on AML acid mine drainage (AMD) projects. This AMD corrective activity would be impacted with the loss of funding from the AML program.

8

These socio-economic impacts to coal field residents from reductions in coal mining must be considered in the EIS.

Chapter III.V – Relationship of Surface Mining and Air Quality
The draft EIS states that Black Lung is a condition prevalent in coal mine workers who have worked in underground coal mines for a period of eight years or longer. The report includes six pages discussing the impacts of black lung on the residents of the study area. This information has little to do with the consequences of MTM/VF, other than if coal mining shifts from surface mining to underground mining. This irrelevant information should be deleted from the report. 15-2-4

<u>Chapter IV</u>
Environmental Consequences
The last paragraph on Page IV.A-3 is misleading to the reader. The author of the document describes a condition of a mine site not having a post mining land use of forestry that may take hundreds of years to revert to forestry. There are sites that are reclaimed as hayland/pasture. The land usable for farming in the coalfield counties of southwestern Virginia is very small. Post mining land uses of hayland/pasture are welcomed and are used by landowners. The report should not imply that forestry is the only desirable use of reclaimed mine land. 19-3-4

The page IV.B-1 section titled Consequences Common to the No Action Alternatives and Alternatives 1, 2, and 3 should take into account the headwater streams that are replaced with diversion ditches and drainage systems in and around fills. In addition headwater streams disrupted or severed by prior mining activities are often reconnected to lower stream reaches when the highwalls on abandoned mined land are remined and backfilled. 5-7-4

On page IV.B-4, the third paragraph discusses the potential release of toxic materials into the environment by mining operations. Studies in Virginia have not shown any toxic waters from valley fills. Also, water quality standards are monitored on a regular basis by DMLR inspection staff for compliance with water quality standards. 5-5-4

None of the stream studies referenced in this document were conducted in Virginia. Therefore, conclusions regarding streams may not be valid for Virginia.

Page IV.F-1 section Energy, Natural, or Depletable Resource Requirements fails to mention that one of the requirements of SMRCA is to maximize coal recovery. The EIS authors should recognize this statutory mandate when evaluating alternatives.

The language on page IV.G-3 gives readers the impression that mountain top mining is displacing local communities. There is no evidence of this in Virginia. In Virginia, people in these coal camps were leaving the area long before mountain top mining began to be practiced. The coal companies that constructed these camps have long since shut down and left these camps to deteriorate. With no sewer systems or public water systems, residents began leaving. With no jobs any longer available, children graduating from schools left the area for work. Mountain top mining did not create this condition. Additionally, any actions taken as a result of this EIS that restrict future mining would further harm local economies and hasten the decline of these communities. These consequences should be recognized in the EIS. 10-2-4

9

<u>**Appendix D – Aquatic**</u>
General Comment
Many of the studies cited do not address Virginia. Virginia conditions, both on the ground conditions and the effectiveness of Virginia's coal surface mining regulatory program, differ from West Virginia and Kentucky. Conclusions based on these studies may not be applicable in Virginia. Notes on specific studies follow. 6-6-2

A Review of Wetland Resources in the Steep Slope Terrain of West Virginia
No Virginia study information included. 5-3-2

The Value of Headwater Streams: Results of a Workshop, State College, Pennsylvania, April 13, 1999
No Virginia study information included. It should be noted in the EIS that remining of AML areas would often reconnect headwater streams to lower reaches. These streams were originally disrupted by AML mining activities. The headwaters empty onto the AML bench, then flow down the bench, eventually flowing over the bench at a low point by passing the lower reach of the stream. By remining and backfilling the AML highwalls these streams can be re-connected. 6-6-2

A Survey of the Conditions of Streams in the Primary Region of Mountaintop Mining Valley Fill Coal Mining
Streams assessed during the study that contained residential development were the most impaired. Because several stressors, including mining activities and residential development could cause the observed impairments, no specific conclusions were reached. Although issues regarding conditions in sediment control ditches associated with fill construction are identified, very little useful data was provided to characterize conditions in those structures.

Kentucky Mountaintop Mining Benthic Macroinvertebrate Survey
The study has very limited usefulness because it was specific to only four Kentucky counties and samples were collected just a single time at twelve stream sites in May of 2000. The study's conclusions that mountain top mining and valley fill (MTM/VF) construction negatively impacts benthic health do not match similar study results from Virginia. See the research report "<u>Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia</u>" by Timothy Merricks with Dr. Donald Cherry. Also, the last paragraph of the study report indicates that the impacts to benthic health from MTM/VF activities relate to deforestation. Forest is the most common post-mining land use in Virginia. This differs from Kentucky reclamation practices and therefore the conclusions of this report do not seem applicable to Virginia. 6-4-2

Ecological Assessment of Streams in the Coal Mining Region of West Virginia Using Data Collected by the U. S. EPA and Environmental Consulting Firms
As with the Kentucky report, the study has limited usefulness because in was specific to West Virginia. Seasonal data was collected from five West Virginia watersheds. No Virginia study information was included. The study's conclusions that mountain top mining and valley fill (MTM/VF) construction negatively impacts benthic health do not necessarily match similar study results from Virginia and West Virginia. The research report "<u>Ecotoxicological Evaluation</u>

10

of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia" by Timothy Merricks with Dr. Donald Cherry do not support this conclusion.

A Survey of the Water Quality of Streams in the Primary Region of Mountaintop/Valley Fill Coal Mining
No Virginia study information included. The same five West Virginia watersheds were used for the chemical water quality survey as for the ecological survey. 5-5-2

A Survey of Eight Major Aquatic Insect Orders Associated with Small Headwater Streams Subject to Valley Fills from Mountaintop Mining
On page 3 of this study, no indication if any of the streams sampled had been adversely impacted by past mining, logging, or other activities. 6-4-4

Flow Origin, Drainage Area, and Hydrologic Characteristics for Headwater Streams in the Mountaintop Coal-Mining Region of Southern West Virginia, 2000-01
The areas in this report are limited to southern West Virginia. No Virginia information is included. 5-4-2

Appendix E – Terrestrial
General Comment
Regional experts were not used for these studies. Experts outside the study area were used. No studies were conducted in Virginia. Refer to Appendix G comment concerning the article by the Society of American Foresters. Handel's report has no mention of amount of trees being planting by landowners today. Handel also noted that the studies were short in duration. Conclusions should not be drawn when insufficient information is obtained to back the conclusions.

Handel Terrestrial Report
"Trees that were obvious parts of an implemented planting program (determined by plantation spacing and diameter at breast height) were not included in the counts, as these did not naturally arrive on the sites and are not part of any invasion process. Any offspring produced by planted individuals were included in the data, however. We were not interested in survival of the planted trees, as all planted species we encountered are either forestry created hybrids or non-native and in fact illegal to plant in many states. Data were entered on computer databases for further study." This statement in the Handel report is an example of the types of flawed information the EIS contains. Handel references a study by Karen Holl that concluded, "The research reviewed above showed plant communities on mine sites reclaimed within the past 30 years developed into ecosystems that resemble the native hardwood forests. Although all species in surrounding forests were not found on the mined sites, the reclaimed-mine forests are still very young relative to the native hardwood forests which had developed over much longer time periods. Research has shown that reclamation practices have a dramatic influence on the rate of forested ecosystem recovery on unmanaged reclaimed mine sites, and on their long-term productivity and economic value. Practices that encourage ecosystem recovery are compatible with and complementary to those that may be used to establish commercially viable, productive hardwood forests on reclaimed mine sites." Handel described the Holl paper as follows. "An in-press article by Holl (2002) shows the potential for reinvasion and recovery on reclaimed surface mined lands. It is extremely important to note that, like the Skousen article, her study was comprised of pre-law 7-5-2

sites dating back to 1962 reclamations. She does not report how many of the 15 sites were post-law (post 1977), but her three age classes for the mines are 1962-1967, 1972-1977, and 1980-1987. Also, the mines in that report are small ¼ hectare parcels, not comparable to the large mountaintop removal areas subject to this study. The Holl study sites, only 62.5 x 40m in size, examined areas very close to seed sources, within "5-50 m from unmined forests." When Virginia Tech was asked to respond to this assertion by Handel, DMME received the following reply. "Karen (Holl) did look at larger pre-law mines, but her actual study plots are what are being sized out here. He (Handel) should be nervous because he completely mis-represented her work after she talked with him about it and offered to assist him in the interpretation." The use of experts not familiar with the region leads to these type of mistakes. Handel presumes that all mines are of the scale of large mountaintop removal operations several thousand acres in size. That is not the case in Virginia. 7-5-2

Edge Bird Populations
No studies were conducted in Virginia where the typical permit size is smaller than sites used in the study. Therefore, the conclusions in the report may not be applicable to Virginia.

Page 2 of the study gives the reader the impression that all surface mines leaves huge tracts of grasslands. This is not true in Virginia. More than 85% of all mined land in Virginia is returned to forestland. 7-3-2

Vertebrate Study
This study focuses only on grasslands. The author of this report should note that not all reclaimed mine sites have a post mining land use of hayland/pasture (grasslands). No studies were conducted on mine sites in Virginia that have been reclaimed to forestry. Therefore, the conclusions may not be applicable to Virginia lands. 7-1-2

Appendix G
Mountaintop EIS Technical Report
On page 1 of the Executive Summary second paragraph states that 14 sites that were chosen for this study were all located in West Virginia. No sites in Virginia were part of this study.

On page 1 of the report under the heading of Methodology, the report indicates that there were differences between the sites chosen because of different geographic and geologic settings. There are also differences from the areas in Virginia as well. Virginia does not have the multiple coal seams available that allows for mining mountaintop removal operations like those in West Virginia. 11-8-2

Page 2 under the heading of Conclusion, it is noted that the lower end of the ephemeral stream are very high in the valley thus restricting the amount of fill that could be placed in the fill. According to Virginia estimates, approximately 70%-80% of area currently being mined is previously mined land. In these cases, the ephemeral stream has been buried or disrupted by being cut through by mining. This report does not take into account the impacts to stream from past mining.

Land Use Assessment
This is a West Virginia Study. No other states are mentioned as being included in this study area. Therefore the data and conclusions may not be appropriate to Virginia.

Table 7on page 13, under the heading of Current Mining Permits Methods and Results, only lists land uses that could be easily identified. The report should include areas that have been reclaimed and post-mining land uses implemented. Also, table 4 does not include land uses such as residential, commercial or industrial.

The last paragraph on page 17 and the first paragraph on page 18 are either stated wrong or are misleading. State and Federal governments (SMCRA authority) do not have control over post-mining land uses. SMCRA authorities are charged with approval and monitoring implementation of the post-mining land use. SMRCA authorities do not control landowner rights or local zoning requirements. Landowners and local zoning and planning agencies control what post-mining land use changes are selected. SMCRA only requires that the site has an equal or higher post-mining land use.

Page 31 paragraph 2 under Land Use Planning and Decision Making for Specific Mine Sites states that, "land use decision-making is generally focused on identifying site-specific rather the regional development potentials". This is not always the case. A regional development authority that actively considers regional development potential serves the Virginia coalfield region.

This EIS does not reflect the following facts listed in a publication on the Internet by the Society of American Foresters (http://www.safnet.org/aboutforestry/facts.cfm), reads: 10-3-2

- There are a total of 247 billion trees above 1" diameter in the US on all lands, according to the last forest inventory.
- The science of forestry was established in the United States at the turn of the century, at a time when vast areas of forests had been cut down with little thought of the future. Foresters have done a magnificent job in restoring America's forests. Our forests now grow nearly four times more wood each year than in 1920.
- There are 747 million acres of forestland in the United States, about 71% as much as there was in 1630.
- America's forests are owned by private individuals (54%), public agencies (37%), and private industries (9%).
- Each year about 1.4 billion tree seedlings are planted – roughly four million a day – more than making up for those that are harvested. If you include naturally regenerated trees the net growth exceeds the harvesting by 33% due to good forest management.
- The average American uses about 749 pounds of paper every year and 95% of the houses built are done so using wood. That means that the average person uses the equivalent of a 100-foot high, 16 inches in diameter tree each year for their wood and paper needs.
- Parks, wildlife refuges, and other preserves span 166 million acres of the nation's total land mass; and the National Wilderness Preservation System covers an additional 104 million acres – a total of 270 million acres set aside for parks, refuges, or wilderness areas.
- The forest industry ranks among the top 10 employers in 40 of the 50 states.

13

- About 45 percent of the paper consumed in the United States is recovered for recycling. Recycled paper, however, is not "pure" so it must contain some new wood fiber for strength.
- Three well-placed mature trees around a house can cut air-conditioning costs by 10-50 percent, while trees and other landscaping can increase property value by 5-10 percent.
- One mature tree absorbs approximately 13 pounds of carbon dioxide a year. For every ton of wood a forest grows, it removes 1.47 tons of carbon dioxide and replaces it with 1.07 tons of oxygen.
- Today, the United States has about the same amount of land covered by trees (or slightly less) as it did in 1907.
- Species such as whitetail deer, wild turkeys, and wood ducks were almost extinct at the turn of the century. Wildlife conservation and habitat enhancement has resulted in flourishing populations of these and other species we now take almost for granted. Now, foresters are working with other professionals to improve habitats and ensure survival of other wildlife species. 10-3-2
- Until the 1920s, forests were generally logged and abandoned. Now, across the country an average of 1.7 billion seedlings are planted annually. That translates into 6 seedlings planted for every tree harvested. In addition, billions of additional seedlings are regenerated naturally.

This information contradicts studies within the Draft EIS that deal with forestry and the extent of tree planting. The Draft EIS states that huge tracts of forestlands are being converted to grasslands. These conflicts should be reconciled in the EIS.

Phase I and II Economics Study
The Phase I study of potential reduction in mining from actions taken as a result of the EIS used a technically incorrect model based on West Virginia terrain. The results of this model were then used to project reductions into Virginia. The results of this projection were then used to project economic effects in Virginia. These economic projections should not be used as they are based on projections made from an inaccurate technical model.

Additionally, the January 2003 Hill and Associates report, page 1, states that coal from deep mines will grow and make up the lost tonnage because of valley fill restrictions. Deep mining will not replace coal that cannot be mined under this proposed EIS. Any restrictions developed as a result of this EIS will affect deep mines as well as surface mines. It would be as difficult to permit new slurry impoundments or existing slurry impoundments expansions as it would be to permit new surface mines. The EIS recommendations will apply equally to these structures as they would to valley fills. The EIS should account for this impact. 11-8-2

Appendix H
General Comment
These studies are not necessarily representative of conditions on Virginia. Almost all surface mining in Virginia involves remining in some way. This typically takes the form of AML highwalls being second cut and AML highwalls backfilled with excess spoil. Some permits have no valley fills as 100% of the spoil can be disposed of on AML benches. No studies have been done for the EIS to document these issues in Virginia and as such the EIS cannot purport to represent conditions in Virginia.

14

Appendix K
Final Report of the Joint OSM Special Study on Drainage Control (Dec., 1999) – conducted in Kentucky
Report findings – "no corroborating evidence to support allegation that surface mining operations had an adverse impact on the flooding potential for citizens and residences downstream, when DSMRE's hydrologic policies and procedures were followed." In Virginia no instances of mining related flooding other than from AML sites or blowouts from underground mines have been documented. While no Virginia sites are addressed in this study, DMME's experience supports the findings from Kentucky. 17-1-2

15

Comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement

The Kentucky Environmental and Public Protection Cabinet (Cabinet) is the newly established agency with regulatory responsibilities for the program areas that are the subject of the Draft Mountaintop Mining/Valley Fills in Appalachia Programmatic Environmental Impact Statement. The Cabinet hereby requests that it be afforded an additional three (3) weeks to provide its comments. Those policymakers responsible for the provision of the comments were installed in the last two (2) weeks. They have not had the opportunity to review the issues due to the recency of their appointments and the reorganization of the agencies with programmatic responsibility and, therefore seek this extension of time. 3-5

REC'D JAN 2 6 2004

Ernie Fletcher
Governor

LaJuana S. Wilcher
Secretary

Commonwealth of Kentucky
Environmental and Public Protection Cabinet
Office of the Secretary
Capital Plaza Tower
Frankfort, Kentucky 40601

January 21, 2004

Mr. John Forren
US EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Draft Programmatic Environmental Impact Statement

Dear Mr. Forren:

The Kentucky Environmental and Public Protection Cabinet (EPPC) welcomes the opportunity to submit comments on the Draft Programmatic Environmental Impact Statement (EIS) on mountaintop mining/valley fills prepared by the U.S. Army Corps of Engineers (COE), the U.S. Environmental Protection Agency, the U.S. Department of Interior's Office of Surface Mining and Fish and Wildlife Service and the West Virginia Department of Environmental Protection. EPPC is a new state agency created by executive order of Governor Ernie Fletcher entered on December 23, 2003, and is charged with responsibility for regulation of the environment and the protection of Kentucky's natural resources, among other things. EPPC's responsibilities include administration of state programs implementing the federal Clean Water Act (CWA) and the Surface Mining Control and Reclamation Act (SMCRA).

EPPC is aware that its predecessor agencies in Kentucky have participated in a very limited manner in the development of the draft EIS that is under consideration. The unfortunate result is that the draft EIS does not fully reflect Kentucky's experiences in the regulation of mountaintop removal and valley fill mining activities or their impact on Kentucky's environment. EPPC pledges its full cooperation and greater participation in the federal agencies' future efforts to address this important issue.

The Fletcher administration is committed to the development of Kentucky's abundant mineral resources while protecting the state's natural environment. It would be difficult to conceive of a situation where such a balance of interests would be more appropriate than in the formulation of a workable approach to the regulation of mountaintop removal and valley fill mining activities. The viability of Kentucky's mining industry, an important part of our economic future, hinges upon the continued ability of the coal mining industry to conduct mining operations under reasonable regulatory constraints. On the other hand, Kentucky's

environmental future hinges upon the ability of government to ensure that this activity is conducted in a manner that minimizes adverse environmental effects and protects our aquatic resources and critical ecosystems. As a result, the successful completion of the objectives of this draft EIS is a matter of highest priority to EPPC.

EPPC believes that federal and state agencies involved in the regulation of mountaintop mining/valley fills should seek to accomplish two goals: to coordinate and expedite the review of applications to conduct mining activities, and to minimize the number, size and impacts of valley fills. EPPC is of the opinion that several of the alternatives considered in the draft EIS have the potential, if properly implemented, to help accomplish those goals. Accordingly, EPPC has no objection to the federal agencies' recommended alternative but strongly encourages consideration of the specific suggestions set forth below.

- **States should be encouraged to administer elements of the Section 404 permit program and adequate funding should be made available for implementation.**

Many of the procedural delays in the issuance of CWA Section 404 permits for coal-related activities could be minimized if states were encouraged to administer elements of the program under state programmatic general permits. In order for states to undertake such obligations, it would be necessary for federal agencies to provide a source of funding for such activities. Such federally-funded state activity could play a major role in the expedited permit review procedures contemplated under Alternative 2 of the draft EIS. 12-1-1

- **Clear and concise definitions and procedures should be developed and uniformly applied.**

A recurring issue has been the definition utilized by the COE for the determination of its jurisdiction over headwater streams in applications for CWA Section 404 permits for coal-related activities. Kentucky is encompassed in four different COE districts and the jurisdictional definitions vary from district-to-district. The development and application of uniform definitions for all COE districts would eliminate uncertainty on the part of state water pollution control agencies and regulated entities. Additionally, this action would provide a standard point of reference for determinations as to jurisdictional waters and provide clear and consistent guidance as to the point in streams at which nationwide permits may be utilized and as to the point at which individual COE permits must be obtained. 1-6

- **Conflict resolution procedures should be developed to resolve interagency disputes in a timely manner.**

Federal and state agencies should establish effective procedures for the resolution of inter-agency conflicts that arise during the administration of the programs that govern coal-related activities. For example, such procedures would be an essential program element if the COE utilizes state programmatic general permits to encourage state assumption of part of the administrative burdens of the CWA Section 404 permit program for coal-related activities.

Mr. John Forren
January 21, 2004
Page 3

- **Procedures for rendering final determinations should be developed that accommodate state administration of elements of the Section 404 permit program.**

Under the CWA Section 404 permit program disagreements between the COE and the Environmental Protection Agency are resolved by elevating the issue to the administrative heads of the two agencies for consideration with final resolution pursuant to CWA Section 404(c). Additional procedures for rendering final determinations should be developed to accommodate state administration of elements of the program pursuant to state programmatic general permits. 1-6

In addition to the comments outlined above, EPPC has identified a number of technical issues raised by the draft EIS that should be resolved prior to finalization of the document. These technical issues are discussed in the Technical Attachment to this letter.

EPPC respectfully requests your careful consideration of the comments set forth above.

Sincerely,

LaJuana S. Wilcher
Secretary

Attachment

TECHNICAL ATTACHMENT

A. Economic impacts to coalfield communities

The socio-economic studies do not accurately address the effect the loss of coal-mining jobs would have on the Appalachian coalfield communities or the effect mining activities may have on the development of the tourism industry. The Kentucky coal industry directly and indirectly employs over 56,000 and is a $3.15 billion industry (Kentucky Coal Council). Clearly, the coal industry has a dramatic influence on individual coal counties. Miners in Martin County represent nearly 30% of the workforce and over $41 million in wages, representing over 48% of the total county wages with an additional $1.8 million of coal severance taxes returned to the county. In Pike County, miners represented 15% of the workforce, with $182 million paid in wages and $3.3 million returned in coal severance taxes. 11-9-2

B. The "No Action Alternative" is improperly characterized

The "No Action Alternative" should be revised to acknowledge the many changes that have occurred in SMCRA and COE regulatory programs since the EIS was started. Since 1998 the SMCRA, EPA and COE programs (particularly the SMCRA and COE requirements) have been, and continue, to change. For example, in 2000 the COE Louisville Regional office advised the Kentucky Department for Surface Mining Reclamation and Enforcement (DSMRE) that it would develop regional conditions for CWA 404 NWP 21 authorizations. Because of these COE conditions, the DSMRE began developing or modifying a number of policies relative to: the permitting and mitigation of stream impacts (RAM #134); the construction of durable rock fills (RAM #135); inspection requirements for fills (Directive 36 – Division of Field Services). In addition, the COE and the KY Division of Water (DOW) have entered into an agreement that provides for an In-Lieu Fee Program for mitigation of stream impact. If these revisions are not made, "No Action Alternative" should be modified to describe the regulatory programs, policies and coordination processes, as they existed in 1998. 12-2-2

C. Remining/bond liability period

On page ES-7 (fifth item), the COE requires post mitigation monitoring for a period of five years. EPA has documented that "remining" of pre-SMCRA mined areas will improve water quality in associated watersheds. OSM and Kentucky have enacted statutes providing for a two-year liability period, in lieu of the normal five-year period, for remined areas in order to encourage these beneficial activities. The absolute five-year period required by the COE would constitute a disincentive to the industry to undertake mining operations in these areas that would otherwise be left in their present degraded condition. 1-6

D. Definition of Mountaintop Mining

The draft EIS, Page I-1, extends beyond the true definition of "mountaintop mining". The draft EIS defines the term "mountaintop" as the "summit of the mountain". 1-6

Page 1 of 5

However, the draft EIS is applicable to all types of surface coal mining (mountaintop removal, area, contour, etc.) in the steep terrain of the Appalachian coalfield. This would effectively include mining activity from the valley floor to the summit. ("Surface coal mining occurring on mountaintops, ridges, and other steep slopes…). Thus the use of the term "mountaintop mining" in the draft EIS should be changed to properly recognize the broader impacts associated with the actions proposed in the draft EIS. 1-6

E. Does not recognize different fill types

The draft EIS portrays all excess spoil fills as "valley fills". However, there are several different types of fills, characterized by elevation in the hollow, location and geometric configuration. The common types of fills are:

1. Valley fills – these structures are located in the valley floor and they cover or are adjacent to intermittent or perennial streams and, therefore, have the potential to constitute the greatest impact to the environment.
2. Hollow fills and head-of-hollow fills – these structures are located at mid and upper elevations in the hollow and would primarily affect intermittent and ephemeral stream reaches.
3. Side hill fills – these structures are small fills located in the ephemeral reaches or sub-watersheds of intermittent streams. 13-3-2
4. Bench fills – these fills are confined to existing mine benches, left as a result of mining prior to the enactment of SMCRA. They normally affect only ephemeral portions of streams above the mine bench. These fills often result in the elimination of pre-SMCRA highwalls, therefore, reducing threats to the safety of the public and wildlife utilizing these areas.

Without the above characterization, the application of the conclusions of the draft EIS in a broad manner may unnecessarily affect the utilization of some types of fills which can provide a benefit to the public and the environment without the associated impacts of the more invasive true "valley fills".

F. Recognizing the differences that exist from state to state

The draft EIS recommends OSM, EPA and COE establish a uniform federal mandate regarding "mountaintop mining" and AOC requirements. This recommendation was based primarily on mining methods and topographical conditions existing in the state of West Virginia. However, mining methods and conditions often differ dramatically in Kentucky.

In West Virginia, there are greater elevation differentials from valley floors to uppermost coal seams, resulting in larger excess spoil disposal areas and much larger plateaus with AOC variances. These conditions are infrequent in Kentucky. 1-6

Permitted areas in West Virginia tend to be larger, in that the rights to potential mining areas are held by large mineral holding companies. In Kentucky, permits are smaller due to many private landowner parcels.

G. Kentucky was not a signatory to the Settlement Agreement

The draft EIS discusses the Bragg 1998 Settlement on page I-8. The four federal agencies and the West Virginia DEP signed the MTM/VF settlement agreement. However, Kentucky and other primacy states in the Appalachian coalfields were not signatories to the settlement agreement and are not bound by its terms and conditions. This draft EIS assumes that the federal agencies, via oversight, would compel other states to comply as a condition of maintaining their regulatory programs. (Note Page I-9 – "to aid in the objective of increased scrutiny of permits.") The federal agencies should not unilaterally implement a voluntary consent agreement in non-signatory states. 1-6

H. Reduction in fills – as a result of regulatory uncertainty instead of improved coordination

The 2000-2003 Chronology –states that, "Following the permitting changes instituted pursuant to the *Bragg* settlement agreement and other unrelated factors, the average number of fills/year approved in the EIS study area declined…." The draft EIS failed to recognize that the decline was due, in part, to the COE's moratorium on issuing 404 or NWP 21 permits. This hesitancy resulted in a tremendous backlog of permit applications in Corps' Huntington Regional office so fewer fill permits were approved. The portrayal that the permitting changes instituted pursuant to the Bragg settlement agreement has reduced the number of approved fills per year may be somewhat misleading. 13-2-4

I. Aquatic Studies – do not accurately represent Kentucky streams

Although Kentucky concurs with (and uses) the EPA aquatic sampling protocols performed in West Virginia and Kentucky stream studies, Kentucky sampling locations were inappropriate as they do not truly reflect "mined" watersheds and reference streams. Data collected for the mined watersheds included impacts from logging, agriculture, residences and public roads as the sampling locations were a considerable distance from the mining operations. Sampling locations immediately below (downstream) of a mined area would identify the true impacts of the mining activity. Sampling sites for reference reach streams were located in extremely remote and restricted areas far removed from other industrial/commercial and public impacts. Similarly, sampling locations for an unmined area should be located at higher elevations, upstream of any non-mining impacts. Therefore, the selection of these streams does not represent typical unmined/mined watersheds in Eastern Kentucky. The second stream study conducted targeted selected species in perennial streams ("permanent headwaters"). The majority of mining operations in Eastern Kentucky affect ephemeral portions of streams. 6-4-2

J. Appalachian forest community – studies do not represent Kentucky streams Reforestation Initiatives

Page III.F-12 of the draft EIS characterizes reclaimed mine lands in the study area as, "… often limited in topographic relief, devoid of flowing water, and most commonly 7-6-4 dominated by erosion-controlling, herbaceous communities". This characterization fails to recognize the efforts of Kentucky's Reforestation initiative (RAM # 124) and the accompanying long-term benefits. The DSMRE started promoting reforestation as the post mining land use of choice in 1997. In cooperation with the University of Kentucky, a number of research areas have been developed that are providing great insight to the potential forest communities that can be established in the eastern Kentucky coalfields if reclamation practices are modified. Though the revegetation standards don't compel the establishment of all the different native species in the forest, the coal industry is required to satisfy diversity by establishing a number of different tree, shrub and ground cover species. Further, the grading practices advocated by this agency for reforestation will provide for invasion and natural succession. The "Kentucky Reforestation Initiative" is highly regarded by other state and federal surface mining programs, and is the standard by which other states model their own reforestation programs. 7-6-4

K. Valley fill trends

The information contained in the valley fill trends indicates that a significant number of fills have been approved for construction in the eastern Kentucky coalfields. We believe that the data in this section is somewhat misleading. In part, this is due to the confusion over the intermittent stream definition and similar confusion over the stream buffer zone. As a result of limiting fills to upper stream reaches, a larger number of smaller fills have resulted. OSM records reveal that most of the fills in Kentucky are small. As of September 2000, 4421 fills have been permitted since 1985. These approved fills are located: 81% in watersheds < 75 acres; 14% in watersheds 76-250 acres; 5% in watersheds > 250 acres. 13-3-4

L. Maximizing coal recovery is a regulatory requirement

In the list of technical study conclusions, page ES-4, last bullet, the statement that "The extraction of coal reserves in the study area **could** be substantially impacted if fills are restricted to small watersheds" should be changed to "**would** be substantially impacted". The EIS Mountaintop Technical Team reviewed plans on 11 WV sites and concluded the reduction of available fill volume resulted in a significant reduction in the coal reserves recovered. The original plans for the 11 sites reviewed would have produced 186 million tons of coal. By restricting the fills to the ephemeral streams, the total recovery is 16.8 million tons. That would be a 90.9% reduction in mineable coal. If the West Virginia study were extrapolated to the Appalachian coalfield as a whole, similar reductions in resource recovery would be anticipated in eastern Kentucky. However, federal and state requirements (SMCRA Section 102(f) and (k); 405 KAR 16:010 Section 2) mandate the conduct of mining operations so as to maximize the utilization and conservation of coal reserves, while minimizing the impact of those operations. Kentucky has taken steps to promote this issue through our "Remining Initiative" (RAM # 129). This program supports the recovery of remaining coal reserves on old pre-SMCRA mine sites, and also provides for the proper reclamation of these areas after remining. 13-1-4

Page 4 of 5

M. Postmining land use options/landowner participation

Page IV.A-3, the last paragraph is somewhat misleading. The author describes the condition of a mine site not having been reclaimed to a post mining land use of forestry, and explains that it may take hundreds of years to revert to forestry. There are many sites that are reclaimed to hay land/pasture in accordance with the desires of the landowners. Landowners who manage their property as hay land and pasture intentionally inhibit the natural succession and the development of a forest. The report improperly implies that forest is the only desirable PMLU for reclaimed mine land. 19-3-4

Page 5 of 5

REC'D OCT 2 3 2003

COMMONWEALTH of VIRGINIA
Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.state.va.us

October 20, 2003

Mr. John Forren
US EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Re: Draft Programmatic Environmental Impact Statement
DHR File # 2003-0789

Dear Mr. Forren:

We have received materials for review of the above referenced project. It is our understanding that the Army Corps of Engineers, the US Environmental Protection Agency, the Office of Surface Mining, the US Fish and Wildlife Service, and the West Virginia Department of Environmental Protection are preparing this document to assist in minimizing the adverse environmental effects of mountaintop mining in Appalachia.

As stated in Section III.S-1, Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to consider the effects of their undertakings upon historic and prehistoric resources. An undertaking is defined as "...any project, activity or program funded in whole or in part under either the direct or indirect jurisdiction of a Federal agency" (36CFR800.16(y)). 36 CFR 800, the regulations under which Section 106 review is implemented, requires that the review process be completed prior to issuance of said funding, permits or licenses. We recommend that this action be initiated as early as possible in the planning process so that our office may best assist you in identifying and addressing potential impacts to these resources. We ask that, prior to initiating consultation with our office, the Federal agency or it's designated contractor perform a search of our archives to identify historic and prehistoric resources that may be affected by the project. For more information on this process please access our website at http://state.vipnet.org/dhr/review. 10-2-1

Regarding statements made in Section IV.G-2, coordination with the SHPO should be approached from a procedural standpoint, rather than from the assumption that consultation will result in a determination of adverse effect and a single form of mitigation. It is the

Administrative Services
10 Courthouse Avenue
Petersburg, VA 23803
Tel: (804) 863-1624
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Ave.
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Portsmouth Region Office
612 Court Street, 3rd Floor
Portsmouth, VA 23704
Tel: (757) 396-6707
Fax: (757) 396-6712

Roanoke Region Office
1030 Penmar Ave., SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Winchester Region Office
107 N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

agency's responsibility to work with the SHPO to not only identify the scope of the project and any known cultural resources or resource potential within that scope, but to evaluate alternatives that may assist in avoiding adverse affects to significant cultural resources (36CFR800.6). Mitigation is the approach taken when other options have been determined infeasible. 10-2-1

We look forward to working with the above referenced agencies both in completion of this useful document and in review of applicable projects in the future. If you have any questions about the Section 106 review process or our comments, please call me at (804) 367-2323, Ext. 140.

Sincerely,

Joanna Wilson

Joanna Wilson, Archaeologist
Office of Review and Compliance

Organizations

AUG 18 2003 — -- RECD

MOUNTAIN REDBIRD MUSIC

August 11, 2003

Mr. John Forren
US EPA
1650 Arch Street
Philadelphia, PA 19130

Dear Mr. Forren:

I am writing to you to voice my strong belief that Mountaintop Removal should be stopped.

Mountaintop Removal is destroying the "skyline" of America. The magnificent Appalachian Mountains that reach to the sky are among the world's oldest mountains, and we are allowing them to be destroyed. 1-9

Along with the leveling of our majestic natural skyline, streams are being destroyed and drinking water is being contaminated. The blasting is damaging the surrounding homes, causing air pollution, destroying hardwood forests and wildlife habitats.

Mountaintop Removal defies the Executive Order regarding Environmental Justice for low-income people. 10-7-2

There is nothing good about it. No good comes of it. Please stop it.

I am taking my 12-year-old son next week on a trip from our home in Brooklyn, New York, to see the beautiful Appalachian Mountains. I am saddened by the thought that the possibility exists that when he is a parent he will not be able to do the same for his children.

Yours truly,

Tina Aridas

TINA ARIDAS
MOUNTAIN REDBIRD MUSIC
565 9TH STREET ● BROOKLYN, NY 11215
718-965-8490 ● 917-514-5364 ● TINA@JAMESREAMS.COM
WWW.JAMESREAMS.COM

If There Were Nothing To Mine

by T.Aridas/J.Reams, BMI ©2002 Mountain Redbird Music
718-965-8490 info@jamesreams.com

They tunneled deep into the hills of my county
The mules and the ponies went blind underground
The men and the boys got sick from the coal dust
A deadly affliction for pennies a pound

If God had not put coal in these mountains
If there had been nothing but rock, dirt and trees
My Daddy'd be walking these hills in the springtime
Not living a hard death of black lung disease

Now dynamite blasts off the tops of these mountains
And big machines carve out the coal from the seams
They flatten the hills and fill up the valleys
And turn into black pools God's pure mountain streams

If God had not put coal in these mountains
If He had blessed them with nothing to mine
The hilltops would offer their green domes to Heaven
Crowned with pink rosebay and blackberry vines

The strip mines that take off the tops of these mountains
Leave scars that won't heal and make God turn his eyes
They level the hilltops that once reached toward Heaven
A mighty green skyline now humble in size

As God looks down at coal mining counties
At what has been done to this blessed land
I wonder if He ever wishes He never
Put coal in these mountains and gave them to man

SIERRA CLUB
FOUNDED 1892

Tennessee Chapter

Sierra Club – Water Sentinels Program

P.O. Box 111094, Memphis, TN 38111

January 3, 2004

Mr. John Forren
U.S. EPA (3EA30), 1650 Arch Street
Philadelphia, PA 19103

RE: Draft Programmatic Environmental Impact Statement (DEIS) on Mountain Top Mining-Valley Fill (MTM-VF) in the Appalachian region of the eastern United States.

Dear Mr. Forren,

Please accept these comments on behalf of the Water Sentinels Program of the Tennessee Chapter of the Sierra Club.

I am writing these comments because of concerns for the environmental degradation of the forests, the ephemeral and headwater streams, as well as the perennial streams that will be adversely affected as a result of MTM-VF activities in Kentucky, West Virginia, Virginia and Tennessee or throughout the Appalachian coal-fields. The experience so far in Tennessee with the Zeb Mountain Mine, just one mountain top mine (here called "cross-ridge" mining, but I believe essentially the same as mountaintop removal) cannot be accomplished without devastating destruction of affected ephemeral and headwater streams, as well as the perennial streams.

These mountain top mining operations are massive projects that strip many acres of forest as a first step. The DEIS lists that over 380,000 acres of mature forest will be destroyed by MTM-VF over the next ten years. This loss will destroy wildlife habitat and fragment more habitats. These forests are among the most biologically diverse in the world and are home to such wildlife as the Cerulean Warbler, a species that has been petitioned for listing under the Endangered Species Act. 8-1-2

The DEIS recognizes the value of headwater streams to a river ecosystem. As stated by *Doppelt, et al 1993*, ". "Even where inaccessible to fish, these headwater streams provide high levels of water quality and quantity, sediment control, nutrients and wood debris for downstream reaches of the watershed. Intermittent and ephemeral headwater streams therefore are often largely responsible for maintaining the quality of downstream riverine processes and habitat for considerable distances."

Yet, the following quote indicates that the DEIS recognizes that the dangers of valley fills and the potential offsetting values of sediment basins need further study. "Filling or mining stream areas even in very small watersheds has the potential to impact aquatic communities some of which may be high quality or potentially support unique aquatic species."

To supposedly minimize the discharge of mud, silt and sediment into the downstream waters, the mining company installs man-made sedimentation ponds to capture this sediment. This DEIS assumes that these sedimentation ponds will be of great value in protecting downstream waters. Personal experience and observation reveal that most ponds, no matter how well constructed cannot handle the sheer volume of runoff and that the ponds will "short circuit" and discharge levels of mud, silt and sediment into the streams that will adversely affect fish and aquatic life. I am not alone in making these observations. According to the Stormwater Center, "... few (sediment basins) are probably capable of consistently removing 70% of the incoming sediment, much less the 95 to 99% removal that is typically assumed," and measures to increase the solids trapping efficiency of sediment basins are rarely incorporated into the design (Stormwater Center 2003). Stormwater Center (2003). "Improving the Trap Efficiency of Sediment Basins." Technical Note #84, Watershed Protection Techniques. 2(3): 434-439 (http://www.stormwatercenter.net)

The DEIS states at III-D-4, "It has not been determined if drainage structure connected with mining can provide some benefit."

The DEIS also states at III-D-7, "Further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community and structure are needed." 8-1-2

At III-D-8, the DEIS states, "While these studies illustrate that mining and valley fills may alter the sediment composition of streams, it is not known if this change may impact functions of streams downstream or how long those impacts may last. Assessment of stream sediment characteristics should be included in any further evaluations or monitoring program for streams downstream from mining and valley fills."

Section III-D-11 clarifies the issue further, "...potential impacts from valley fills to stream chemistry and possible alterations to stream geomorpholgy were discussed as areas of further need for investigation."

At the Zeb Mountain site in Tennessee, after only a few months of mining (at a mine with a 10-year life span), total suspended solids readings in a major stream (which is home of the federally threatened fish the Blackside Dace) have already been consistently more than ten times the permit limits.

We can do better than strip the forests off of mountain peaks and destroy and fragment wildlife habitat. We can do better than rip the mountain apart to mine a small seam of coal, and filling the valleys with overburden and destroying ephemeral and headwater streams in the process. We can do better to not send mud and silt pollution into larger streams and destroy fish and aquatic life. We can do a lot better than "restoring a mountain" to its original contours, remembering that it will take at least several human lifetimes or longer for the forests to renew themselves. It is better for humans to use non-polluting energy generation systems such as wind and solar power; which will spare wildlife habitat, and protect streams, for our families, for our future.

I submit that because further studies are needed, this Draft Environmental Impact Statement is incomplete. I suggest on behalf of the Water Sentinels Program of the Tennessee Chapter of the Sierra Club, that the Draft Environmental Impact Statement must be re-done with additional studies on forest health and water quality. The public must also be involved in these studies at all levels of DEIS development. In addition, until there is a final EIS, these mining practices need to cease and desist immediately. 9-2-2

On behalf of the Water Sentinels Program of the Tennessee Chapter-Sierra Club, I appreciate the chance to comment on this Draft Environmental Impact Statement.

Respectfully Submitted,

James H. Baker – Project Leader-Tennessee Water Sentinels

c. Mr. Gary Bowers – Tennessee Chapter Conservation Chair
Mr. Don Richardson – Tennessee Chapter Vice-Conservation Chair
Mr. Axel Ringe – Tennessee Chapter Water Quality Chair
Mr. Scott Dye – Director, Sierra Club Water Sentinels Program
Mr. Charles A. Rond – Chickasaw Group Chair
Dr. Allan Lummus – Chickasaw Group Conservation Chair
File

Tennessee Chapter-Sierra Club
http://tennessee.sierraclub.org
www.sierraclub.org/watersentinels

100% Tree Free Paper

3

----- Forwarded by David Rider/R3/USEPA/US on 01/23/2004 09:23 AM -----

Sherman Bamford
<bamford@rev.net>
01/21/2004 07:21 PM

To: R3 Mountaintop@EPA
cc: bamford@rev.net
Subject: Mountaintop Removal DEIS comments

Sherman Bamford
Virginia Forest Watch
P.O. Box 3102
Roanoke, Va. 24015-1102
Bamford@rev.net

January 21, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street Philadelphia, PA 19103
mountaintop.r3@epa.gov

The following are comments submitted on behalf of Virginia Forest Watch and myself regarding the DEIS for mountaintop removal, valley fills, clean water, habitat, and associated issues. Virginia Forest Watch (VAFW) is a grass-roots based coalition of individuals and environmental groups whose mission is to maintain and restore the natural ecology and biodiversity of woodlands across Virginia through education and citizen participation. Many members of this coalition live, work, and enjoy the natural amenities of the western Virginia area, and face the devastating impacts of mountaintop removal.

Mountaintop removal/ valley fill significantly affects western Virginia and many of our neighboring states in the Appalachian chain: "The geographic focus of this study involves approximately 12 million acres, encompassing most of eastern Kentucky, southern West Virginia, western Virginia, and scattered areas of eastern Tennessee. The study area contains about 59,000 miles of streams. Some of the streams flow all year, some flow part of the year, and some flow only briefly after a rainstorm or snow melt. Most of the streams discussed in this EIS are considered headwater streams. Headwater streams are generally important ecologically because they contain not only 9-2-2 diverse invertebrate assemblages, but some unique aquatic species. Headwater streams also provide organic energy that is critical to fish and other aquatic species throughout an entire river.

Ecologically, the study area is valuable because of its rich plant life and because it is a suitable habitat for diverse populations of migratory songbirds, mammals, and amphibians." (executive summary for the DEIS - underlining for emphasis). The practice has serious, centuries-long impacts on watersheds, forests, and wildlife habitat that we are fighting to protect, and that our neighbors are fighting to protect in nearby states. We believe that mountaintop removal operations/valley fills are one of the top threats to ecosystems in the Appalachian Mountains. 9-2-2

We are concerned that given the inadequate range of alternatives in the draft EIS on mountaintop removal, it appears likely that the EPA would not strengthen protection of our mountains and valleys in Virginia and other states, but would weaken those protections. Adequate streamside buffers would not be retained, dumping of toxins would be tolerated, drinking water would be tainted, and many people would lose the hunting and fishing areas they love. Please establish the strong measures that are needed to retain our natural heritage for future generations. 1-5 1-10

We are concerned that:
- over 1200 miles of streams have been damaged or destroyed by mountaintop removal

- direct impacts to streams would be greatly lessened by reducing the size of the valley fills where mining wastes are dumped on top of streams

- the total of past, present and estimated future forest losses is 1.4 million acres

- forest losses in West Virginia have the potential of directly impacting as many as 244 vertebrate wildlife species. Mountaintop removal in other states could affect many more species. 1-5

- even if hardwood forests can be reestablished in mined areas, which is unproven and unlikely, there will be a drastically different ecosystem from pre-mining forest conditions for generations, if not thousands of years

- without new limits on mountaintop removal, an additional 350 square miles of mountains, streams, and forests will be flattened and destroyed by mountaintop removal mining

- Streams are smothered by the millions of tons of waste rock and debris produced by mountaintop removal. One hundred thousand acres of wildlife habitat have been destroyed. And generations-old communities have been and continue to be forced to move from their homes because of mountaintop removal mining.

- According to government reports from the U.S. Fish & Wildlife Service as well as the EPA, mountaintop removal mining has devastated bird, fish, and other wildlife habitat in Appalachia and obliterated more than 1,000 miles of streams in West Virginia and Kentucky. Virginia and Tennessee are threatened as well.

- In Virginia, tributaries of the Clinch, Powell, and Holston Rivers are some of the most diverse rivers in North America in terms of mussel, fish, and other aquatic species diversity. According to a report commissioned by the American Fisheries Society, 71.7% of all freshwater mussel taxa in the U.S. and Canada are "considered endangered, threatened or of special concern." (Williams et al, Fisheries Vol. 18, No. 9) Mussels are highly sensitive to sedimentation and contaminants. (Intro. to mollusks section, Neves, Virginia's Endangered Species, Terwilliger, ed., Virginias Endangered Species, McDonald and Woodward Publishing, 1991). These and other watersheds to the west and north (eg, Pound River, Russell Fork, Levisa Fork, and other watersheds) also offer spectacular mixed mesophytic forests, whitewater and canoeing recreation, black bear habitat, Indiana bat habitat, cerulean warbler habitat, other songbird habitat, salamander habitat, and interior forest habitat. Mountaintop removal would have serious impacts on these watersheds and quality of life in them. 5-6-2

-Cerulean warblers, for example, are bearing the brunt of habitat destruction from mountaintop removal and from other habitat destruction: the warblers' key breeding area overlaps Appalachian coalfields, and their population has plummeted 70 percent since 1966. 8-1-2

- Watersheds exist in Virginia are vulnerable to high water events. For example, in July 2001, devastating flooding occurred in the heavily logged and roaded Big Stony Creek watershed, killing one person and wreaking havoc on property owners. Although mountaintop removal was not a factor in this watershed, mountaintop removal has the potential to exacerbate impacts in other watersheds where the practice occurs - whenever flooding and high water events occur. 17-1-2

- The immediate and long-term environmental effects of mountaintop removal coal mining are severe and irreversible, according to recently released studies accompanying a draft Environmental Impact Statement (EIS). Hundreds of miles of streams have been buried, hundreds of square miles of forested mountains flattened, 10-2-2 and generations-old communities of coalfield residents have been forced from their homes by this extremely destructive mining practice. 10-2-2

According to the draft Environmental Impact Statement (EIS) on mountaintop removal coal mining, the environmental effects of mountaintop removal are widespread, devastating, and permanent. Yet the draft EIS proposes no restrictions on the size of valley fills that bury streams, no limits on the number of acres of forest that can be destroyed, no protections for imperiled wildlife, and no safeguards for the communities of people that depend on the region's natural resources for themselves and future generations. 1-7

We do not understand why the "preferred alternative" for addressing the enormous problems caused by mountaintop removal coal mining is to weaken existing environmental protections. The draft EIS proposes streamlining the permitting process, allowing mountaintop removal and associated valley fills to continue at an accelerated rate. The draft EIS also suggests doing away with a surface mining rule that makes it illegal for mining activities to disturb areas within 100 feet of streams unless it can be proven that streams will not be harmed. This "preferred alternative" ignores the administration's own studies detailing the devastation caused by mountaintop removal coal mining, including: 1-10

You must consider alternatives that reduce the environmental impacts of mountaintop removal and then implement measures to protect natural resources and communities in Appalachia, such as restrictions on the size of valley fills to reduce the destruction of streams, forests, wildlife and communities. 1-5

As the draft EIS would not lessen the devastation or significantly improve the environmental protections from the impact of mountaintop removal mining, the agencies to withdraw this draft EIS and start all over again or at the very least, make substantial changes before issuing a final EIS.

Thank you for considering our comments.

Sincerely yours,

Sherman Bamford
Virginia Forest Watch

----- Forwarded by David Rider/R3/USEPA/US on 01/23/2004 09:22 AM -----

Lawrence Beckerle
<lawrencebeckerle@yahoo.com>
01/21/2004 04:34 PM

To: R3 Mountaintop@EPA
cc:
Subject: Comments on EIS

January 21, 2004
Further comments on mountaintop mining EIS
By Lawrence T. Beckerle

VALLEY FILLS
Mining companies are only allowed to use two designs in West Virginia: All material for chimney core valley fill must pass the slate durability test End dump valley fills must be at least 80 percent durable rock through out the entire valley fill.

It would make more sense to have such requirements for just the face of valley fills where stability is a concern. Instead DEP requires that such requirements be met through out the entire length of the valley fill. By forcing coal companies to go to such extremes, regulatory agencies have caused some remarkable conditions. The valley fills are exceptionally well aerated, so oxidation of fill material proceeds at an unusually rapid rate. The release of iron, manganese and selenium is thus also quite rapid. Conversely the reduction of these minerals is minimized, so the release of these minerals into discharge waters is much higher than what would otherwise occur. It is thus a good example of this fundamental truth: When regulatory agencies take things to extremes, more environmental problems are created. 13-3-1

ORGANICS
The regulatory emphasis on perennial grasses to meet the requirement for permanent cover has resulted in a hostile environment for many native plants and animals. It has also resulted in a decline of soil improving crop type plants. Reseeding annuals provide permanent cover. (Example: crimson clover provides a permanent cover and acts as a good nurse crop for native plants. It allows warm season natives to quickly overtake it, usually within 18 months from when the native seeds germinate.) Perennial forbs provide permanent cover. Each should be recognized by regulatory agencies as providing permanent cover. In addition a pure stand of native blackberry and/or raspberry vines should be recognized as providing permanent cover. 19-3-1

High Nitrogen Organics Example: A farmer can apply treated sewage sludge to a pasture field and "it's no big deal". But if a coal operator wants to apply sewage sludge to a surface mine, the regulatory requirements are prohibitive. Such misguided actions forfeit the chance to use organics to reduce the amount of oxygen that causes sulfur, iron, manganese and selenium to be released from mined areas. It also forfeits a chance to feed sulfur-reducing bacteria, which help to reverse acid mine water production and lead to a cleaning of water by precipitating out various metals. So even though my research in 1972 and the research of others have proven the advantages of using treated sludge on surface mines, the regulatory extremes make it impractical for coal operators to productively use this kind of material.

Organics Deficient In Nitrogen Example: "Sawdust" Has been shown to reduce surface runoff rates, increase the productivity of the land, and to reduce acid mine drainage. (Reports also suggest this includes a lowering of selenium.) Decay of sawdust uses as much oxygen as if one were to use it for fuel. Plus the other enhancements of soil life absorb even more oxygen. However regulatory requirements for use of permanent grass for permanent cover make "sawdust" type materials unattractive for coal operators. Typically sawdust is applied through the summer months. Early summer applications are planted to cowpeas, soybeans or other large seeded legume. Before 50 percent leaf drop of the cowpeas or soybeans, crimson clover (and perhaps some cereal rye) plus a perennial clover (white Dutch or red clover) are sown. In about February there is another sowing of either white Dutch or red clover (called a "frost seeding", because freezing and thawing works the seed into the ground.) While these plantings are usually quite lush, it is 18 months to two years from the first seeding before perennial grass can be grown. Thus the fact that regulatory agencies only recognize permanent cover with the establishment of perennial grass puts a bonding release penalty against those who establish other forms of perennial cover and thus virtually prohibits the use of organics such as sawdust to make topsoil. 19-3-1

NATIVE PLANTS AND ANIMALS

Excessive competition prevents the establishment of native plants. While there has been attention in recent years about how the use of overly competitive grasses prevents the establishment of trees, there has been little attention about how excessive competition prevents the establishment of native forbs and shrubs.

In prior comments I detailed how the regulatory rule preferences results in mined lands that are excessively dry, and further prevent the establishment of vernal pools and ephemeral pools so necessary to the breeding of several salamanders, toads, frogs, and crayfish. This also prevents the establishment of plants like Nutrush (Scleria triglomerata). Nutrush produces a seed (with the appearance of polished white ceramic) that is relished by Bobwhite quail and other seed eating birds.

A few examples of native plants that are put at a severe disadvantage by current rules: Partridge pea is a reseeding native annual that is quite effective at revegetating disturbed sites when competition is limited. This native and others like it are seldom seen on strip mines reclaimed since 1977.

Blackberry thickets where old canes cover the ground are not found on mined land reclaimed since 1977. (Such thickets are necessary for bobwhite quail to find adequate protection from house cats and other nighttime predators.)

Bayberry, Carolina bush pea, orange puccoon, prairie acacia, Quercus illicifolia, several of the native bushclovers will spread by root sprouts and/or otherwise form groundcovers into open areas where grass competition is absent.

All these plants are important to the winter survival of animals with needs similar to Bobwhite quail. Normally 60 to 80 percent of wild populations of Bobwhite perish each winter. So the absence of these plants frequently leads to the extinction of bobwhite quail populations. Bobwhite quail were present in all counties of West Virginia before 1977 (and frequently found on old surface mines). After 27 years of SMCRA Bobwhite quail are absent from about 90 percent of West Virginia (and are only found on a couple of these surface mines where exceptional efforts have been made to support quail). Other factors have been involved, but extremist interpretations of SMCRA have also been a major contributor to the decline of bobwhite quail and other birds that have similar habitat requirements.

Instead of being an example what to do to establish native plants (and what to do help restore populations of native animals that are in trouble) current mined land reclamation practices must so comply with bureaucratic cookbook style regulations (which are often a reaction to the latest lawsuit by radicals rather than the intent of SMCRA) that they are generally among the best examples of what not to do. 19-3-1

Bobwhite quail need a mosaic of habitat types. To achieve this mosaic there must be allowances for a number of plantings plans to fit different weather conditions, aspect, slope and other variables. There must be fair allowances for nurse cropping and relay cropping techniques.

Seeds must fall on bare ground or on vegetative litter where quail can find them. Seeds that fall into thick tough grass sods are a good food source for rodents that also chew off shrub and tree seedlings, but not for ground feeding birds such as bobwhite quail.

The regulatory intolerance for reasonable amounts of bare ground in areas with little or no erosion hazard often results in a lack of suitable areas for birds to dust themselves. Dusting is necessary for birds to rid themselves of parasites. Without adequate dusting, their health declines making vulnerable to disease and predators.

Lawrence T. Beckerle, Chairman
West Virginia State Chapter of Quail Unlimited

Nurse cropping: a nurse crop modifies the soil surface enough that more tender seedlings are able to establish in a soil surface environment that otherwise would be too harsh for them. Crimson clover is an ideal nurse crop, since it begins to decline in May as soil temperatures begin to reach 70 degrees (the temperature at which most native warm season plants germinate.)

Relay cropping: Sometimes a succession of plants is required to make the soil suitable for some perennials, for example: One might sow crimson clover, doveweed (Croton spp.) and partridge pea in August to early fall of 2004. (The Crimson clover would germinate usually within a week. Most of the partridge pea would germinate in March 2005 and most of the doveweed would germinate in May 2005.) Mealy bean, milk pea, and pink bean could be sown into the crimson clover stand in early May 2005. (Some of those seeds would germinate in May and some would not germinate until May 2006.) If soil nitrogen had been severely limiting then one would not plant American beakgrain, prairie dropseed, sacaton, smooth or circular paspalum grass until May 2006 (Many of these seeds would germinate immediately. Some would not germinate until May 2007. If any crimson clover were left, it would generally cease to be part of the stand by the end of summer 2006.) Permanent cover is maintained through this succession of plants, but the regulatory agencies currently penalize anyone using such a plant establishment method. Yet this method is most advantages to Bobwhite quail and to establishing many native plants. When will the regulatory agencies recognize the need for this and other wildlife friendly plant establishment methods?

Fences: As an educational tool I would like to see a fence built along the contour that more or less separates at least some of the areas with slopes less than 25 % slope from those with slopes greater than 25%. Openings in the sire fence should not be less than 2 inches wide by 2.5 inches tall to permit the passage of Bobwhite quail and allow them to distance themselves from predators too large to pass through the wire.

19-3-1

Kentuckians For The Commonwealth

P.O. Box 1450 London, Kentucky 40743 606-878-2161

January 3, 2004

John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

REC'D JAN 0 9 2004

Dear Mr. Forren:

On behalf of Kentuckians For The Commonwealth, I am writing to express our deep opposition to the recommendations contained in the draft EIS on mountaintop mining.

KFTC is a grassroots social justice organization with more than 2,000 members statewide. For more than 22 years we have worked to build citizen leadership and organize low-income communities to improve the quality of life in Kentucky. Our history is rooted in the struggle for justice in the Appalachian coalfields. In the early 1980s, KFTC initiated, fought for and won an unmined minerals tax so that corporations who hold most of the wealth in this region must contribute to the development of local communities. We fought for and won a constitutional amendment that prohibits coal companies from strip mining against the wishes of landowners. Together with our allies, we have worked to strengthen and protect state and federal laws governing water quality and coal mining. And we have worked with thousands of individuals and scores of communities over the past two decades to protect homes and the environment, hold companies accountable, and win meaningful enforcement of mining laws.

Personally and organizationally, we oppose mountaintop removal mining and valley fills. A common sense reading of the Clean Water Act and Surface Mining Laws not only allows but *requires* the government to prohibit the use of valley fills and mountaintop removal. These practices are immoral and illegal and should be stopped.

Let me be very clear why we oppose the conclusions reached in the EIS document:

1. The recommendations are a sham and a shame. They betray the original purpose of the EIS.

The stated purpose of this document was:

> ***"To evaluate options for improving agency programs under the Clean Water Act (CWA), Surface Mining Control and Reclamation Act (SMCRA) and Endangered Species Act (ESA) that will contribute to reducing the adverse environmental impacts of mountaintop removal operations and excess spoil valley fills in Appalachia."***

The EIS report was originally requested by coalfield citizens and environmental supporters in order to identify ways to better protect our land, water and people. Indeed, the studies contained within this 5,000-page document show that the damage caused by mountaintop removal mining is more widespread and severe than previously known.

1

Yet the report was hijacked by the coal industry and its cronies within the Bush administration. Rather than addressing the serious harm caused by mountaintop removal mining, its recommendations focus on issues of "government efficiency" and the need to "provide a basis for more predictable business and mine planning decisions." Based on an internal memo from the office of Deputy Secretary of the Interior (and a former coal industry lobbyist), it is clear that the Bush Administration seized this opportunity to aid the coal industry at the expense of local communities and the environment. The draft report is loaded with ways to gut existing water protections and make it easier for the industry to continue with its full-scale assault on our communities, environment, and hope for the future.

2. The report ignores its own findings.

KFTC welcomes the scientific studies that document the widespread and irreversible damage the coal industry is doing to our state and region. We've known and experienced these problems in Kentucky for too long. Mountaintop removal and valley fills bury and destroy important headwater streams, destroy biologically rich forest and stream ecosystems, damage drinking water sources used by millions of people, cause frequent and severe flooding, and wreck the quality of life in mountain communities.

Yet the three alternatives proposed would do nothing to end or minimize this destruction. All three so-called alternatives will increase the ease and rate of destruction and make MTR an even more attractive option for the coal industry. 1-5

Below are a few examples of the environmental damage documented, and then ignored, within the EIS.

- 724 miles of streams across the Central Appalachian region were buried by valley fills between 1985 and 2001 (many more miles have been permitted but not yet buried);
- an additional 1,200 miles of streams have already been impacted by valley fills;
- selenium was found only in those coalfield streams below valley fills (selenium is a metalloid that, according to the EPA, "can be highly toxic to aquatic life even at relatively low concentrations"); 1-9
- aquatic life forms downstream of valley fills are being harmed or killed;
- without additional restrictions, a total of 2,200 square miles of Appalachian forests (6.8 percent) would be eliminated by 2012 by large-scale mining operations (this is an area that would encompass Floyd, Knott, Leslie, Letcher, Perry and most of Harlan counties in eastern Kentucky; or Hopkins, Daviess, Union, Muhlenberg and Webster counties in western Kentucky);
- without additional environmental restrictions, mountaintop removal mining will destroy an additional 600 square miles of land and 1000 miles of streams in the next decade.

3. The report mentions, and then immediately rejects, any proposals that would restrict the ability of the coal industry to bury Appalachian streams under valley fills —in other words any proposal that would require the coal industry to obey the law.

The EIS fails to give meaningful consideration to any options that would reduce the destruction to water, land, public welfare and the quality of life in local communities. Some worthy ideas that received no consideration were: 1-7

- Enforcing the Clean Water Act, which prohibits the dumping of waste in streams.
- Restricting valley fills to certain types of streams.
- Restricting the size of allowable valley fills from more than 250 acres to just 35 acres.
- Setting an upper limit on the total number or percentage of streams allowed to be impacted.
- Labeling the streams in the region as "high value," which would kick-in other parts of the Clean Water Act that could restrict the use of valley fills.
- Using the anti-degradation rules of the Clean Water Act to prohibit the use of valley fills.

2

The report dismisses most of these options out-of-hand, claiming there is not enough "science" to support them. It is hard to imagine what additional scientific evidence is needed to demonstrate that burying hundreds of miles of Appalachian headwater streams, eliminating thousands of square miles of forests, and leveling the oldest mountains in the world causes irreparable harm and should be stopped.

And if the science is not enough, just open your eyes and use your common sense.

The report also rejects size limits on valley fills because the "economic study results were determined to have limitations and were not suited for establishing alternatives." In truth, the government's economic studies showed that even the strictest size limit would have a minimal economic impact on the economy and jobs. 1-7

We oppose all three of the so-called alternatives contained with the EIS report.

KFTC opposes Alternatives #1, 2 or 3 contained within the EIS report. None of these options will protect our water. None of these options will protect our communities. None of these options will shape a better future for Kentucky or the region. They are a sham and a shame. They do nothing to address the real problems of our region. Rather, they will only make it easier for the coal industry to seek and obtain permits to continue with the total destruction of our land, water and people. 1-5

It is notable that all three alternatives, even the one called "status quo" would weaken existing water protections. All three options call for the elimination of the stream buffer zone rule that has been in existence for 25 years. This rule, known as SMCRA regulation 30 CFR 816.57, prohibits mining activity within 100 feet of intermittent and perennial streams. Using the EIS process to eliminate this protection is cynical and outrageous behavior. KFTC believes this rule should be strictly enforced for valley fills and in all other cases. 1-10

KFTC also strongly opposes the report's support for a rule change enacted one year ago by the Bush administration which changed the definition of "fill" in order to allow the Corps of Engineers to grant permits for valley fills under the Clean Water Act. We believe that valley fills created in the process of mining for the disposal of mining waste are a clear violation of the CWA. 13-3-2

In conclusion, we believe that the Draft EIS document is a shameful gift to the coal industry and a betrayal of our Appalachian communities. I urge the government to reject the three alternatives offered in this document and go back to the drawing board. Give meaningful consideration to options that would protect our water, forests and land from further destruction. Support the meaningful enforcement of existing laws. Reject efforts to shred and weaken water protections. Have the courage to do what is right, and in the process help us create a better future in Kentucky and throughout the Appalachian region. 1-5

Sincerely,

Teri Blanton

Teri Blanton
Chairperson
Kentuckians For The Commonwealth

3

----- Forwarded by David Rider/R3/USEPA/US on 01/08/2004 11:30 AM -----

KFTC <info@kftc.org>
To: R3 Mountaintop@EPA
cc:
01/06/2004 01:05 PM
Subject: MTR EIS comments

Kentuckians For The Commonwealth
P.O. Box 1450
London, Kentucky 40743
606-878-2161

January 3, 2004

John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

On behalf of Kentuckians For The Commonwealth, I am writing to express our deep opposition to the recommendations contained in the draft EIS on mountaintop mining.

KFTC is a grassroots social justice organization with more than 2,000 members statewide. For more than 22 years we have worked to build citizen leadership and organize low-income communities to improve the quality of life in Kentucky. Our history is rooted in the struggle for justice in the Appalachian coalfields. In the early 1980s, KFTC initiated, fought for and won an unmined minerals tax so that corporations who hold most of the wealth in this region must contribute to the development of local communities. We fought for and won a constitutional amendment that prohibits coal companies from strip mining against the wishes of landowners. Together with our allies, we have worked to strengthen and protect state and federal laws governing water quality and coal mining. And we have worked with thousands of individuals and scores of communities over the past two decades to protect homes and the environment, hold companies accountable, and win meaningful enforcement of mining laws.

Personally and organizationally, we oppose mountaintop removal mining and valley fills. A common sense reading of the Clean Water Act and Surface Mining Laws not only allows but requires the government to prohibit the use of valley fills and mountaintop removal. These practices are immoral and illegal and should be stopped.

Let me be very clear why we oppose the conclusions reached in the EIS document:

1. The recommendations are a sham and a shame. They betray the original purpose of the EIS.

The stated purpose of this document was:

"To evaluate options for improving agency programs under the Clean Water Act (CWA), Surface Mining Control and Reclamation Act (SMCRA) and Endangered Species Act (ESA) that will contribute to reducing the adverse environmental impacts of mountaintop removal operations and excess spoil valley fills in Appalachia."

The EIS report was originally requested by coalfield citizens and environmental supporters in order to identify ways to better protect our land, water and people. Indeed, the studies contained within this 5,000-page document show that the damage caused by mountaintop removal mining is more widespread and severe than previously known.

Yet the report was hijacked by the coal industry and its cronies within the Bush administration. Rather than addressing the serious harm caused by mountaintop removal mining, its recommendations focus on issues of "government efficiency" and the need to "provide a basis for more predictable business and mine planning decisions." Based on an internal memo from the office of Deputy Secretary of the Interior (and a former coal industry lobbyist), it is clear that the Bush Administration seized this opportunity to aid the coal industry at the expense of local communities and the environment. The draft report is loaded with ways to gut existing water protections and make it easier for the industry to continue with its full-scale assault on our communities, environment, and hope for the future.

2. The report ignores its own findings.

KFTC welcomes the scientific studies that document the widespread and irreversible damage the coal industry is doing to our state and region. We've known and experienced these problems in Kentucky for too long. Mountaintop removal and valley fills bury and destroy important headwater streams, destroy biologically rich forest and stream ecosystems, damage drinking water sources used by millions of people, cause frequent and severe flooding, and wreck the quality of life in mountain communities.

Yet the three alternatives proposed would do nothing to end or minimize this destruction. All three so-called alternatives will increase the ease and rate of destruction and make MTR an even more attractive option for the coal industry. 1-5

Below are a few examples of the environmental damage documented, and then ignored, within the EIS.

ÿ 724 miles of streams across the Central Appalachian region were buried by valley fills between 1985 and 2001 (many more miles have been permitted but not yet buried);
ÿ an additional 1,200 miles of streams have already been impacted by valley fills;
ÿ selenium was found only in those coalfield streams below valley fills (selenium is a metalloid that, according to the EPA, "can be highly toxic to aquatic life even at relatively low concentrations"); 1-9
ÿ aquatic life forms downstream of valley fills are being harmed or killed;
ÿ without additional restrictions, a total of 2,200 square miles of Appalachian forests (6.8 percent) would be eliminated by 2012 by large-scale mining operations (this is an area that would encompass Floyd, Knott, Leslie, Letcher, Perry and most of Harlan counties in eastern Kentucky; or Hopkins, Daviess, Union, Muhlenberg and Webster counties in western Kentucky);
ÿ without additional environmental restrictions, mountaintop removal mining will destroy an additional 600 square miles of land and 1000 miles of streams in the next decade.

3. The report mentions, and then immediately rejects, any proposals that would restrict the ability of the coal industry to bury Appalachian streams under valley fills -in other words any proposal that would require the coal industry to obey the law.

The EIS fails to give meaningful consideration to any options that would reduce the destruction to water, land, public welfare and the quality of life in local communities. Some worthy ideas that received no consideration were: 1-7
ß Enforcing the Clean Water Act, which prohibits the dumping of waste in streams.
ß Restricting valley fills to certain types of streams.
ß Restricting the size of allowable valley fills from more than 250 acres to just 35 acres.
ß Setting an upper limit on the total number or percentage of streams allowed to be impacted.
ß Labeling the streams in the region as "high value," which would kick-in other parts of the Clean Water Act that could restrict the use of valley fills.
ß Using the anti-degradation rules of the Clean Water Act to prohibit the use of valley fills.

The report dismisses most of these options out-of-hand, claiming there is not enough "science" to support them. It is hard to imagine what additional scientific evidence is needed to demonstrate that burying hundreds of miles of Appalachian headwater streams, eliminating thousands of square miles of forests, and leveling the oldest mountains in the world causes irreparable harm and should be stopped. 1-7

And if the science is not enough, just open your eyes and use your common sense.
The report also rejects size limits on valley fills because the "economic study results were determined to have limitations and were not suited for establishing alternatives." In truth, the government's economic studies showed that even the strictest size limit would have a minimal economic impact on the economy and jobs.

We oppose all three of the so-called alternatives contained with the EIS report.

KFTC opposes Alternatives #1, 2 or 3 contained within the EIS report. None of these options will protect our water. None of these options will protect our communities. None of these options will shape a better future for Kentucky or the region. They are a sham and a shame. They do nothing to address the real problems of our region. Rather, they will only make it easier for the coal industry to seek and obtain permits to continue with the total destruction of our land, water and people. 1-5

It is notable that all three alternatives, even the one called "status quo" would weaken existing water protections. All three options call for the elimination of the stream buffer zone rule that has been in existence for 25 years. This rule, known as SMCRA regulation 30 CFR 816.57, prohibits mining activity within 100 feet of intermittent and perennial streams. Using the EIS process to eliminate this protection is cynical and outrageous behavior. KFTC believes this rule should be strictly enforced for valley fills and in all other cases. 1-10

KFTC also strongly opposes the report's support for a rule change 13-3-2 enacted one year ago by the Bush administration which changed the definition of "fill" in order to allow the Corps of Engineers to grant permits for valley fills under the Clean Water Act. We believe that valley fills created in the process of mining for the disposal of mining waste are a clear violation of the CWA. 13-3-2

In conclusion, we believe that the Draft EIS document is a shameful gift to the coal industry and a betrayal of our Appalachian communities. I urge the government to reject the three alternatives offered in this document and go back to the drawing board. Give meaningful consideration to options that would protect our water, forests and land from further destruction. Support the meaningful enforcement of existing laws. Reject efforts to shred and weaken water protections. Have the courage to do what is right, and in the process help us create a better future in Kentucky and throughout the Appalachian region. 1-5

Sincerely,

Teri Blanton
Chairperson
Kentuckians For The Commonwealth

January 6, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103
mountaintop.r3@epa.gov

RE: Joint Coal Industry Comments on the Mountaintop Mining/Valley Fill Draft Environmental Impact Statement

Dear Mr. Forren:

Coal Operators and Associates, the Kentucky Coal Association, the National Mining Association , the Ohio Coal Association, and the West Virginia Coal Association appreciate the opportunity to share our views on this Draft Environmental Impact Statement (EIS) on Mountaintop Mining and Valley Fills (hereinafter, "MTM") in Central Appalachia. This issue is extremely important to our members because many of them utilize coal extraction methods that require the construction of head of hollow fills and valley fills in their coal mining operations in the study area. As recognized by the EIS, MTM operations are generally the most economical and efficient forms of surface mining in this area. EIS III I-1.

Using valley and head of hollow fills in this region is absolutely necessary, because when mining is conducted in steep slope areas such as Appalachia, the volume of the spoil material is significantly greater than the volume of the

1

overburden excavated from its original geological location.[1] This is true whether the mining methods are mountaintop mining, contour mining, or even, in many instances, when creating the necessary surface area to begin and support an underground mine. Consequently, the excess spoil must be placed in valley and head of hollow fills. MTM is a major factor in coal production in this area, and accounts for ¼ to 1/3 of Appalachian coal production, and about 95% of the surface mining in West Virginia. EIS III I-23; III N-1. A brief description of the signatory trade associations to these comments follows.

Coal Operators & Associates, Inc. (COA) is a trade association that represents nearly 300 member companies involved in the ownership, leasing, mining, transportation and preparation of coal in Eastern Kentucky; or, supply goods and/or services to the coal mining industry. Our members mine by both surface and underground mining methods and represent the majority of coal mined in Eastern Kentucky.

The Kentucky Coal Association (KCA) is a non-profit corporation whose membership includes large and small, surface and underground coal operators in both the eastern and western Kentucky coal fields. KCA's membership also

[1] The volume of spoil is greater than the overburden that is excavated because the material swells by as much as 25% when it is removed. *See Bragg v. Robertson*, 248 F.3d 275, 286 (4th Cir. 2001), cert. denied, 122 S.Ct. 920 (2002); *See also Illinois South Project, Inc. v. Hodel*, 884 F. 2d 1286, 1292 (7th Cir. 1988)(recognizing that overburden from mining may swell in the range of 15-40% depending on how compact it was in its natural state).

includes a wide range of businesses associated with the coal industry. The KCA seeks to promote the best interests of the Kentucky coal industry.

The National Mining Association (NMA) is a national trade association that includes the producers of most of the nation's coal, metals, industrial and agricultural minerals; the manufacturers of mining and mineral processing machinery, equipment and supplies; and the engineering and consulting firms, financial institutions and other firms serving the mining industry.

The Ohio Coal Association is a non-profit trade association that is dedicated to representing Ohio's underground and surface coal mining production. Today, the Association represents close to FORTY coal producing companies and over FIFTY Associate Members, which include suppliers and consultants to the mining industry, coal sales agents and brokers and allied industries. As a united front, the Ohio Coal Association is committed to advancing the development and utilization of Ohio coal as an abundant, economic and environmentally sound energy source.

The West Virginia Coal Association (WVCA) is a State coal trade association representing the interests of companies engaged in the extraction of coal in the State of West Virginia. WVCA's producing members account for 98% of the Mountain State's underground and surface coal production. WVCA also represents 250 associate members that supply an array of services to the mining industry in West Virginia. These associate members include permitting consultants, engineering firms, mining equipment manufacturers, coal transportation companies, coal consumers and land and mineral holding companies. WVCA's primary goal is promoting the continued viability of the West Virginia coal industry by supporting and facilitating environmentally responsible coal removal and processing through reasonable, equitable, and achievable State and Federal policy and regulation.

Our comments are divided into several sections that will convey our views. First, we will provide some background information on the statutory and regulatory framework for mining in general and MTM in particular, under which our members operate. Second, we provide extensive general comments on the EIS. This section explains how the EIS shows that MTM has minimal individual and cumulative effects on the environment, highlights some of the significant positive aspects of MTM, and discusses its programmatic nature. The document will demonstrate that, based on the evidence in the EIS record, the best alternative to select would be Alternative III, including an explanation of why Nationwide Permits (NWP) under Clean Water Act (CWA) Section 404 are appropriate in most cases for coal mining operations including mountaintop mining, and why individual permits are normally not appropriate in most MTM situations. Next, our comments analyze all 17 action items contained in the EIS. Third, we provide a section of specific comments on aquatic, terrestrial, and community impacts of MTM.

1-4

4

I. Background

a. Mining in General, and MTM in Particular, is Very Heavily and Closely Regulated, but is also Expressly Sanctioned by Federal Law

Mining is one of the most heavily regulated industries in American history. There are several statutes that specifically regulate mining, and many other general laws that are applicable to mining operations. Just some of the most significant Federal laws include the Surface Mining Control and Reclamation Act (SMCRA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Endangered Species Act (ESA), and the Mine Safety and Health Act. In addition to all of these laws, and the thousands of pages of Federal rules in the Code of Federal Regulations pursuant to these laws that are designed to protect the environment and the public, there are hundreds of State laws that regulate mining.

There are also several provisions in these laws and regulations that apply even tougher standards for some of the activities that take place at MTM operations. Although the law sets tough standards for operators mining in these areas, the indisputable logical corollary to this is that Congress has specifically sanctioned MTM by enacting these provisions. Some of these provisions include SMCRA sections 515(b)(3)(requiring restoration of approximate original contour); 515(b)(22)(governing excess spoil placement); and 515(c)(2) and (3)(expressly

5

discussing MTM techniques). *See also* Office of Surface Mining (OSM) regulations at 30 C.F.R. 785.14 (MTM); 30 C.F.R. Part 824 (MTM); 30 C.F.R. § 780.29 (stream channel diversions); 30 C.F.R. 816.57 (Stream Buffer Zone Rule); 30 C.F.R. § 816.72 (Disposal of Excess Spoil in Valley Fills); 30 C.F.R. § 816.151(d)(5)(relocation of natural stream channels). The EIS itself recognizes that "Congress acknowledged the necessity of valley fill construction in streams [in SMCRA § 515(b)(22)]." EIS II D-2.

OSM regulations also recognize the necessity of mining in or near streams. 30 C.F.R. § 816.43 expressly allows and regulates the diversion of streams. MTM and mining in or near streams is presumed necessary and valid by Congress and the regulatory agencies, such as the OSM, so long as adverse effects to offsite areas are minimized. There are additional protections in the law for areas that are designated as unsuitable for mining. In extraordinary circumstances, States may designate specific areas in § 522(a)-(d) of SMCRA, if the evidence in the record supports such findings by the State government. *See also* 30 C.F.R. §§ 761-764.

Given all of these statutory and regulatory requirements that must be met, mining operations produce volumes of analyses and plans before they are issued a permit to build a mine. During this process, the public is provided with numerous opportunities to provide input and comment on the permit application, and may object to the regulatory authority. 30 U.S.C. §§ 1263-1264. Even after the permit

is issued, Federal and State laws provide for regular monthly and quarterly inspections of surface coal mining operations to ensure their compliance with applicable laws, regulations, mine plans, and their permit conditions. 30 C.F.R. Part 842; 30 C.F.R.§ 840.11. In addition, mines are subject to inspection following any citizen complaint giving rise to a concern that a violation of SMCRA or regulations has occurred. 30 C.F.R. § 842.12.

The CWA, like SMCRA, is also crystal clear that valley fill construction for excess spoil placement is permissible under Federal and State law. Environmental groups have repeatedly tried and failed to convince appellate courts that MTM is somehow illegal based on misguided interpretations of the CWA, SMCRA, and their implementing regulations. However, the 4th Circuit Court of Appeals has clearly held that such a view of the law is wrong because: (1) EPA's and COE's interpretation of "fill material," which expressly included coal mining overburden placement in waters of the U.S. (including the streams at issue in the EIS), was a reasonable interpretation of the CWA; and (2) SMCRA anticipates that excess spoil from MTM "could and would" be placed in waters of the U.S.[2] 5-7-1

As the EIS correctly notes, both the CWA and SMCRA recognize that incursions and disturbances of streams are frequently unavoidable. EIS II C-30. Congress, the administrative agencies, and the courts all recognize that Federal law anticipates that excess spoil will be placed in streams. **The real question is not whether MTM or excess spoil placement is permissible, but rather how to regulate it.** Therefore, the question is not what happens to the stream segment that is filled, but whether the downstream impacts or impacts to areas outside the permit area are so significant that they cannot be avoided or satisfactorily mitigated. With this background and this issue in mind, we next turn to an examination of MTM, how it has been analyzed over the years, and what this most recent EIS teaches us about MTM.

5-7-3

b. MTM/VFs have been Studied for Decades, and those Studies Have Consistently Demonstrated that they Are Acceptable Mining Methods

As demonstrated above, Congress was well aware of MTM/VF techniques when it enacted the SMCRA legislation, and recognized the legitimacy of these practices through Federal law. MTM/VF practices have been extensively studied and analyzed since that time as well. For example, in 1979, EPA authored a report concluding that MTM is actually environmentally desirable, and that head of hollow fills can reduce adverse environmental impacts. EPA concluded[3] that:

[2] *See Kentuckians for the Commonwealth v. Rivenburgh*, 317 F. 3d. 425, 443 (4th Cir. 2003).
[3] *Environmental Assessment of Surface Mining Methods: Head-of-Hollow Fill and Mountaintop Removal, Interagency Energy/Environment R&D Program Report* (hereinafter: "*EPA EA of Surface Mining Methods*"); U.S. EPA (July 1979) p. 6.

8

(1) Mountaintop removal mining is an environmentally desirable surface mining technique in the steep sloped terrain of southwestern West Virginia and eastern Kentucky when conducted in compliance with existing reclamation criteria; and

(2) Head-of-hollow fill reclamation can reduce environmental impacts occasionally associated with other reclamation practices such as contour regrading in steep terrain or downslope spoil casting. Specifically, these improvements are realized in erosion and sedimentation control, spoil stabilization, revegetation success and land use potential.

5-5-5

In 1989, the Department of Interior prepared a report to Congress on mountaintop mining. This report found that OSM and other Federal agencies are committed to studying the environmental impacts of MTM thoroughly. One of the key studies[4] attached to the Congressional report, the WV Governor's Report, found that "numerous regulatory programs are in place to assure protection of State water quality," and also found "...no significant evidence of widespread or routine violations of State and Federal water quality standards..." *See WV Governor's Report* at ENV9-10. It concluded that, "On balance...the positive

[4] "*State of West Virginia Governor's Task Force on Mountaintop Mining and Related Practices,*" (December 1998)(hereinafter "WV Governor's Report").

9

impacts of mountaintop removal mining can outweigh the negative impacts." *See Id.* at People-7. 5-5-5

The current EIS contains an additional 30 studies on MTM/VF, and continues the trend of careful and continuous study, evaluation, and improvement of MTM/VF practices. A summary and analysis of the contents of this latest comprehensive analysis of MTM/VF is explained below.

II. General Comments on the EIS

a. The EIS Demonstrates that in Most Areas of Concern, MTM Does Not Raise Significant Issues

Inspector Gregory:

"Is there any other point to which you would wish to draw my attention?"

Holmes: "To the curious incident of the dog in the night-time."

"The dog did nothing in the night-time."

"That was the curious incident," remarked Sherlock Holmes.

From "The Adventure of Silver Blaze" by Arthur Conan Doyle

i. Overall Impacts of MTM

The EIS commissioned 30 comprehensive scientific studies over a span of four years to determine the impact of MTM on the study area, which includes parts of four different States in Appalachia. Based on this information, it is clear that the overall impact of MTM on the study area is not significantly adverse. For example, studies found that despite the size of these MTM operations, about 98% of the streams in the study are not directly impacted by MTM. EIS III D-2. Only slightly more than 1% of streams are actually filled, and many of those "streams[5]" consist of areas that either flow only intermittently for part of the year, or are dry channels that contain water only immediately after a rainstorm[6]. The EIS acknowledges that its estimates of potential future stream losses are overstated because they do not take into account avoidance, minimization, and mitigation already required by the 2002 Nationwide Permit (NWP) 21. EIS IV B-3. Such estimates are probably even more inflated, given that changes to the status quo made by any of the three Alternatives would improve environmental protection and better coordinate the CWA and SMCRA. EIS II B-1. The studies also found that even when aggregating all MTM activity over the past decade, about 97% of the study area was undisturbed by MTM. EIS II C-62. Finally, the evidence shows that MTM has been decreasing, both in numbers and in average size in recent years. EIS II C-5.

[5] Regulatory agencies, such as the COE, define "streams" much more broadly than the general public does. More common definitions of the term say it includes only "A body of *running* water;" or "a steady current of a fluid." (emphasis added) *See* American Heritage Dictionary, 2nd Edition.

[6] In Kentucky and Virginia, many of the fills are not valley fills but rather head of hollow fills impacting only stretches of ephemeral streams.

In addition to the fact that these overall impacts are minimal, one must recognize that "...surface mining is a temporary use of the land and, with proper mining and reclamation techniques, the land is not irretrievable for a variety of future land uses." EIS IV F-1. Therefore, many of the impacts listed above, such as forest fragmentation will ultimately be a temporary phenomena.

ii. Specific Impacts of MTM Found Insignificant

1. Air Quality Impacts

The EIS found that air quality concerns were not an issue with MTM. MTM has not been considered a major source of air pollution since it does not meet the criteria for major source air quality permits under Title V of the CAA. EIS III V-3. Moreover, except for ozone, monitoring stations reported good air quality for all criteria air pollutants. EIS III V-1. OSM regulations already specifically require an air pollution control plan. 30 C.F.R. § 780.15. 15-2-1

In addition, the Mine Safety and Health Administration (MSHA), maintains separate air monitoring requirements for mining operations to protect mine workers, and has established enforceable exposure limits for respirable coal dust. EIS III V-4 MSHA regulations also require every mine to submit a ventilation

system and methane and dust control plan every six months. *Id.* Finally, MSHA is required by statute to make surprise inspections of every surface mine in the United States at least twice each year. 30 U.S.C. § 813(a). 15-2-1

2. Impacts to Land, Blasting, Stability, Scenery, and Forest Cover Are Insignificant

The studies found that land use is not a significant issue because "existing regulatory controls are adequate to address the issue." EIS II A-7. Likewise, blasting is not considered a significant issue with MTM because the studies concluded that "existing regulatory controls provide adequate protections from coal mining related blasting impacts on public safety and structures including wells." EIS II A-6. The EIS found that stability of valley fills is not a significant issue because there were "very low occurrences of stability failures, and those identified failures were generally minor in nature and posed no risk to public safety." EIS II A-8. Finally, the EIS found that scenery and culturally significant landscapes have statutory and regulatory controls that are adequate to address the issue. *Id.*

The EIS explains that only 3.4% of the forested land in the study area was changed to grassland by surface mining[7] over the past ten years (in WV, Valley

[7] For example, the EIS predicts that if MTM continues at its current rate, there may be a potential loss of up to 3.4% of the salamander population in the study area. EIS Appendix I at 92-93. Although we do not necessary concede that losses would be this dramatic, even if the estimate is correct, the EIS predicts that

Fills (VF) account for only 0.7% of forest loss). EIS Appendix I at V. Therefore, MTM does not have a significant adverse effect on forest cover, particularly when one considers that some of this land will be reforested through reclamation, which will be further facilitated by pending changes in OSM rules to encourage tree planning. Statistics from the EIS show that there is actually more forest cover today than there was in 1950.[8] EIS III R-2. In addition, this land will eventually revert to forest through natural succession. EIS IV A-4.

The EIS concludes that "...impacts to soils from MTM/VF are not irreversible and that over time, soils similar to those that existed prior to mining are likely to be re-established on reclaimed mine sites." EIS IV C-7. In addition, providing grassland areas and edge habitat in this region will have positive environmental benefits for many species that require diverse habitats to flourish. EIS Appendix I at 15. Fragmented forests have more edge habitat, and the creation of more edge habitat often corresponds to an increase in local species diversity as "edge" species are attracted to the region. EIS Appendix I at 43.

3. Exotic and Invasive Species are not Invading; Threatened and Endangered Species are not Threatened

there would still be an abundant salamander population of over 35 billion in the study area—or about 100 salamanders for every man. woman. and child in the United States.

[8] This trend is continuing. Data from the U.S. Forest Service indicates that the average cubic feet of forest growth exceeds the average annual rate of forest loss for ALL states in the region. EIS IV C-2.

The studies found no evidence that MTM has contributed to the spread of invasive and exotic species in Southern WV. EIS III F-16; Handel 2001. Nor is there a significant issue regarding the Endangered Species Act (ESA). The biological opinion issued in 1986 states that "...surface coal mining conducted in accordance with properly implemented State and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats." EIS IV D-5. Another EIS study says that "...ample forest will remain in the West Virginia portion of the study area to maintain relatively high PEC[9] scores, [but] impacts to many forest interior bird species are likely to occur." EIS Appendix I at 90. Finally, the EIS notes that "there are no significant differences among the No Action Alternative and Alternatives I, II, and III in terms of their ability to protect [threatened and endangered] species." EIS IV D-7.

4. Water Issues are not Significant

The EIS found that flooding due to MTM is not a significant concern. The EIS found that downstream flooding potential is not significantly increased by existing mining practices so long as approved drainage control plans are properly

[9] PEC stands for potential ecological condition, and is a value calculated to determine the ecological health of a defined landscape scale, usually a watershed level, but this cumulative impact study did so on a State

applied. EIS IV I-7; Appendix H. In addition, "...valley fills do not seem to be causing excessive sediment deposition on the first and second order streams." EIS III D-8. "...[T]he substrate characteristics of the filled, filled/residential, and mined classes were not substantially different from the unmined class." EIS III D-13. In other words, the EIS found no significant sediment problem that could be attributed to MTM. Finally, "the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S." EIS II D-9.

The EIS suggests that changes in water chemistry downstream from MTM operations are cause for concern. EIS III D-7. First, with respect to USEPA's water chemistry data, the USEPA identified problems with the quality assurance/quality control (QA/QC) implemented during the collection and analysis of the water chemistry data, causing all the water chemistry data to be called into question.[10] Assuming these QA/QC issues do not change the overall conclusion that significant differences exist between the filled and unmined sites and between the filled/residential and unmined sites, supplemental studies conducted in conjunction with the MTM/VF EIS studies conclude that neither the changes in the biological community, nor changes in water chemistry in the filled sites appear to have significant adverse impacts on the stream function with respect to 5-5-2

by State level. According to the EIS, PEC is an effective measure of biologic integrity. EIS Appendix I at 17.

downstream segments. Instead, these studies found sites influenced by mining continue to support abundant populations with representatives of all the functional feeding groups and stream function does not appear compromised at these sites.[11]

Second, the evidence does not show a clear impact on the study streams by the mountaintop mining/valley fill activities. To the contrary, the data establishes that MTM/VF activities result in changes in water chemistry and biological communities typical of any large scale development project, e.g. road construction or residential development. Such changes in community structure are more likely the result of changes in temperature regimes, typical whenever ponds, dams or municipal discharges are present. *Id.* Therefore, it is fair to say that any statement in the EIS attributing a cause and effect to a single activity where others such as temperature or ponds which provide a different food source are playing a role must be considered with caution. In addition, it should also be noted that USEPA reported studies compare a mined site on a third, fourth or fifth order stream with an unmined site on a first or second order stream. No unmined sites were selected on third, fourth or fifth order streams. Changes in water chemistry and biological communities between first or second order streams and third or fourth order streams are expected. USEPA failed to consider changes associated with 5-5-2

[10] These problems are discussed in the report "A Survey of the Water Quality of Streams in the Primary Region of Mountaintop/Valley Fill Coal Mining" (April 8, 2002).
[11] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002.

increasing stream order in data interpretation and presentation to the public. This flaw in the data must be addressed in the Final EIS.

Finally, concerns about elevated selenium at test sites are minimized when considered in light of the latest scientific data on aquatic toxicity of selenium. EPA's current nationally recommended chronic criterion for selenium (5ug/l in the water column) and 20 ug/l acute criterion have been adopted by many States and utilized in water quality standards programs. However, based upon the latest 5-5-2
scientific knowledge on selenium toxicity, EPA made a decision to update the acute and chronic criteria for selenium and published, in March 2002, a draft selenium criteria document.[12] EPA's draft document proposes a revised freshwater acute criterion (185 *ug/l*) in the water column and 7.9 ug/g (dry weight) in fish tissue that is considerably higher than the current national criterion. It is important to note that in some geographic areas in the study area background levels of total Se exceed 20 ppb, yet no acute toxic effects are observed. Therefore, the levels of concern expressed in the EIS studies become much less significant when considered pursuant to the agency's proposed revised criteria.

The EIS found that "Overall, the abundance of macroinvertebrates was 6-4-2
found to be similar in upstream and downstream stations or to be slightly higher in

[12] See *Draft Aquatic Life Water Quality Criteria for Selenium 2002*. EPA Contract No. 68-C6-0036 (March 2002 Draft).

downstream stations. EIS III D-9. This strongly suggests that MTM operations are not having an adverse impact on downstream water quality. Likewise, the studies note that: "Biological conditions in the mined sites generally represented very good conditions, although a few sites did score in the good and poor range." 6-4-2
EIS III D-12. This strongly suggests that MTM can be conducted with minimal effects on the environment, provided that appropriate mitigation techniques are applied.

Environmentalists have alleged that all of the above areas are at severe risk due to MTM. As explained above and in the EIS, the scientific data from the 30 comprehensive studies does not support the environmentalists' alarmist predictions. At the end of the day, the EIS observed that: "Watershed impacts directly attributable to mining and fills could not be distinguished from impacts due to other types of human activity." EIS II C-74. As Sherlock Holmes observed, the "dog that didn't bark" is a clue in and of itself.

b. The EIS Demonstrates that MTM has Numerous Positive Benefits that Suggest it Should be Permitted

i. MTM has Provided Environmental Benefits

MTM has resulted in improvements in water quality in several areas. Studies commissioned by the EIS have found that MTM resulted in improvements in pH, iron, and manganese levels downstream. EIS III D-7. As the EIS notes, "the Appalachian coalfields provide almost limitless opportunities for watershed improvement." EIS IV B-9. Such opportunities are presented both in the form of remining operations, which can greatly improve water quality and improve public safety be removing highwalls, as well as mitigation conducted as part of the MTM process.

Runoff and groundwater are stored in valley fills. EIS IV B-4. Valley fills hold approximately 7 times more water as their pre-mining counterparts. EIS III H-4. This water is slowly released downstream, increasing base flows, lowering peak discharges, and moderating water temperatures. EIS IV B-6. An increase in base flow may eliminate intermittent flow, improving an intermittent stream to a perennial stream.

MTM activity also creates ponds. The EIS recognizes that functions of man made ponds exist and may be considerable, and may tend to limit the effect of disturbances on the downstream watersheds. EIS III C-18 & 20; Wallace B. in EPA et al. March 20, 2000. Wetland areas are being created at reclaimed mine sites. It is anticipated that wetland acreage has actually increased as a result of these steep slope [MTM] activities. EIS III D-19. These newly created wetland habitats, in conjunction with results from other mining reclamation efforts, have created habitat, such as grasslands, edge habitat, and scattered ponds that are

important for game species such as wild turkey, bobwhite quail, ruffed grouse, and white tailed deer. EIS III F-11. Some forest edge and grassland species (certain reptiles, birds, mammals, raptors, etc.) are positively impacted by the terrestrial habitat diversity created by MTM. EIS II C-75. The EIS documents that there has been an increase in the abundance of edge and grassland bird species at reclaimed MTM sites. EIS III F-7.[13]

ii. MTM has Provided Economic and Social Benefits

MTM has provided immeasurable economic and social benefits to one of the poorest regions of the United States. These mines provide high paying jobs, economic activity for other businesses, taxes for governments and schools, roads (EIS III J-2), and land that, in certain cases, can be used for commercial development.

The population in the study region is exceptionally poor. According to the Census, over 1/3 of the residents in 24 counties in the study area are below the poverty level. EIS III P-2. What the study area lacks in personal income, it makes up for in natural resources. The area contains over 28.5 billion tons of coal. EIS ES-2 MTM/VF operations are generally the most economical and efficient forms of surface mining in steep slope Appalachia and provide for the highest possible

[13] See also Wood and Edwards, 2001; Canterbury 2001.

recovery of multiple coal seams. EIS III I-1. Such operations may be able to mine as many as 18 seams. EIS III J-1. At current rates of coal production, this area could produce coal for the next 100 years.

One of the many benefits of these MTM operations are the high paying jobs and taxes created by the activity. Mining made up more than 10% of employment in a number of the study area counties. EIS III Q-5. Impacts are even greater in certain regions of the study area. Whereas MTM operations account for about ¼ to 1/3 of Appalachian coal production, in southern West Virginia, about 95% of the surface mining is done by the MTM method. Such impacts are also reflected in the tax revenues of these areas. For example, in West Virginia, 90% of the severance taxes come from coal. EIS III Q-10. Surface mining is particularly important to the economies of Boone, Logan, and Mingo counties. EIS III Q-13.

iii. Unnecessary Limitations on MTM Will Cause Both Economic and Environmental Harm

Unnecessary limitations on MTM in the study area would have significant adverse consequences, for the economy, the people of the region, government, and the environment. The EIS recognizes that if mining costs increase too greatly in the study area, mining employment would drop and tax revenue from coal would decline. Other studies have found that prohibiting valley fills in West Virginia would cause State tax revenues to decline by as much as $168 million annually,

plus an additional $83 million drop in County tax collections.[14] Commensurate school closings, and diminished State and government services would occur. EIS IV I-2. The EIS also recognized comments in the record stating that local governments depend on revenues and taxes in order to provide police and fire protection, ambulance service, and education. EIS I-20. Impacts to the private sector would be even greater, resulting in the loss of over 15,000 jobs and a $2.4 billion decrease in economic output in West Virginia. *See* Marshall Study, cited *supra*. The EIS does not offer any significant economic activity that would replace MTM if it were lost.

Moreover, "if coal in the study area is rendered economically unrecoverable, it may never be mined..." EIS IV F-1. This would be contrary to what is best for the environment, because it would waste natural resources and require coal to be mined somewhere else that may not involve the most economical and efficient form of surface mining that does not provide for the highest possible recovery of multiple coal seams. EIS III I-1. As early as 1979, EPA has stated that MTM may be preferable to other forms of mining, such as contour mining: "Mountaintop removal may serve as an excellent alternative to contour mining in these mountainous areas primarily because of the potential for reduced environmental impact, improved reclamation, increase land value,

[14] *See "The Fiscal Implications of Judicially Imposed Surface Mining Restrictions in West Virginia,"* Marshall University Center for Business and Economic Research, (February 2001).

expanded land use potential and total resource recovery." *EPA EA of Surface Mining Methods* at p. 25. In addition, the Marshall study also found that mining firms would be "extraordinarily unlikely" to replace lost MTM tonnage with additional coal mined underground. Indeed, a policy that did not maximize utilization of our coal resources would actually violate OSM's regulations, which provide that surface mining activities must be conducted to maximize the utilization and conservation of the coal so that reaffecting the land in the future is minimized. *See* 30 C.F.R. § 816.59.

Finally, the EIS fails to address impacts to national security if the amount of coal reserves noted elsewhere in this document are excluded from recovery. There is no consideration for this Administration's National Energy Strategy, aimed at securing energy independence for the United States. This strategy relies heavily on the continued use of this nation's abundant coal resources as a low-cost and reliable source of energy.

c. The EIS is Programmatic in Nature

The agreement to prepare the EIS is contained in a settlement agreement that resolved Federal claims in the case of *Bragg v. Robertson*, 54 F.Supp. 2d 653 (S.D. WV 1999). The stated purpose of the EIS is:

> "...to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills."

64 Fed. Reg. 5778 (February 5, 1999).

The EIS is not specific to any particular action, but rather is a "Programmatic EIS" in that it evaluates broad Federal actions such as the adoption of new or revised agency program guidance, policies, or regulations. An EIS is not itself "final agency action" subject to judicial review. Standing alone, it does not establish any rights, obligations, or other legal consequences.[15] A programmatic EIS is essentially procedural in nature and not substantive. In the future, policies will be finalized and rules promulgated based on information and analysis contained in the EIS, but the EIS itself does not change any current laws or regulations. Future actions proposed as an outgrowth of this EIS may require independent or supplemental NEPA analysis.

[15] *See Bennett v. Spear*, 520 U.S. 154, 177 (1997).

The EIS has done exactly what it is supposed to have done—it has considered various policies, guidance, and coordinated agency decision-making processes to minimize the impacts of MTM to the extent practicable. Accordingly, in the framework of this programmatic EIS, we turn now to a discussion of Alternative III, and why we believe that it should be selected as the best Alternative in the Final EIS.

d. Alternative III is Preferable

Although the EIS states that "the alternatives were developed with the objective that each would satisfy the requirements of the CWA and SMCRA," EIS II B-1, and each would likewise "improve environmental protection and better coordinate implementation of the CWA and SMCRA..." *Id.*, Alternative III is the most preferable alternative for the following reasons.

i. Alternative III Will Produce the Best Decisions, Which Will Improve the Environment 1-4

The EIS correctly observes that: "[Alternative III] would provide clear environmental performance targets for industry, stakeholders, and regulators based on combined analyses of SMCRA and CWA performance standards, a better basis for decisions and findings by SMCRA regulators, and an improved ability for States, with more knowledge about environmental resources within their borders,

local conditions, etc., to set priorities for mitigation." *Id.* The EIS also recognizes that the U.S. Army Corps of Engineers (COE) does not have staff with mining engineering background as OSM does, and that CWA § 404 minimization alternative analyses involve a knowledge of mine planning theory and practice, as well as operational feasibility to determine if all practicable alternatives have been considered. EIS IV I-17. Therefore, Alternative III is the most logical choice because the Federal regulatory personnel with the best knowledge about the subject will more frequently be in a lead role in making environmental decisions.

ii. Coordination will Also Yield Better Decisionmaking 1-4

Alternative III is based on a joint permit application that will provide for concurrent review, which will result in better decisionmaking. It will enhance the coordinated regulatory processes by serving as the platform for evaluation of compliance with SMCRA and CWA Sections 401, 402, and 404 programs. EIS II C-22. Although a single permit application would be used, each agency would remain responsible for ensuring that all statutory and regulatory responsibilities in SMCRA and the CWA are met, further enhancing environmental protections. A memorandum of agreement (MOA) and field operating procedures (FOP) will further enhance coordination and decisionmaking. EIS II C-25-26.

SMCRA requires that Federal and State agencies, such as OSM, State regulatory authorities, and the COE, coordinate implementation of their programs and cooperate "to the greatest extent possible" in order to minimize duplication, delays, and conflict. 30 U.S.C. §§ 1211(c)(12) & 1292(c); 30 C.F.R. § 773.5. The CWA likewise mandates the agencies minimize duplication.[16] Alternative III is clearly the best option to fulfill this statutory mandate, because it would minimize duplication by promoting "a single lead agency with coal mining regulatory expertise for permitting and a framework for efficient, environmentally responsible production of energy resources." EIS II B-15. Requiring both an individual permit (IP) and a SMCRA review would be duplicative and inefficient, unless it is determined necessary by the COE in a particular situation, and justified by the particular circumstances. 1-4

iii. Alternative III Correctly Presumes the NWPs are Appropriate in Most Cases

Data from the EIS demonstrates that the vast majority of MTM operations are currently authorized pursuant to NWP 21. For example, in West Virginia from 1990-2002, 81 NWPs have been issued for MTM operations, versus only 5 individual permits (IP). EIS II C-46. The COE has been independently applying the statutory requirements of the CWA over this time, and has concluded 94% of

[16] 33 U.S.C. § 1303(a); 33 C.F.R. § 322.2(f)(2); *See also WV Governor's Report* at ES-4 ("[COE, FWS, OSM & EPA] should be encouraged…to cooperate in resolving outstanding mountaintop removal issues.").

the time that NWPs are appropriate. Environmental organizations have repeatedly challenged approval of these permits, and have repeatedly lost their claims in Federal courts.[17] Therefore, it is apparent that Alternative III is the most appropriate alternative, because it establishes the regulatory paradigm that will most often produce the correct decision.

iv. Balancing Environmental, Economic, and Technical Considerations

Alternatives are considered not only with regard to their impact on the environment, but also on technical and economic factors. For example, one of the primary purposes of SMCRA is to "assure that the coal supply essential to the Nation's energy requirements and to its economic and social well being is provided and strike a balance between protection of the environment…and the Nation's need for coal as an essential source of energy." 30 U.S.C. § 1202(f). Agencies are required to follow all Congressional mandates, including those in SMCRA and other laws. Since the comprehensive analysis concluded that: "the environmental benefits of the three alternatives are very similar," EIS II B-13, the agencies should select Alternative III because it is the best alternative that also fulfills other statutory mandates by minimizing the adverse impacts to the 1-4

[17] *See Bragg v. Robertson, 72 F. Supp. 2d 642, 658 (S.D. W. VA 1999); vacated, Bragg v. West Virginia Coal Association, 248 F.3d 275 (2001); cert. denied, 122 S.Ct. 920 (2002); See also Kentuckians for the Commonwealth v. Rivenburgh,* 317 F. 3d. 425 (4th Cir. 2003).

economy. This approach is also consistent with NEPA and regulations by the Council on Environmental Quality (CEQ), which allow agencies to consider economic and technical issues: "An agency may discuss preferences among alternatives based on relevant factors, including economic and technical considerations and agency statutory missions." 40 C.F.R. § 1505.2(b); 42 U.S.C. § 4332(B).

v. Why NWPs are Appropriate for MTM

1. COE Asserts that NWP are Appropriate for MTM

1-4

The COE reauthorizes its nationwide permits (NWPs) every five years. In all of its previous actions, and particularly in its most recent reauthorization, the COE clearly stated that NWP 21 is appropriate for MTM: "...this [NWP 21] permit is designed for use by mountaintop mining operations as well as other surface coal mining activities. 67 Fed. Reg. 2042 (January 15, 2002). The COE also states that "...valley fills may be pursued under the current regulations." *Id.* at 2039. The COE, through NWP 21, ensures that surface coal mining activities do not cause more than minimal adverse effects to the aquatic environment after considering mitigation. *Id.*

The COE believes that NWP are appropriate and useful for expediting the processing of permits provided there is adequate compensatory mitigation. Id at

2043. The COE found that proposed projects under NWP 21 are generally located at the upper limits of the watersheds and are therefore not interfering with aquatic species migration. *Id.* Moreover, the COE is ensuring that such projects are avoiding and minimizing impacts to the extent practicable and providing adequate mitigation, especially in the form of enhancement or rehabilitation of existing streams through stabilizing old mined sites to reduce sedimentation and acidic water releases. Such activities can result in substantial improvement in downstream water quality and aquatic habitat within a watershed. *Id.* These findings are consistent with those of the EIS, which found that Appalachian coalfields provide almost limitless opportunities for watershed improvement. EIS IV B-9. The EIS also agrees that mitigation could not only offset, but enhance aquatic resources. *Id.* Finally, the COE recognizes that coal mining is different than many other activities authorized under NWPs, because coal mining projects are thoroughly reviewed for environmental impacts under several other authorities. *Id.* at 2042.

1-4

2. There are many protections built into the NWP framework

There are many protections available under NWP 21 to ensure protection of aquatic resources. Such protections are always evolving and improving, as necessary. For example, just last year, the COE made two changes to NWP 21. First, the COE now requires a specific written determination by the District

Engineer (DE), on a case-by-case basis, that the proposed activity complies with the terms and conditions of this NWP, and that adverse effects to the aquatic environment are minimal both individually and cumulatively, after consideration of any required mitigation before any project can be authorized. 67 Fed. Reg. 2038. Second, the COE clarified specifically in the NWP 21 that the agency will require mitigation when evaluating surface coal mining activities in accordance with General Condition 19. The COE also will now address direct and indirect effects to the aquatic environment from the regulated discharge of fill material in its § 404 review.

Furthermore, under Alternative III, the COE retains discretion to (1) require an individual permit if the adverse individual or cumulative effects on the aquatic environment will be more than minimal after mitigation; (2) add regional conditions on a watershed, regional, or geographic basis; or (3) suspend, modify, or revoke authorizations under a NWP. NWPs do not authorize any activity that is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the ESA, or to destroy or adversely affect the designated critical habitat of such species. Not only does the COE have substantial discretion to regulate NWPs, but EPA is also authorized to veto any § 404 permit. EIS II C-8; CWA § 404(c). 1-4

vi. IPs Are Duplicative and Unnecessary in Most Cases Because SMCRA Provides Comprehensive Information on all Aspects of Mining for Use by COE in § 404 Reviews

The COE, pursuant to CWA § 404, is limited to regulating the placement of fill material in waters of the United States, and the scope of its analysis is limited to impacts on aquatic resources. However, SMCRA provides much broader coverage through several statutory and regulatory provisions, through which OSM protects fish, wildlife, and the hydrologic balance. Indeed, that is why NWP 21 is the only "programmatic" Nationwide Permit—that is, a general permit directly tied to another environmental regulatory program that already comprehensively regulates the authorized activities. As the COE has repeatedly found, SMCRA adequately addresses environmental concerns and provides similar protections for aquatic resources as the § 404 program requirements. [18] The language of NWP 21 has always tied the authorization directly to those activities that are "authorized by [OSM] or States with approved programs under Title V or [SMCRA]." *See* 51 Fed. Reg. 41026, 41256 (November 13, 1986); 67 Fed. Reg. 2020, 2081 (January 15, 2002). A number of these SMCRA protections are discussed below. 1-4

SMCRA § 515(b)(10) requires operators to "minimize the disturbances to the prevailing hydrologic balance at the mine site and in associated offsite areas and to the quality and quantity of water in surface and ground water systems..."

[18] *See* 56 Fed. Reg. 14598, 14604 (April 10, 1991); 56 Fed. Reg. 59110, 59124 (November 22, 1991).

In addition, § 515(b)(24) provides that operators must minimize disturbances and adverse impacts of operations on fish, wildlife, and related environmental values to the extent possible using best technology currently available (BTCA).

For permit applications, SMCRA also requires information on maps, mining plans, watersheds, climatological factors, geological information regarding overburden strata, coal seams, aquifers, the water table, spoil, topsoil, blasting, natural drainways, and chemical analyses. 30 U.S.C. § 1257(b). Further information is required for the mine's reclamation plan. 30 U.S.C. § 1258.

In addition, SMCRA § 507(b)(11) requires a determination of the probable hydrologic consequences of the mining and reclamation operations, both on and off the mine site. This section results in information collected on the hydrologic regime, quantity and quality of water in surface and underground water systems, information on dissolved and suspended solids, and such other data as required to assess the probable cumulative impacts (set forth in a Cumulative Hydrologic Impact Analysis, or "CHIA"). *See also* 30 C.F.R. § 780.21.

All of this information is available to the COE to assist in making its required determinations pursuant to its authority under CWA § 404. Because SMCRA provides such comprehensive information regarding the mine, and because Alternative III provides numerous avenues for coordination between

1-4

OSM and COE, it would be unnecessary, duplicative, and contrary to Congressional intent to require lengthy individual permits as the norm, as is likely under Alternative I. Moreover, courts have observed that they will not uphold presumptions, such as Alternative I, that are counterfactual.[19]

1-4

vii. OSM Will Promulgate Rules to Fill any Regulatory Gaps

OSM will issue rulemakings (Action 3.3 and Action 7) and an MOA to ensure that any gaps, including § 404 data collection, impact prediction, and alternative analysis, including avoidance and minimization are addressed. EIS II C-23. These actions include amending the "stream buffer zone" rule and the OSM regulations on the placement of excess spoil. We strongly support these regulatory changes by OSM that are more fully explained in Section II(e)(iii) & (vii) of our comments, *supra*.

e. Discussion of Specific EIS Action Items (EIS II C)

The EIS proposes seventeen specific action items. Our comments on these Action items are provided below.

[19] *NMA v. Babbitt*, 172 F.3d 906, 913 (D.C. Cir. 1999)(we do not see how a counterfactual procedural device could be justified even as a matter of policy); *See Allentown Mack Sales & Serv., Inc. v. NLRB, 522 U.S. 359, 118 S. Ct. 818, 828, 139 L. Ed. 2d 797 (1998).*

i. Action Item 1: Regulatory Alternatives

As explained in great detail in Section II(d). of our comments, we strongly support Action 1.3, commonly referred to as "Alternative III." 1-4

ii. Action Item 2: Consistent Stream Definitions

We support this action. Like the definition of "fill material" that was clarified by the COE and EPA in 2000, creating consistent definitions of streams would be beneficial so that the same definitions would apply to various regulatory programs. This would lead to greater efficiency, better coordination, and consequently better environmental analysis, decisionmaking, and consistency among the various programs. 1-13

iii. Action Item 3: Clarification of the Stream Buffer Zone Rule

We strongly support this action.

SMCRA has never mentioned, let alone mandated, a requirement that there needs to be a "buffer zone" around a stream. Quite the contrary, SMCRA is

replete with references to mining near, under, and/or through streams. Instead of prohibiting stream disturbance altogether, the law requires an effort to minimize adverse effects *outside the permit area and downstream*. *See, e.g.* SMCRA §§ 515(b)(10(B)(i)(prevent to the extent possible using BTCA additional contributions of suspended solids to streamflow or runoff outside the permit area); 515(b)(22)(D)(allowing disposal in springs, natural water courses or wet weather seeps as long as drains are constructed); 516(b)(9)(B)(focusing on limiting additional contribution of suspended solids to streamflow outside the permit area); 516(b)(11)(minimize, to the extent possible using BTCA disturbances & adverse impacts of operations on fish & wildlife); 516(c)(allowing mining under perennial streams, except where imminent danger to human inhabitants exists). Congress reiterated its concerns in SMCRA's legislative history, which emphasized that Congress was not primarily concerned with the footprint of MTM VFs, but rather with the downstream impact, both in terms of safety to populations and the environment. *See* Senate Report No. 95-128, 1st Session, p. 83.

The original purpose of the stream buffer zone (SBZ) rule was to protect a stream from sediment bearing water flowing from the disturbed area. See 44 Fed. Reg. 30619 (May 25, 1979). This purpose confirms the fact that the rule was never meant to apply to valley fills in the first place. Instead, it was directed at mining near a stream. As OSM recognized in its 1983 rule, "It is impossible to conduct surface mining operations without disturbing a number of minor natural streams, including some which contain biota." 48 Fed. Reg. 30313 (June 30, 1983).

The CWA, as well as OSM regulations, provide ample protection for streams. CWA § 404 permits provides extensive protection, including mitigation requirements that are beyond that required by SMCRA. In addition, almost a dozen other SMCRA regulations provide protection for the hydrologic balance and fish & wildlife.[20] The SBZ rule is therefore not only redundant, but worse, its vague language has resulted in unnecessary and costly litigation, permit delays, and uncertainty in the SMCRA regulatory programs. Therefore, this rule needs to be eliminated, or at the very least, properly clarified. 1-13

iv. Action Item 4: Advanced Identification Designation (ADID)

We strongly oppose this action. This action is unnecessary and duplicative, because authority already exists under SMCRA to designate areas that are unsuitable for mining. 30 U.S.C. § 1272. These SMCRA provisions are specifically designed for mining, and are more appropriate for use with MTM operations than is an unrelated provision meant to be applied in other contexts. Moreover, both the CWA and SMCRA require agencies to minimize duplication.

[20] *See, e.g.* 30 C.F.R. §§ 816.41-43; 816.45; 816.72; 816.97; 816.150(b)(5); 816.150(d)(1) & (d)(2); 816.151(c)(2); and 816.151(d)(5).

38

30 U.S.C. § 1292(c) & 1303(a); 33 U.S.C. § 1211(c)(12); 33 C.F.R. § 322.2(f)(2). Such duplicative action is also contrary to the purpose of the EIS, which calls for coordinated agency action.

In addition, ADID regulations have historically been used only for specific geographic locations and not applied to a general class of particular stream segments or water resources. EIS II C-36. ADID designation only occurs following exhaustive site-specific data collection and analysis, and thorough public participation. *Id.* Without these site-specific efforts for each headwater stream, an ADID designation for a broad category of streams would be arbitrary. EIS II D-7. 1-13

v. Action 5: Development of New Water Quality Standards

The CWA requires States to review water quality standards (wqs) at least once every 3 years. 33 U.S.C. § 1313(c)(1). The Associations support efforts by States to review and revise wqs as appropriate to ensure they are attainable and that they are based upon the latest scientific knowledge. EPA recognizes that there are a number of factors, water quality and non-water quality, that affect the attainment of the biological integrity of a particular water body, including the amount of human activity resulting in permitted and non-permitted discharges, and

39

the type and extent of hydrologic modifications.[21] For example, some recent literature suggests the full restoration of natural aquatic life communities may not be feasible in small watersheds with heavily urbanized areas. *Id.* at 23. Likewise, the same may be true for certain water bodies where natural background conditions or irretrievable human-induced conditions prevent attainment. As such, EPA recommends States consider developing a system of tiered aquatic life uses and subcategories which define reasonably attainable biological communities for the impacted areas. Once a refined designated use system is developed, individual water bodies may be assigned refined designated uses, as appropriate, and wqs and water quality criteria (wqc) may be revised accordingly. Such revisions are subject to EPA review and approval and require an appropriate scientific, technical or economic justification for the change. The Associations believe, particularly in light of new scientific evidence suggesting the current national water quality criteria for selenium may be over-protective, that States should undertake a meaningful review of current standards and use designations where credible evidence supports a reanalysis, e.g. such as standard for selenium. 1-13

vi. Action 6: Refine Ecological Function Protocols

[21] See EPA Guidance: Coordinating CSO Long-Term Planning With Water Quality Standards Reviews, July 31, 2001.

40

We support the use of appropriately crafted protocols to assist in determining the effects of MTM operations on ecology. However, such protocols must be based on real evidence and sound science, and not arbitrary numbers created just for the sake of having a threshold limit.

vii. Action 7: Rulemaking on Excess Spoil

We support this rulemaking effort by OSM. We agree that the permit applicant should demonstrate, to the satisfaction of the regulatory authority, that the volume of excess spoil is no more than necessary and that the location and configuration of excess spoil fills will result in the least environmental impact after considering alternative sites and designs. However, consistent with SMCRA § 515(b)(24), the second requirement should be required only *to the extent possible, using BTCA*, since this limitation was imposed by Congress. 1-13

viii. Action 8: BMP manual for stream protocol and mitigation

We support this action.

ix. Action 9: Refine and Calibrate Stream Assessment Protocols

41

We support this action. The protocols should continue to be improved and calibrated as new data becomes available.

x. Action 10: Incorporate Mitigation/Compensation Monitoring Plans into SMCRA/NPDES inspection schedules. Coordinate SMCRA and CWA requirements to establish financial liability to ensure that reclamation and compensatory mitigation projects are completed successfully.

We do not understand this action. This action seems to combine and confuse concepts that do not belong together. For example, NPDES does not relate to mitigation. Likewise, there is no bonding under the CWA; rather, bonding is required only under SMCRA, and only for reclamation. NMA filed comments with OSM last year on proposed changes to its bonding regulations. 1-13
The comments explained that bonds are set to cover certain activities, and cannot be broadened after the fact. There is a serious problem with the availability of reclamation bonds for the mining industry. Also, heaping too much liability on the system risks additional forfeitures, which can ultimately make the overall problem worse. We are not aware of any COE regulations requiring bonding for mitigation associated with NWPs. Therefore, the agencies must be extremely careful in implementing this action.

We cannot provide further comments without more specifics on exactly what is being proposed in this action.

xi. Action 11: Apply Stream Assessment Protocols to Determine On Site Mitigation Requirements

The SMCRA regulatory authority should apply the stream assessment protocols to determine on site mitigation requirements so long as the protocols are realistic and produce realistic assessments. However, certain protocols that have been developed so far are of questionable reliability. For example, the Louisville Protocol has not undergone extensive peer review or public comment, and may contain errors.[22] In addition, permittees should receive credit for SMCRA reclamation towards mitigation requirements.

xii. Action 12: Creation of a Dynamic GIS Database for evaluating and Tracking Aquatic Cumulative Impacts 1-13

We support the gathering of additional data to better evaluate and track the cumulative impacts on aquatics. However, we do not agree that such information should be used to establish a "bright line" cumulative impact threshold for feasible CWA § 404 MTM permits. The evidence in the EIS uniformly suggests that such a bright line is inappropriate because there are too many site specific factors, and therefore, the creation of such a line would be arbitrary and capricious. Moreover, the EIS itself found that smaller watershed sizes, by increasing the number of fills

[22] *See* Joint Industry Specific Comments.

constructed, could result in *greater* cumulative impacts, reductions in coal reserves and increases in utility costs. EIS II C-73.

xiii. Action 13: BMP Manual for Growth Media & Reclamation with Trees

We support this action. Studies have shown that changes in reclamation techniques, coupled with modifications to OSM regulations could greatly improve the ability to grow trees on reclaimed land. Moreover, the EIS recognizes that "...impacts to soils from MTM/VF are not irreversible and that over time, soils similar to those that existed prior to mining are likely to be re-established on reclaimed mine sites." EIS IV C-7. Such techniques, if properly applied, can actually be less expensive than current practices. This is an area where OSM rulemaking could make a significant contribution to minimizing the impact of MTM operations by removing existing impediments to planting trees. 1-13

xiv. Action 14: Congressional Mandate to Grow Trees

We strongly oppose this action. A one-size-fits-all mandate such as this was not put into SMCRA by Congress in the first place because they recognized that OSM, States, and permittees needed flexibility to address site specific conditions that are most appropriate for the area. Moreover, most surface rights are not owned by mining companies, and therefore permittees cannot normally

force landowners to accept forest cover as the post mining land use. If such an amendment were made to SMCRA, it would remove a big stick from the surface property owners' bundle of rights, and cause takings lawsuits. It would unnecessarily eliminate flexibility that is built into current law. Finally, forcing States to do this may also violate the 10th Amendment to the Constitution. This is an unnecessary and bad idea.

xv. Action 15: Evaluate and Coordinate Dust/Blasting Programs and Develop BMP Manual

The creation of a BMP manual may merit further consideration. However, we oppose the regulatory actions because the EIS shows that "dust and fume emissions from blasting pose no potential health problems outside the permit area. Visible and measurable fugitive dust rarely migrated more than 1000 feet from the actual blast." EIS II C-84. Air quality control plans are already required as part of the SMCRA permit. *See* 30 C.F.R. § 780.15. In addition, MSHA also regulates explosives and blasting. *See* 30 C.F.R. §§ 77.1300-1304. 1-13

xvi. Action 16: Flooding Guidelines

We support the concept of non-mandatory guidelines to assist operators in minimizing the potential for off-site flooding, to the extent that guidelines are reasonable. However, we would not support mandatory flooding regulation because the EIS does not support such action. It found that: (1) the predicted increases in peak flow did not cause flows to leave the banks of the stream channel; and (2) flooding was caused by mine sites that were not following or maintaining their approved drainage control plans. EIS II C-87. This evidence demonstrates that more regulations are not necessary or productive, but rather, the focus should be better compliance with existing rules and regulations at a few operations.

xvii. Action 17: Program Changes to Comply with the ESA

As noted above, the most recent biological opinion issued by FWS says that: "...surface coal mining conducted in accordance with properly implemented State and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats." In addition, the EIS says that: "there are no significant differences among the No Action Alternative and Alternatives I, II, and III in terms of their ability to protect [threatened and endangered] species." EIS IV D-7. Endangered species issues can be adequately addressed on a permit-by-permit basis under existing 1-13

regulations. Neither a CWA 404 permit nor a SMCRA permit will be issued if it will result in violations of the ESA.[23] 1-13

The following section of the comments will provide detailed comments on specific sections of the EIS.

III. Specific Comments on the MTM EIS

Page II.C-30

> *The extent to which valley fills reduce energy (organic carbon) resources that may be used by downstream aquatic communities is not well known.*

Scientific research has demonstrated that no-net reduction in energy transport or energy availability has occurred. For example, the United States Geological Survey, as part of the National Water Quality Assessment Program, conducted a survey of fish communities to assess biological responses to certain stressors, with an emphasis on mining. Published in 2001, the study found that streams associated with large scale surface mining activity (including one of the streams analyzed in both the EIS benthic and chemistry reports) had high scores in terms of both sensitive individuals and total fish counts: 6-8-4

[23] 33 U.S.C. § 1344(c); 30 C.F.R. § 780.16; 30 C.F.R. § 816.97(b).

Among the Kanawha River streams, Clear Fork at Whitesville, Kelley's Creek at Cedar Grove and Laurel Creek at Hacker Valley ranked among the best sites in several species composition metrics.[24]

If valley fill construction or other mining-related disturbance was impacting the amount of energy available to downstream reaches, according to the positions advocated by participants in the *Value of Headwater Streams Workshop* (EIS Appendix D), a corresponding reduction in fish populations would occur below valley fills. As noted under the same section of the EIS, *"Macroinvertebrate recovery appears to be facilitated provided sufficient food sources and aquatic habitats are available."* The results of the USGS fish survey and the findings of the EIS Cumulative Impact Study (CIS) demonstrate that sufficient energy exists and will continue to exist to provide input for these watersheds and to sustain aquatic function in the downstream reaches of the watershed. 6-8-4

Page II.C-36, Actions 4.1 and 4.2 — Designate Areas Generally Unsuitable for Disposal Referred to as Advanced Identification of Disposal Areas

Application of this §404 regulatory tool to mining in Central Appalachia would be redundant. Each of the factors identified as part of the ADID process are currently addressed and/or facilitated by other regulatory programs. For instance, premining baseline water quality data is collected and submitted as part of the

[24] U.S. Geological Survey. *Fish Communities and Their Relation to Environmental Factors in the Kanawha River Basin, West Virginia, Virginia, and North Carolina 1997-1998.* 2001

SMCRA and NPDES applications. The public participation avenues that are stressed in the ADID description are an integral part of the SMCRA, §401 and §402 permitting processes. While permit-specific legal challenges are not a matter of routine in the study area, the SMCRA process certainly provides the option of administrative challenge (to an appeals board) and legal challenges to the appropriate state court.

As noted by the COE in earlier rulemaking actions regarding NWP 21, the mining related dredge and fill permits are one of the only permits in the §404 program that are subject to extensive, independent environmental analysis [25]. Mining operations are subject to extensive SMCRA permitting requirements and NPDES requirements. Depending on the activity, other agencies such as the federal Mine Safety and Health Administration can be involved in permitting actions. All these existing environmental programs are subject to federal oversight: OSM in the SMCRA process and EPA in the NPDES process. 6-8-4

In summary, the ADID process would only add to an already comprehensive, expensive and time consuming regulatory process associated mine permitting actions.

Page II.C-37 — Stream Impairment

> *Studies indicate that aquatic communities downstream of surface coal mining operations and valley fills <u>may</u> be impaired.*
> *(emphasis added)*

[25] 56 Fed. Reg.14598, 14606 (April 10, 1991) "SMCRA provides similar protections for aquatic resources as the § 404 program requirements." See also 56 Fed. Reg. 59110, 59124 (November 22, 1991). COE again acknowledges that § 404 and SMCRA protect the same resources.

Scientific research conducted for this EIS and by mining companies in conjunction with the EIS does not support this statement. The most significant change observed below valley fills was a shift in the benthic community towards more filter-feeding organisms and a reduction in mayfly population. This shift may or may not be directly attributable to valley fill construction or mining activity. OSM found similar community shifts with a distinct reduction in mayfly populations downstream of mining without valley fills:

> **A study was...conducted by OSM on the cumulative off-site impacts from a large area mine in southeastern Ohio over a twelve year period. The location of the study was on the Central Ohio Coal Company (COCCO) property where a dragline was used...Although this study was not in the EIS study area it was included to show how mining activities without valley fills can impact water quality. The chemical analysis of the impacted streams indicated similarly elevated levels of hardness, sulfates, conductivity...**
>
> **Comparative surveys of macro invertebrates...indicate similar results to those in the filled and filled/residential class sites of the MTM/VF studies (i.e.; elevated conductivity, sulfates, hardness and a decline in pollution sensitive species)...It is particularly noteworthy that none of the macro inveterate samples...showed any significant numbers or kinds of mayflies.**
> **EIS III.D-7.**

6-8-4

Since the OSM study cited above was in connection with mining that did not involve valley fills, similar results can be expected with any earth disturbing activity, mining or otherwise.

50

Neither the decline of the mayfly population or the shift towards filter-feeding organisms impacts stream function downstream. The USGS fish survey found that streams below valley fill and surface mine disturbance supported healthy and diverse fish populations, indicating that sufficient energy exists below filled areas.

> *Total fish species downstream of some filled sites were lower than mined and reference sites. However, fisheries sampling was limited by drought conditions during the study period and the sample populations may not be statistically representative.*

The Associations believe that statements regarding fish impairment are incorrect. As noted above, results of the Fish Report are questionable, and of little value. The USGS fish survey conducted in the same region as the EIS Fish Report found some of the healthiest fish populations downstream of areas subject to large scale mining and valley fill activities. As noted in the subsequent paragraph: 6-8-4

> *The sample size and monitoring periods conducted for the EIS were not considered sufficient to establish firm cause and effect relationships between individual pollutants and the decline in particular macro invertebrate populations. Impairment could not be correlated with the number of fills, their size, age, or construction method.*

When viewed in conjunction with the USGS fisheries report previously cited in our comments it is clear that valley fills and other mining activities are having no adverse affect on the downstream fish communities. <u>The failure of the EIS to state the obvious is a serious flaw and should be addressed in the final EIS</u>.

Page II.C-44, third paragraph under Action 6:

51

An example of biomonitoring to assess baseline stream health using macro invertebrate data is the West Virginia Stream Condition Index, which was used in some of the aquatic studies conducted for this EIS.

Application of the WV SCI to the southern coalfields of West Virginia is inappropriate. This assessment method was developed using data collected across the State, but an undue emphasis was placed on information collected in the central and northern regions. The conditions in these other regions are quite different that those that exist within the primary region of MTM/VF which rests in the southern portion of the State. A more region specific assessment would account for the natural conditions evident in the West Virginia portion of the study area Further, the results of the WV SCI have been incorrectly interpreted to assign "impairment" to several streams.

Finally, it is inappropriate to conclude that changes are the result of valley fills. For example, OSM's evaluation of a large scale surface mine in Ohio, the Central Ohio Coal Company Study (OSM COCCo. Study) documented similar benthic changes below mining disturbance that did not include valley fill construction. Mayfly taxa were virtually non-existent in this study as well. Because of generally flat terrain of the mined area, OSM COCCo. Study could be characterized as an evaluation of excavation rather than mining, so similar impacts to the mayfly taxa should be expected below any activity that fractures rock and disturbs the soil.

1-13

Page II.C-51, NWPs Discussion:

52

On January 15, 2003 the COE reissued all of its NWPs. Those permits generally identified upper limit thresholds for NWP applicability of each identified activity. In considering the need for thresholds for NWP 21, the COE determined that there was currently no scientific basis for a programmatic threshold. Additionally, the COE believes the coal mining is different from activities authorized under other NWPs in that coal mining projects are reviewed for environmental impacts under other federal authorities.

As noted in this section of the EIS narrative, coal mining is subject to extensive and detailed environmental analyses through the state or federal SMCRA, NPDES and 401 water quality certification programs. Any potential environmental impacts of mining are identified and addressed prior to the issuance of the SMCRA and NPDES permits. These existing permit reviews which occur independent of the §404 permitting process are sufficient to insure that "no more than minimal" impacts will result from the proposed mining operation. 1-13

However, the COE made the commitment to re-evaluate the possibility of an upper threshold for NWP 21 after this EIS is completed.

The existence of the SMCRA and NPDES permitting programs, coupled with data collected through the EIS technical studies and other scientific research support a final decision by the COE to assume that all §404 permit applications are eligible for authorization under NWP 21 as advocated under alternative three, and that an upper threshold is not required. Specific evidence to support this approach and alternative are presented under our General Comments.

Page II.C-52, Compensatory Mitigation, General Comment:

53

The COE encourages applicants to perform compensatory mitigation projects in conjunction with mining operations;

A permanent conservation easement is required for mitigation and coal mine companies frequently do not own the property they are mining.

Requiring permanent conservation easements works at odds with encouraging on-site mitigation performed as part of the reclamation of a mined area and improperly extends the COE's influence beyond its statutory jurisdiction. As the statements cited above acknowledge, coal companies usually do not own the land on which they are mining. Instead, the mining companies lease the right to extract the mineral and the surface of the area reverts back to its owners once extraction and reclamation are completed. Because of this unique land ownership arrangement, the ability of the mine operator to obtain property and execute conservation easements is extremely limited, if not impossible. Unlike other development activities that impact wetlands and require §404 permits, mining is only a temporary land use. Whereas highway, infrastructure and building construction are permanent activities, mining only occurs in an area for a relatively short time. Any mitigation project undertaken for these permanent activities lends itself better to perpetual easements, since property is usually purchased by the permittee in conjunction with these permanent land uses and maintained in perpetuity as simply an extension of that project. Other natural resource extraction activities often coexist with mining, with timbering and natural gas production being the most prevalent activities. These activities, like coal

1-13

54

extraction, are temporary and are usually facilitated through leases, not ownership. Conservation easements could potentially complicate these other extraction activities thereby reducing the land's overall value and presenting a takings situation.

A conservation easement forecloses the possibility of future use or development and eliminates the private property rights retained by the landowner

As with many other particulars to the "wetlands" mitigation requirements it is clear that mining and the temporary nature of coal extraction was never considered in the development of this requirement.

Imposition of a conservation easement is unneeded and duplicative. Any future activity that could impact jurisdictional waters would require §404 authorization from the COE.

Page II.C-73, last paragraph, Establishing Cumulative Impact Thresholds:

Based on the fact that there have been 5 individual permit applications compared to the 81 projects approved under NWP 21 in West Virginia, it appears that applicants are designing the majority of MTM/VF proposals to stay below the 250-acre minimal impact threshold and thereby avoid the IP process.

This statement is presented without any explanation as to the effects of the interim 250-acre NWP/IP permit threshold. Operations in West Virginia redesigned to fall under the 250-acre reduced projected employment and production numbers. A particular operation in Nicholas County West Virginia was redesigned by the permittee to reduce valley fill configurations in order to fall below the 250-acre

1-13

55

watershed restriction. The project's planned recoverable coal reserves were lowered from 25 million tons to 8 million tons.[26]

The EIS technical studies found similar results, which are summarized on page IV.I-3:

> **The economics studies show a direct correlation between fill size and shifts in production due to increased mining costs. The Hill & Associates sensitivity analysis projected reserve reductions of 22 and 45% as well as cost increases of around 8 and 14% when all fills are restricted to 250- and 75 acre watersheds respectively.**
>
> **The Hill & Associates studies generally concluded that smaller fills necessitate less complete extraction but more rapid depletion of the surface mineable reserve base with different equipment types...**

The effects of the 250-acre threshold require more explanation in the EIS as the reader is left with the impression that the limit is impact-free, which it clearly is not: reserve bases are being reduced and the projected life of particular mine sites are being diminished with coincident reductions in employment, state tax collections etc. 1-13

Page II.C-45, Fill Minimization, General Comment

The entire discussion of fill minimization in this section overlooks a critical controlling factor in the location and development of mining operations. <u>Coal mining occurs where the coal resource exists.</u> Unlike other land disturbance activities that potentially impact jurisdictional waters, alternatives to filling are

[26] *Bragg v. Robertson*, Civil Action 2:98-636 U.S. District Court for the Southern District of West Virginia.

generally not available to the coal industry. As noted in the Mining Technology section of the EIS, all disturbance for surface or underground mining in the region will result in the generation of spoil. AOC reclamation returns most of this spoil to the mined area, but because of the "swell" factor of fractured overburden, not all the spoil, even under an AOC scenario can be returned to the mined area

Page II.C-47

> *Compensatory mitigation for unavoidable impacts is required by the CWA for both general and individual permits. The amount and type of compensatory mitigation required are determined by the functional assessment of the waters impacted by a specific project; i.e. higher quality streams require more mitigation than lower quality streams. The functions of streams lost through filling can require substantial mitigation as compensation. Consequently, mitigation to replace and restore aquatic functions can be a costly endeavor. <u>Therefore, the cost of mitigation can serve as an incentive to minimize valley fills in aquatic habitats.</u>* 1-13

<u>Assuming that exorbitant mitigation requirements will result in fill minimization is a false impression</u>. First, any disturbance, mining or otherwise, in the steep slopes of Central Appalachia will result in the generation of excess spoil. For mined areas, existing SMCRA requirements mandate these areas be restored to AOC unless an alternative land use is justified by the applicant. Even if AOC reclamation occurs based on the swell factor of the interburden and overburden some fill material <u>MUST</u> be placed in a valley fill regardless of mitigation requirements:

> **The primary reason for using valley fills is that the excavation of overburden results in a greater volume of**

Avadavit of William B. Raney.

> **material than was present on the mine site before mining. When bedrock is broken up forming spoil, void spaces are left between the individual rock fragments, causing them to occupy a greater volume than the original, unbroken rock. This expansion is referred to as swell and typically represents a volume increase of about 40 percent. Compaction of the spoil during backfilling partially offsets swell as the rock fragments are squeezed together by the weight of the overlying material, but this shrinkage factor will not completely return the spoil to its solid...volume.**
>
> **Particularly on steep-sloped mine sites, the excess spoil generated by the swell factor cannot be completely backfilled on the mine bench with the construction of potentially unstable slopes or substantial deviation from AOC**
> EIS III.K-3.

The EIS economics technical studies demonstrated that the physical and economic recoverability of a given coal reserve is directly tied to available valley fill opportunities: 1-13

> **The economics studies show a direct correlation between fill size and shifts in production due to increased mining costs.**
> EIS IV.I-3.

So, rather than encouraging fill minimization and stream avoidance, draconian mitigation requirements will only increase the cost of mining and act as a de facto programmatic barrier to mining activity in the region, much like the specific watershed acreage restrictions considered but ultimately rejected for inclusion in the EIS.

Another result of excessive mitigation requirements is to discourage post-mining land development. Though lack of suitable, stable land remains a chronic

economic and social problem throughout the study area, mitigation requirements and costs will discourage these post-mining developments.

Site specific conditions may exist that permit the operator to further minimize fill placement beyond the existing AOC requirements if suitable adjacent, attainable areas such as AML benches exist, but the incentive to use these areas is provided in the 404(b)(1) analysis and would be identified in the SMCRA permitting process absent any increased mitigation costs.

Page II. C-52, Compensatory Mitigation, General Comment:

As the EIS properly notes, environmental conditions in the study area provide ample mitigation opportunities:

> *The Appalachian coalfields provide almost limitless opportunities for watershed improvement, following almost 100 years of abandoned mine land (AML) problems. Mine drainage pollution, eroding spoil on the down slope, clogged stream channels, abandoned highwalls and coal refuse areas, and other orphan land problems exceed the capacity of the SMCRA AML Trust Fund. Many of the problems are such low priority that it is unlikely that the AML program will ever address them.* 1-13

Acid mine drainage and other stream impacts such as eroding spoil or coal refuse emanating from AML sites is by far the most serious and common water quality problem in the study area. A cursory glance at the 303(d) list of any of the states within the Central Appalachian region reveals hundreds if not thousands of streams identified as impaired from these impacts. The above-cited paragraph is also correct by observing that few, if any of these problems will be alleviated by the current AML program established under SMCRA, where impacts posing threats to health and safety receive the most attention and funding. While the AML fund may not provide for timely reclamation of sites impacting water quality in the study area it provides an excellent structure to facilitate reclamation and remediation of these areas through mitigation.

Except for Tennessee, all the states currently have an AML program that has been delegated to the state regulatory authority. These state AML programs use allocations from the federal AML fund to complete reclamation of identified pre-SMCRA disturbance. Using this existing structure, operators seeking 404 authorization for valley fill construction would, in cooperation with the state AML agency, identify an AML site(s) that is adversely impacting water quality. The operator would then work with the AML agency to alleviate these impacts. Mitigation credit would be assessed based on the overall improvement to water quality and habitat. 1-13

Approaching mitigation from this more practical standpoint will have a substantially greater improvement on the environmental health of the area than will in-kind replacement of headwater streams for several reasons. First, the scopes of potential impacts are not of a severe magnitude. Headwater streams will continue to comprise roughly 60% of total stream length in Central Appalachia and the area will maintain sufficient PEC scores. Second, structures constructed in accordance with SMCRA mandated mining and reclamation standards can serve as onsite mitigation. Research has demonstrated that these SMCRA provide unique habitats (through wetlands) that do no exist in the study area. Third and

60

most important, improving or preserving the energy transported from headwaters to the downstream system means nothing if other stressors such as AMD and excessive sedimentation impair or eliminate the aquatic habitat. In other words, mitigation efforts that restore, preserve or enhance the energy transport from mined areas means nothing if there are no macroinvertebrates alive downstream to consume this energy. This approach to mitigation is best viewed as a "watershed" approach that results in an overall net environmental benefit.

Similar environmental benefits will be seen from other water quality improvements that can be implemented through mitigation. The second most prevalent water quality problem in the study area results from the lack of public infrastructure. Failing or nonexistent wastewater treatment systems contribute to stream degradation in the region as do crude road crossings, stream bank erosion caused by repeated flooding and residential stream encroachment. Again, using the watershed approach to mitigation, it makes little sense to enhance the energy transport of the mined area through enhanced SMCRA structures or preservation of headwater reaches only to have this energy flow to a downstream area that is severely impacted by fecal coli form, or from another stressor resulting from the lack of infrastructure. 1-13

The correction of pre-existing water quality stressors coupled with vast mitigation potential of mining-created wetlands, ponds and side drains make the study area a "gold mine" of mitigation possibilities, and <u>the final EIS should recognize and promote these "nontraditional" mitigation measures.</u>

61

Page II.C-53, COE Stream Assessment Protocol, General Comment:

The Louisville Stream Assessment Protocol is mentioned throughout this section. Use of a functional assessment may indeed facilitate mitigation decisions, but the value or applicability of the Louisville Protocol is not as established as the discussion in this section presents it to be. Unlike the EPA RBP, the Louisville Protocol has not undergone an extensive peer review or public comment.

The Louisville Protocol is based on an earlier study conducted by the Kentucky Division of Water, so any errors made in this proceeding endeavor will be amplified by application of the Louisville Protocol. Serious questions exist regarding the inclusion/exclusion of particular benthic metrics in the document that may unfairly skew the assessment and the documents' heavy reliance on conductivity. 1-13

II. D-1, Alternatives Considered but Not Carried Forward in This EIS, General Comment, entire section:

Both SMCRA and the CWA clearly contemplate fill construction in streams, as noted in our introductory comments. Each of the various specific fill restrictions presented in this section ignores this basic, underlying premise: Mining and valley fill construction is legal and with recent court decisions its legality is crystal clear. Two specific legal challenges have targeted surface mining in Appalachia specifically. *Section I, Purpose and Need* provides a cursory glance at these recent judicial assaults that sought to undue Congressional statutory intent and decades of regulatory interpretation by the very agencies that have prepared this EIS. The

62

first, styled as *Bragg v.Robertson* was centered on the SBZ of OSM and a similar provision found in West Virginia's state surface mining program. The District Court in this action chose to accept the plaintiff's tortured reading of federal and state mining law that construed the SBZ to prohibit valley fill construction in intermittent and perennial streams. The *Bragg* decision was reversed by the U.S. Court of Appeals for the Fourth Circuit on federalism and jurisdictional questions. A subsequent action was filed in the same Court, this time challenging the COE's interpretation of the CWA to permit valley fill construction under §404. The same District Court this time held, despite years of interpretation to the contrary, that mining spoil was "waste" under the CWA and could not be permitted pursuant to §404. In the decision, the District Court went so far as to dismiss a pending EPA-COE rulemaking that would finally end the confusion surrounding mining spoil and place it firmly within the jurisdiction of the COE as "fill material". This decision too was appealed to the Fourth Circuit and again the Appeals Court reversed. In this case there was no overriding question of jurisdiction and the Appeals Court spoke directly to the legality of surface mining in the context of both SMCRA and the CWA: 1-13

> **While SMCRA does not define "fill material", its "excess spoil material," 30 U.S.C. section 1265(b)(22), is defined in the SMCRA regulations as material placed "in a location other than the mined-out area."...And, regardless of whether the fill has a beneficial primary purpose, SMCRA does not prohibit the discharge of surface coal mining excess spoil in waters of the United States.**

63

Indeed, it is beyond dispute that SMCRA recognizes the possibility of placing excess spoil material in waters of the United States...
It is apparent that SMCRA anticipates the possibility that excess spoil material could and would be placed in waters of the United States...[27]

The Appeals Court decisions in *Bragg* and *KFTC* ,which predate the release of this EIS, have properly recognized Congressional intent and sustained years of regulatory implementation. Consequently, any such alternative contemplated by the agencies seeking to ban valley fills would require a statutory change and reach far beyond the programmatic scope of this EIS.

The watershed specific fill restrictions explained in this section ignore the scale and scope of current and anticipated mining activity in the region and appear to assume that mining and valley fill construction activities were affecting vast regions of the study area, while in fact that is not the case. The CIS has determined, using liberal estimates, that mining and valley fill activity could potentially impact 4.10% of the streams in the study area. The same study found that the dominant land use of the area will continue to be dense, unmanaged forest over: 87.5% of the study area is forecast to remain unchanged when all disturbances including mining are considered. Assuming a worst-case scenario of mining disturbance (no renewed emphasis on reforestation and fill minimization) the same study found that the area would maintain adequate PEC scores to support healthy and abundant terrestrial and aquatic life. So, even absent the scientific 1-13

evidence showing the minimal/beneficial effects of mining, the minute scale of disturbance would not justify the sweeping changes and restrictions contemplated under this section. 1-13

Page III.C-3, Energy Sources and Plant Communities:

> *Headwater energy sources are important, not only to invertebrates and vertebrates in upper reaches of the watershed, but excess organic carbon is subsequently utilized by life forms in all stream orders down gradient. Since streams have a unidirectional flow, downstream areas are also dependent on upstream areas for portions of their energy.*

This statement leaves the impression that energy can only be supplied by headwater streams. Research conducted by the coal industry in conjunction with the EIS indicates ponds and wetlands constructed during the mine reclamation provide similar, adequate sources of downstream energy: 6-6-4

> **The streams with valley fills have a sediment retention pond located typically in the most upstream reaches of the stream just below the fill area. These ponds carry out a similar function for the upstream reaches of the streams. In the ponds, biological communities are established which are dependent on algal growth, not leaf litter, as a food source. The algae and detrital material flowing from the ponds act as the food source for the downstream communities.**[28]

In addition, upon completion of the reclamation process, vegetation will have returned to the area, replacing the coveted "aquatic-terrestrial interface". Further,

[27] *Kentuckians for the Commonwealth v. Rivenburgh*, 317F.3d. 425 (4th Cir. 2003).
[28] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002

fisheries research conducted below mining impacted watersheds indicates that healthy and diverse fish populations are thriving. According to the River Continuum Concept that is postulated as the true value of headwater streams, one must assume that sufficient energy input is occurring in the stream to support these downstream communities.

Page III.C-5, Organic Matter Processing, general comment, entire section: The entire discussion presented in this section is devoted to an explanation of the River Continuum Concept (RCC). This theory suggests the health of an entire river ecosystem is associated with organic energy that is processed in headwater stream reaches and subsequently transported downstream. The RCC forms the basis for many of statements made in the EIS regarding the possible effects of valley fill construction in headwater streams. 6-6-4

The RCC may be inapplicable to the steep-sloped terrain and stream systems of Central Appalachia for several reasons. First, the RCC assumes a pristine environment, which is certainly not the case in the study region:

> **The Appalachian coalfields provide almost limitless opportunities for watershed improvement, following almost 100 years of abandoned mine land (AML) problems. Mine drainage pollution, eroding spoil on the down slope, clogged stream channels, abandoned highwalls and coal refuse areas, and other orphan land problems exceed the capacity of the SMCRA AML Trust Fund. Many of the problems are such low priority that it is unlikely that the AML program will ever address them. EIS page_____**

Second, the RCC assumes that extreme headwater stream reaches provide the only opportunity for energy inputs to the river system through the aquatic-terrestrial

interface that occurs in forested headwater streams. This is not the case in the study area. Research conducted by mining companies confirms that energy inputs continue in mining watersheds regardless of the level of impact in associated headwater areas because most of the streams below mining areas are forested: 6-6-4

> **The cumulative impact study found that over 80% of first to third order streams in the EIS study area are surrounding by forest.**
> EIS III.D-18.

III.D-1, Loss of Linear Stream Length from Filling and Mining Activities Associated with Fills, General Comment

The findings of the EIS technical studies which are referenced in this section further illustrate the need for the agencies to view potential impacts of mountaintop mining in terms of scope and scale. Only 2.05% of the total stream miles have been directly impacted by valley fill construction and mining activities, and projected future impacts will total only 4.10% of the total stream miles within the region. Absent the renewed emphasis placed by the agencies on mitigation, with a preference for on-site, in-kind mitigation, mining will not result in the mass elimination of headwater streams. As the coal industry, SRAs and the COE implement new mitigation techniques in accordance with the recommendations of the EIS, it likely that the stream segments directly impacted by mining will be more than offset by either stream/wetlands creation during reclamation and/or water quality improvement projects undertaken by operators. 5-7-4

Page III.D-2, Loss of Biota under Fill Foot Print or from Mined Areas,

General Comment:

The Associations do not dispute that the biota present within the fill footprint are lost once fill construction has been completed. Based on the results of the CIS, the benthic organisms common in headwater streams that are subject to fill activity are by no means in danger in the study area. With a mere 4.10% of the streams in the study area projected to be impacted by mining operations, sufficient habitat for these macro invertebrates will continue to exist in the study area. The concern for the biota of these streams should not focus on the minute fraction impacted directly by fill construction, but the ability of reclamation and mitigation to replace the function of these benthic species in the overall aquatic system. EIS Appendix D, *Value of Headwater Streams* concludes that the single most important feature of the biota of headwater streams is to provide energy input to support the health of the streams down gradient of the headwater areas. Subsequent technical research has demonstrated that sufficient energy inputs continue to exist below filled areas. 6-1-4

These studies are summarized on page III.D-9 of the EIS:

> **Overall the abundance of macro invertebrates was found to be similar in upstream and downstream stations or to be slightly higher in downstream stations.**

Other industry sponsored research supports this conclusion:

> **Increased abundance at the filled sites, as compared to the unmined sites and the presence of a similar shredder community**

> **indicates that sufficient food is available to support a benthic community and that downstream communities are likely receiving particulate organic material from these more upstream segments.**[29]

This conclusion is confirmed by the USGS Fisheries Study that found some of the healthiest fish populations in watersheds associated with large scale surface mining and valley fill construction.

In summary, it is reasonable to assume that the energy processing and transport will continue. . Mountaintop mining will potentially impact only 4.10% of the total stream miles in the study area, 60% of which are first order headwater streams, dispelling any myth that mining and valley fills are eradicating all headwater streams. Benthic research has demonstrated that abundance remains high below fills and that the ponds and wetlands created during reclamation are providing their own energy inputs to the stream reaches. The USGS fisheries survey confirms the benthic research, finding that heavily surface mined watersheds supported healthy and diverse fish populations. 6-1-4

Page III.D-5, Changes in Downstream Chemistry:

> *Comparisons to AWQC were performed with a subset of the total data set as explained in USEPA (2002a). Selenium concentrations from the filled category exceeded AWQC for selenium at most (13 of 15) sites in this category.* 5-5-4

Finding selenium concentrations above the suggested criteria can be expected given the overall background levels of selenium present in the native soils of the

[29] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002

area. Similar concentrations can be expected below any land disturbing activity in the region:

> **...we see that in the region of MTM/VF mining, the coals can contain an average of 4ppm of selenium, normal soils can average 0.2ppm and the allowable limits are 5 ug/L (0.005 ppm). Disturbing coal and soils during MTM/VF could be expected to result in violations of the stream limit for selenium** [30]

> *While improvements in pH, iron and manganese were seen , median concentrations of sulfates among all sites increased from 38 mg/L to 56 mg/L in the north and, and from 46 mg/L to 77 mg/L in the south.*

The presence of sulfate, as noted in the narrative, is indicative of disturbance, not necessarily mining induced disturbance . This conclusion is confirmed by the presence of similar sulfate levels below a large scale mining operation in Ohio that did not involve fill construction. 5-5-4

> *In the USEPA (2002a) stream chemistry study, selenium was found to exceed AWQC at Filled sites only and was found to exceed AWQC at most filled sites included in the study.*

As noted in previous comments, selenium is inherent in the soils and coal of the region.

> *The existence of selenium concentrations in excess of AWQC at most of the filled sites indicates a potential for impacts to the aquatic environment and possibly to higher order organisms that feed on aquatic organisms.*

[30] U.S. Environmental Protection Agency. *A survey of the Water Quality of Streams in the Primary Region of Mountaintop/ Valley Fill Coal Mining.* 2002.

This statement is misplaced given the level of understanding relative to selenium impacts and technical research that found healthy aquatic communities in watersheds exceeding the suggested water quality criteria for selenium.

The EIS chemistry study, from which the above cited EIS narratives are drawn, mentions the effects of selenium based on research conducted by Lemely in lotic (non-flowing) habitats, specifically a large pond with extended water retention times. This is a vastly different situation than what exists in the headwater streams of Central Appalachia. Therefore is incorrect to extend the results of the Lemely studies to this EIS.

EPA is currently in the process of revising the suggested water quality standard for selenium. In February 2002 the agency published a draft of these revisions. 5-5-4

Among the conclusions and observations included in the draft document are several that are relevant to this EIS and the assertion that detectable selenium concentrations in the water column are indicative of negative impacts.

> **Since the issuance of the 1987 chronic criterion of 5ug/L, considerable information has come forth regarding the route of exposure of selenium to aquatic organisms. Studies have shown that diet is the primary route of exposure that controls chronic toxicity to fish.**
>
> **...diet controls selenium chronic toxicity in the environment and water-only exposures require unrealistic aqueous concentrations in order to elicit a chronic response...**
> ***...a water-based criterion is not appropriate for selenium*** **because diet is being the most important route of exposure for chronic toxicity.**

If the organisms are provided with an uncontaminated diet, then *exceedingly high water concentrations, possibly above the acute criterion, are needed to elicit effects...*

Sediment has also been proposed as a medium upon which to base the selenium chronic criterion, but because of the patchiness of selenium in sediment and an insufficient amount of data to support a casual link between concentrations of selenium in sediment and the chronic effects observed in fish, a sediment-based criterion was not selected. [31]

Considering the findings of EPA in the draft revised selenium criteria, that water column concentrations of selenium are not correlated to toxicity in fish and that the natural background of selenium present in the soils of the study area, it is clear that application of the current suggested water quality criteria for selenium should be reconsidered. 5-5-4

The USGS fisheries survey supports both EPA's revised selenium water quality criterion and clearly demonstrates that selenium concentrations in the study area have not impacted the aquatic community in the study area. The EIS chemistry study found detectable levels of selenium on sampling sites within the Clear Fork Watershed:

Site	Selenium Concentration
MT-62	2.8 ug/L
MT-64	13.0 ug/L

Despite these concentrations, the USGS Fisheries Study concluded:

[31] See generally *Draft Aquatic Life Water Quality Criteria for Selenium 2002*, EPA Contract No. 68-C6-0036 (March 2002 Draft).

Clear Fork at Whitesville...had good scores in most of the four proportional metrics;

Among Kanawha River sites, Clear Fork at Whitesville...scored among the best sites in several structural metrics...

Among Kanawha River streams, Clear Fork at Whitesville...ranked among the best sites in several species composition metrics.[32]

Given the current status of the selenium water quality criteria, the natural background levels of selenium present in the soils of the region and the inability of the EIS studies and other technical research to correlate impairment to any specific parameter verbiage inferring impacts from selenium should be deleted from the final EIS. Thus, the best approach to possible water-quality induced impacts is presented in the final paragraph of the summary and conclusions section: 5-5-4

Further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community structure and function are needed to address existing data gaps.

Page III.D-7, Changes in Downstream Sedimentation (Bed Characteristics)

...the mean substrate size class was found to be very similar between unmined, filled, filled residential and mined EIS class sites.

Data summarized in this section demonstrates that the sediment control requirements of SMCRA are functioning and preventing offsite impairment. 5-6-4

Page III.D-8, Effects to Downstream Biota

[32] U.S. Geological Survey. *Fish Communities and Their Relation to Environmental Factors in the Kanawha River Basin, West Virginia, Virginia, and North Carolina 1997-1998*. 2001

h.1. Summary of Results from Upstream-Downstream Comparison Type Studies

> *Overall, the abundance of macro-invertebrates was found to be similar in upstream and downstream stations or to be slightly higher in downstream stations.*
>
> *The largest difference seen between upstream and downstream locations was the change in proportion of sensitive groups.*

The results of these studies demonstrate that valley fill construction and mining activity are not having an adverse impact on streams. A mere shift in community structure does not constitute degradation, especially if sufficient energy remains for transport downstream. According to the results of these studies, streams with mining activity in their headwaters are still carrying out the primary function of pristine headwater reaches.

h.2. Results of Comparison of Pre-mining Biotic Conditions to Post-mining Aquatic Communities

> *The authors of this report stated that a qualitative comparison of current to past results suggests that the aquatic macro invertebrate community has undergone a shift to a more tolerant, less sensitive community. Changes in the downstream station were similar to those seen at the upstream station for abundance and taxa richness. However, the diversity and evenness of the downstream macro invertebrate communities decreased... and the proportion of tolerant organisms increased notably...*

The studies cited in this section analyzed mining and disturbance, not necessarily valley fill construction:

> *These studies did not specifically address the presence of or potential impacts from valley fills.*

This ongoing project confirms the results of other studies referenced or included in this EIS. As in the OSM COCCo Study, a shift was observed in the downstream benthic community that appears commensurate with disturbance of the native rock and soils. This shift cannot be termed impairment however, unless the downstream reaches of the watershed are failing to receive adequate energy inputs. Other studies have confirmed that sufficient energy is being provided by mining-related structures and that no net-reduction in watershed productivity and diversity has occurred.

h.3. Results of A Multivariate Analysis Study on Benthic Invertebrate Communities and Their Responses to Selected Environmental Factors

> Coal mining appeared to influence invertebrate communities through two factors... 5-6-4

h.4. Studies of Macro invertebrate Communities in Stream Sites Located Downstream from Mined/Valley Filled Areas in Comparison to Reference Locations

> *Biological conditions in the unmined sites generally represented a gradient of conditions from good to very good, based on the WV DEP SCI scores...*

The wide variability of the scores on the unmined reference streams demonstrates a known fact that is mysteriously absent from the discussions in the draft EIS. Headwater streams are extremely unstable systems in their natural condition as they rely primarily on rain-induced runoff to sustain life and contribute to the synergy of the aquatic ecosystem:

> One[unmined] site scored in the high-end of the fair range in the summer of 1999, one site scored in the poor range in the fall of 1999, and one site scored in the high-end of the fair range in the winter of 2000.

> *Biological conditions in the filled sites generally represented a gradient of conditions from poor to very good... However, over a third of the time, filled sites scored in the good or very good range over the five seasons.*

This statement is probably the most important contained in the EIS and it deserves more attention and focus. Readily apparent is the reality that filled streams are supporting the aquatic processes that receive so much attention as the source of life throughout the stream system. In a region that suffers from multiple water quality stressors such as AML drainage, lack of infrastructure and failing wastewater treatment systems, the effects of valley fill construction appear negligible. 5-6-4

> *The authors believe water quality explains the wide gradient in the biological conditions at the filled sites.*

The OSM COCCo. Study documented increased conductivity below mining that did not involve valley fill construction, demonstrating that increased conductivity should be expected with any human development (mining, residential or highway construction) or natural disturbance (land slides). Again, the background natural conditions of the area appear to make such situations unavoidable. Any development or improvements that are going to occur in the region are going to involve land disturbance- earth and rock will be excavated, and fills will likely be

76

built whether it is for mining, roads, schools, housing etc. Based on the research presented in this EIS, all of these activities will be expected to have similar increases in conductivity. Since the inherent geological and topographic features of the area are such that excavation and fill construction is required in connection with development and mining, the question should not be if conductivity is increased, but what effect conductivity has had on the stream system as a whole. In our comments on other sections of the EIS, the Associations have presented the results of studies conducted for the EIS, by coal operators in conjunction with the EIS , independent of the EIS but within the study area and outside of the study area but related to the subject at issue. The bulk of this research documents a ***shift*** in the biologic community below ***disturbance***. There is some question as to how directly this shift can be correlated to particular water column parameters including conductivity: 5-6-4

> **Differences between the benthic macro invertebrate communities in the unmined and filled sites were evident in metrics involving the mayfly population which decreased below the fill sites. Stoneflies were prevalent in these sites, however, indicating that water quality may not be the limiting factor for the absent mayflies as they are both sensitive taxa** [33]

Whatever the cause, it is overly apparent that this change does not correlate to impairment. In fact, by supplying a more constant source of energy to the stream below (though wetland and pond construction), mining may improve the health of the watershed.

77

Biological conditions in the filled and filled/residential classes were substantially different from the conditions in the unmined class and were impaired relative to conditions in the unmined class, based on the WV SCI scores.

From the results of the EPA Streams study and other related research, it is apparent that the aquatic communities were **different** among the classes, but not impaired:

> **Overall, the filled sites are only significantly different from the unmined sites with respect to the percentage of the population comprised of mayflies.**[34]

As noted in our earlier comments, ponds and wetlands are constructed during the mining process to control sediment and in some instance attenuate flow. These wetlands and ponds influence the composition of the benthic community: 5-6-4

> **Changes in the benthic macro invertebrate community structure below impoundments are well documented...These changes may result from flow constancy, organic loading , temperature changes or a combination of factors...mayflies and stoneflies are often eliminated below impoundments.**[35]

The elimination of the mayfly taxa CANNOT be linked to impairment as the EIS narrative attempts to do:

> **Below the filled sites, the sensitive EPT taxa still comprised an average of 50% of the population.**
> **Also of interest below the fills is the presence of a shredder community very similar to the unmined reference streams...The similar communities in the filled and unmined streams indicate that the downstream reaches of the streams are being supplied**

[33] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002
[34] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002
[35] ibid

> **with coarse and fine organic material which are the major contribution of headwater reaches described in the river continuum theory.**[36]

The cited EIS statement should include a qualifier regarding the stream size sampled in the study. Generally, all of the streams sampled below valley fills were larger streams than those sampled in the unmined/reference class. The unmined reference sites were located on first and second order streams while the filled sites were located on third, fourth and fifth order streams. Changes in the composition of the aquatic community are expected as stream order increases .

Page III.D-15, Impacts of MTM/VF on Fish Assemblages

> *The USGS (2001b) found that stream size and zoogeography masked any potential water quality effects of land use on species composition and relative abundance of fish communities in the area.* 5-6-4

This statement appears to be a weak attempt at explaining away the findings of the USGS fisheries survey. The specific results of this study are enormously important to this EIS. This study determined that one of the healthiest fish communities existed at Whitesville, on the Clear Fork tributary to the Coal River. It is a well-known fact that this watershed has been heavily mined, with most recent extraction occurring in the form of surface mining with valley fills. The EIS Chemistry study found detectable levels of selenium within the watershed, yet the USGS Fisheries Report observes a healthy and diverse fish population.

[36] ibid

The USGS Fisheries Report also designated streams as impaired that were associated with mining activity. However, both of the watersheds are more correctly identified as areas of **historical** mining. Both of these watersheds have identified sources of serious AMD and sedimentation impacts from pre-SMCRA activities.

Page III.D-15:

> *For example, fish collected from one lake downstream of an extensive mining complex in West Virginia were found to contain selenium concentrations much higher than would be expected to occur naturally, indicating that the selenium associated with mining operations occurs in a form that is biologically available for uptake into the food chain (U.S. FWS, unpublished data).*

This reference is entirely inappropriate and should be deleted from the final EIS. First, there is no place for unpublished, un reviewed data in a document of record such as this EIS. Second, "concentrations much higher than would be expected to occur naturally" contradicts assertions made in the EIS chemistry study which recognized that the natural background levels of selenium in the soil, overburden and coal approach the limit established by the current water quality criterion implemented in West Virginia. Third, as this is unpublished data, other possible sources selenium such as non-mining land disturbance cannot be identified. 5-6-4

Page III.D-17 Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems

80

> *Past efforts at compensatory mitigation have not achieved a condition of no net loss of stream area or functions.*

This statement is unqualified, conflicts with subsequent statements made under the same narrative section and should be deleted from the final EIS. A similar prevarication is repeated in the fist paragraph on page III.D-21. Our comments address both statements.

Mining companies have routinely created structures as part of the SMCRA mining and reclamation plan that serve to offset the loss of headwater streams from fill construction. At the same time however, these companies also satisfied the existing COE mitigation requirements imposed by the respective states and not characterized these structures as "mitigation" projects.

In the EIS technical study *A Review of Wetland Resources in the Steep Slope Terrain of West Virginia*, EPA found that few traditional wetlands existed prior to the initiation of surface mining and areas that had no surface mining had no wetlands: 5-3-4

> **...the percentage of vegetated wetlands (PF,PEM,PSS designations) existing in these watersheds is extremely low, representing less than 1/10 of 1% of the watershed in all cases. The majority of the NWI wetlands in these watersheds appear in most cases to be sediment ponds associated with mined sites.**

Other statements in this technical study strive at discounting the value of these created areas by declaring them "unvegetated" wetlands. However, as cited previously in our comments regarding stream function and the biologic condition

81

of streams affected by mining, these wetlands and ponds are providing similar, if not superior energy input to the watershed, eliminating any reduction from the headwater streams impacted directly by construction of valley fills. The EPA review of wetlands goes on to state that isolated wetlands created within the mined area can be enhanced to further supplement and therefore "mitigate" the loss of headwater stream reaches:

> **...opportunities do appear to exist for the creation of functioning wetland systems on mined sites. Planned wetlands, if incorporated into the restoration design, can provide valuable functions by enhancing sediment stabilization, water quality improvement, and wildlife habitat on mined sites.**

With respect to habitat creation, further enhancements may be possible but EIS terrestrial studies have shown that mining-created wetlands are indeed increasing the wildlife diversity of the study area and that several terrestrial species not traditionally associated with the Central Appalachian region have been observed utilizing mining wetlands. 5-3-4

Research conducted by mining companies in conjunction with the EIS have also documented the unique and beneficial habitat provided by mining created wetlands, the results of which are summarized in this section of the EIS:

> **When comparing total abundances and taxa between the ponds, the study found that two of the ponds contained large total abundances of aquatic insects and a desirable number of taxa.[37]**

[37] Pen Coal Corporation-REI Consultants. An Evaluation of the Aquatic Habitat Provided By Sediment Control Ponds and Other Aquatic Enhancement Structures Located on Mine Permitted Areas in Southern West Virginia. 1999

Similar conclusions can be regarding the conveyance ditches or "groin" ditches created on valley fills:

> **During the development of this EIS, technical representatives from OSM and from West Virginia have suggested that groin ditches constructed along the edges of fills may represent an opportunity for the in-kind replacement of streams with an intermittent or perennial flow regime. To date, no drainage structures observed appear to have successfully developed into a functioning headwater stream. EIS III.D-18.**

As noted in our preceding comments, reconstructing headwater streams historically never the goal of these structures. Instead, their design and construction was intended to satisfy the hydrologic requirements of SMCRA and to preserve/assure the stability of the valley fill. These functions must remain the primary objective of the ditches, as they are obviously working (no pattern of fill instability identified by the EIS technical studies). However, if these areas could be enhanced as described in this section and continue to assure the stability of the fill area this opportunity should not be ignored, since it would essentially equate to double the length of the original headwater impacted by the valley fill placement. 5-3-4

The renewed emphasis on mitigation that has emerged from preparation of the EIS and permeates all the suggested alternative actions must acknowledge the ability of these SMCRA structures to serve as mitigation and the alternatives should include the direction to develop a BMP manual for further enhancing the values that can be provided by these structures.

Other historical, state mitigation measures focused on stream restoration through water quality improvement. As earlier sections of the EIS recognize, the study area provides limitless opportunities for mitigation through the remediation of existing water quality stressors such as AMD discharges and installation of public waste water treatment systems. For brevity, we will not repeat extensive comments on this subject made in previous paragraphs, but only observe that state imposed and COE accepted "remediation mitigation" goes further towards satisfying the overall objectives of the CWA than does the current focus on headwater stream creation/ preservation.

In 2001 the National Research Council (NRC) released a comprehensive report regarding the s §404 dredge and fill program titled *Compensating for Wetland Losses Under the Clean Water Act.* In this review, the NRC provided 10 guidelines for implementing the mitigation requirements of the §404 program. Chief among these suggestions was a focus on <u>restoration</u> over creation. State mitigation programs, particularly in West Virginia, favored these types of projects. In the case of public waste water system installation, these mitigation efforts provided another immeasurable benefit: community improvement through infrastructure installation. As the socio-economic sections of the EIS acknowledge, the overwhelmingly majority of the study area is extremely rural and extremely small, isolated communities abound. The likelihood of publicly-funded improvement projects being developed in these areas, absent facilitation through coal mine mitigation, is slim to none.

5-3-4

Past mitigation practices that encouraged and accepted wetlands and water quality remediation either through AMD elimination or community infrastructure

improvement should not be summarily dismissed by the draft EIS as cited statement attempts to do and the current mitigation initiatives underway cannot ignore the benefits of this "remediation mitigation". 5-3-4

IV. ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES ANALZED

B. AQUATIC RESOURCES

Page IV.B-2, last paragraph:

> *...the length of stream buried by mining or valley fills displaces the biomass and proportionate amount of energy provided by fine and coarse particulate material leaving a particular reach of headwater stream.*

This fact in unarguable, however there is no indication that sufficient biomass and energy inputs do not occur in the stream reaches below the filled areas.[38] Further as we have identified in previous comments on other sections of the EIS, wetlands and ponds created during the mining process adequately offset this direct loss. The scientific research used to support these comments also indicates that by providing a more constant flow of energy input, these ponds and wetlands may provide superior contributions to the synergy of the stream system below. Since the ponds at the toes of valley fills are constructed commensurate with mining activity, any reduction in energy inputs would only be temporary in nature. 5-6-4

> *Consequently, leaf litter exclusion as a result of MTM/VF may affect productivity downstream due to this terrestrial aquatic relationship.*

There is no argument that valley fill placement eliminates the aquatic-terrestrial interface that exists within the fill footprint area. However, EIS technical studies have determined that some 80% of the streams in the study area are forested, indicating that substantial aquatic-terrestrial zones exists downstream of the headwater reaches that can be directly impacted by fill construction.[39] Further, most of the stream miles in the study area (60%) are headwater streams. Given the minute scale of current and potential mining impacts, adequate aquatic-terrestrial interface areas will continue to exist.

Page IV.B-3

> *The No Action Alternative and action alternatives will not eliminate the loss of stream segments and reduction in organic matter transported downstream. In the absence of standardized testing and research, it is not clear to what extent this direct stream loss indirectly affects downstream aquatic life.*

5-6-4

This statement incorrectly assumes that some reduction the energy transported downstream has occurred despite scientific evidence to the contrary. Similar fallacious statements in preceding sections of the EIS were addressed in detail in our comments on those sections. However, to be complete we will summarize these comments here. The EIS technical studies found a wide range of conditions below valley fills, suggesting that stream health is preserved below fills:

> **Biological conditions in the filled sites generally represented a gradient of conditions from poor to very good...however, over a third of the time, filled sites scored in the good or very good range.**[40]

[38] U.S. Fish and Wildlife Service. *The Value of Headwater Streams: Results of a Workshop.* 1999, EIS Appendix D.
[39] Ibid.

As we have noted in detail in our comments on other sections of the EIS, the EPA benthic study referenced above did not account for or acknowledge the influence of stream order on benthic populations. Benthic assemblages are expected to be different from 1st and 2nd order streams that are ephemeral and intermittent in nature as were the unmined reference sites opposed to the filled sites in the study which were generally located on 3rd order streams that flowed constantly, possibly as a result of valley fill hydrology.

Industry supported research referenced extensively in our earlier comments has determined that the presence of ponds and wetlands at the toes of fills may provide superior energy inputs through the creation of an aquatic community that processes algae, coupled with increased and constant flow created by fill hydrology. 5-6-4

> *It is also not evident to what degree reclamation and mitigation (e.g., drainage control and re vegetation) offset this reduction*

As with the previous section, this statement assumes that a reduction has occurred in areas of fill construction and our comments above are applicable here as well. As to the ability of mitigation to replace any possible reduction, the industry sponsored research and EIS technical studies suggest that stream reaches below

[40] U.S. Environmental Protection Agency. A Survey of the Condition of Streams in the Primary Region of Mountaintop Mining/Valley Fill Coal Mining. 2000.

the filled areas as well as ponds, wetlands and drainage ditches constructed as part of the mining process can continue to supply adequate, energy downstream.

Page IV.B-4

> *Stream chemistry showed increased mineralization and a shift in macro invertebrate assemblages from pollution intolerant species to pollution tolerant species.*

The degree to which this increased mineralization affects the downstream aquatic community is unknown given the findings of the EIS technical studies and other scientific research indicating the presence of healthy aquatic communities below mined and filled areas. Further, use of the terms "pollution-tolerant" and "pollution-intolerant" fall far short of properly characterizing the conditions in mined and filled areas given the results of similar research and the influence of such variables as stream order.

5-6-4

Page IV.B-5

> *The Aquatic Impacts Statistical Report indicated that ecological characteristics of productivity and habitat are easily disrupted in headwater streams... the analysis indicated that biological integrity is hampered by mining activity and that unmined sites have higher biotic integrity with more taxa and more sensitive taxa.*

This statement is misleading, patently false and should be deleted from the final EIS. The referenced results of the Statistical Report are suspect. The authors of the study excluded industry-submitted data indicating healthy stream populations, arbitrarily dismissing it as "non representative" of the study area. The Statistical Report emphasized perceived impacts from mining and fill construction while

discounting or dismissing the lack of differences between the filled and unmined reference streams.

> *Selenium and zinc were negatively correlated with the WV SCI.*

Concerns regarding the applicability of the WV SCI to the southern West Virginia region of the study area have been presented in comments on other sections of the draft EIS.

> *The strongest association with water chemistry suggested that zinc, sodium, and sulfate concentrations were negatively correlated with fish and macro invertebrate impairments*

The value of this statement, aside from presenting inflammatory verbiage, is further questionable given the caveat presented in the Statistical Analysis with regard to fish communities:

5-6-4

> *...these correlations do not imply a causal relationship between the water quality parameters and fish community condition.*

Subsequent statements in the EIS narrative correctly note that the statistical results are far from conclusive and by no means support the sweeping proclamations made in the above cited portions of the EIS:

> **However, the study also concluded that insufficient data existed to determine the temporal nature of the impact or the distance downstream that the impacts persists. Due to the limited scope of the studies performed by the EIS no correlation could be made of downstream impacts with the age, number, and size of mining disturbances and fills, nor could data differentiate impacts of mining, fills or other human activity in a watershed. EIS IV.B-5.**

Also worth noting is that the Statistical Report did not correlate selenium elevations to fish community impacts as the Fisheries Report attempted to do, casting further doubts on the validity of both studies.

The Associations maintain that the balance of EIS technical research has identified a shift in benthic communities, a shift that can be attributed to a number of factors and a shift that is by no means disadvantageous. Similar shifts were found below mining related disturbance that did not involve valley fill activities at a site outside of the EIS study region suggesting that similar results can be expected below any disturbance within the general Appalachian region.

> *Constructing wetlands is a possible mitigation measure for impacts to headwater streams.*

5-6-4

The positive benefits provided by mining created wetlands have been identified in technical studies and summarized in comments on other sections of the draft EIS narrative.

> *Other human development activities, such as logging and other types of excavation, also pose potential threats to the nutrient cycling function, sedimentation, and other physical, chemical, and biological impacts to headwater streams in the EIS study area. However, the permanent nature of filling discussed under direct loss, as compared to the more temporary impacts from forestry suggest that MTM/VF impacts of headwater stream systems may have a longer-term impact on this system, although data do not currently suggest the duration of these impacts.*

This statement fails to consider the scope and scale of potential mining impacts and suffers a flaw that is unfortunately common in this draft EIS: an overbearing concern with the functions provided by headwater streams.

The CIS study has determined that 59,000 miles of streams exist within the study area and that 60% of these streams are headwater areas. The same study estimated that 1.23% of the streams have been impacted by past and current mining and valley fill activity and that 4.10% of the total stream miles could potentially be impacted by future mining. These results confirm that mining is affecting a relatively minute fraction of the total streams within the study area.

Threats, or more properly stressors to watersheds in the study area are well documented. On page IV.B-9 for example, the EIS acknowledges that the Central Appalachian coalfields provide almost limitless opportunities for watershed improvement. These narrative sections concur with an EPA study initiative that predates the draft EIS: 5-6-4

> **In general, the biological assessment results appear to indicate these are poor water quality streams prior to the impact of mining operations and valley fills.** [41]

Given the reality of stream conditions in the region, the focus on the functions of headwater streams seems misplaced. As confirmed by certain sections of this EIS, the streams of the region are impaired by a variety of stressors unrelated to current mining. Therefore the function of the headwater stream (energy input) may be worthless if the downstream reaches of the watershed are impaired because of other impacts. As we have noted in our earlier comments regarding mitigation, <u>the environmental condition of the study area could have been markedly improved had the massive amount of resources and attention directed by anti-mining groups and the agencies at MTM/VF impacts to headwater streams had been focused on the remediation of existing water quality problems of the region.</u>

Page IV.B-10

> *As a result of all alternatives involving mitigation, there will be a strong disincentive for the applicant to disturb stream segments.*

This statement assumes that practical alternatives to valley fill construction exist for the mining industry and ignores the substantial amount of information collected by the EIS and summarized in the mining technology sections of the document. Because of the very nature of the topography and geology of the study area, the native rock and soil excavated to facilitate mining (both surface and underground) will "swell" and not all of it can be returned to the mined area even under the most rigorous application of SMCRA's AOC mandate. Consequently, some of this excavated material MUST be placed in a valley fill. A "strong disincentive for the applicant to disturb stream segments" already exists through compliance with SMCRA imposed AOC requirements and the 404(b)(1) guidelines of the CWA programs of the COE and EPA. The reality of increased

5-6-4

[41] U.S. Environmental Protection Agency. *Analysis of Valley Fill Impacts Using Macroinvertebrates.* Draft Final Report. 1998.

and what appears to be punitive mitigation requirements will not result in further minimized fills, it will only add yet another economic constraint on the ability to mine coal in this region, since other sections of the EIS narrative and the EIS mine engineering technical studies confirm that the physical and economic recoverability of coal reserves is directly correlated to the amount of fill space available. Another unfortunate result of punitive mitigation measures will be seen in post-mining land use development. The EIS has correctly observed that the lack of stable, flat land remains a substantial barrier to the economic diversification and social stabilization of the region. MTM/VF offers the unique opportunity to create such flat and stable areas at no public cost. However, any area suitable for development will need to be flat, require a variance from the AOC requirements of SMCRA and possibly place more fill material in stream segments. The punitive and overly restrictive mitigation measures contemplated in the EIS such as conservation easements will discourage these types of developments despite a clear and proven economic and social need for their creation. In short, these mitigation measures are more akin to penalizing the citizens and governments of the study area by complicating the private property rights of landowners in the area, frustrating efforts to diversify the economy while at the same time limiting the viability of the coal industry.

Accordingly, the final EIS should focus not on the ability of mitigation to discourage fill placement as fill minimization is already addressed not only through SMCRA but the 404(b)(1) guidelines

5-6-4

Page IV.D-5 d. fish populations, general comment, entire section:

As with other sections of the EIS, the statements in this section fail to account for the scale and scope of mining impacts. If headwater streams are indeed hotbeds of evolution, according the EPA CIS analysis only 4.10% of the streams in the study have or could be affected by mining. Considering that headwater streams comprise the largest portion of the region's streams at 60% of the total stream miles, sufficient areas will remain intact for the occurrence of "natural selection process that may result in the development of new species/subspecies". Regarding the results of the EIS Fisheries Study, the Associations maintain that this study cannot be relied upon to deduce MTM/VF impacts. The study was extremely limited in scope and compared to patently different areas (New River and eastern Kentucky). The USGS Fisheries Survey found two of the healthiest fish populations in the area studied in watersheds associated with large scale surface mining and valley fill construction. 6-1-4

a. Terrestrial

II. C.

Deforestation (page II.C.-75)

General Comment

Any possible impacts from mining activities must be considered in terms of scope. As paragraphs in this section note, technical studies conducted as part of this EIS 7-5-4

have found that the dominant land use of the area is forestland with 92% of the area being densely forested. Mining has disturbed only about 3% of the region. The same study determined that mining, in conjunction with all human disturbances, would only affect about 11% of the area. Therefore, a large-scale elimination of forested areas is not going to occur in the region. Further, a renewed emphasis is being placed on tree growth as a result of this EIS. Considering that mining offers the opportunity to create soils that are superior to native soils and that tree growth on reclaimed mines is possible if traditional SMCRA imposed barriers to reforestation are addressed, the potential impact estimates are likely liberal and forecast a much greater decrease than will actually occur. 7-5-4

Page II.C-76, first paragraph:

> *Post Mining Land Uses without trees were historically perceived to be easier to achieve and less costly, as well as result in a shorter liability period for release of performance bonds.*

This statement fails to consider all the factors that influence the selection of a PMLU, such agency and community preference and regulatory achievability. As noted in the next paragraph, the reason that reclamation with trees is not more widespread is mainly attributable to SMCRA regulation and requirements related to erosion control and stability. 19-2-4

Page II.C-76, last paragraph.

It is possible other economic incentives could encourage reforestation.

A reference to mitigation should be added to this discussion. As noted elsewhere in the EIS and its appendices, the value of headwater streams subject to valley fill construction is the terrestrial-aquatic interface. Any reforestation initiative that is coupled to a stream restoration/mitigation project would further replace this function. Accordingly, reforestation should be considered when assessing required mitigation, as noted by the first paragraph under section a.1, CWA Program on page II.C-7:

> **The protection and/or restoration of forested riparian habitat as part of aquatic resource enhancement may result in mitigation credit by the COE for CWA section 404 permits.**

19-2-4

Page II.C-83, Action 14, general comment, entire paragraph:

> *Action 14: If Legislative authority is established by Congress or the states, the SMCRA regulatory authorities will require reclamation with trees as the post mining land use.*

Advocating such an action is unwise. As noted in our previous comments, no evidence exists that mining activities will result in massive deforestation of the region. The CIS determined that mining and all other human disturbances will only impact about 11% of the existing forested areas within the study area. Assuming the worst case scenario, that all future mining would result in the replacement of dense forest with other habitats the region will remain 87.5 % forest land.

A programmatic tree growth mandate imposed through Congressional edict would remove the opportunities for mining to create alternative land uses and conditions. Suitable land for development remains one of the greatest social and economic barriers in the region. Mining offers a unique opportunity to improve the usability 19-2-4
of lands that are otherwise steeply sloped and undeveloped with little or no additional cost. Economic diversification and social stabilization (by relocating flood prone communities) are real possibilities only if alternative post-mining land uses, other than reforestation, are preserved in the regulatory program.

Page II.C-90, Section 11, Threatened and Endangered Species, General Comment, Entire Section:

As noted in our previous comments, the statements and assumptions fail to consider the scope of the activities in question. The CIS determined that mining affects only a small portion of the study area, which will remain dominated by densely forested areas. The same technical study found that headwater streams comprise 60% of all streams in the region and that mining has the potential to impact only 4.10% of these streams. In preparing the BO, the agencies MUST 8-1-4
consider these factors. It is very apparent that neither mining nor any human activity is going to result in massive elimination of existing fish and wildlife habitat.

The EIS terrestrial studies failed to show that current mining and reclamation practices were adversely impacting existing wildlife assemblages. In fact several species thought to be rare and declining in the study region were actually found in reclaimed areas. For example, the edge effect created by mining disturbance was determined to be a habitat for Cerulean Warblers.

To be adequate, the BO must also consider the positive effects of mining-created habitats for certain species of wildlife. The terrestrial technical studies found several species on reclaimed mined lands that were rare in the study area. Several of these unexpected species are also targeted for conservation efforts. However, at least one of the technical studies went to great lengths to ignore these terrestrial gains. The same mistakes cannot be repeated in the BO if it is to adequately protect T&E species. 8-1-4

Page III.B-11 Last three paragraphs concerning topsoil:

The statements and observations made in these paragraphs imply that topsoil is the most important factor in establishing tree growth. It is common knowledge that the native topsoils of the area are remarkably thin and subject to "wasting" or being destroyed or lost during any efforts to collect and stockpile them for later use. Such statements conflict with EIS technical studies, research conducted independent of the EIS and even statements made in subsequent paragraphs of the narrative. 7-6-4

EIS technical studies have proven that soils created during mining can be of greater value than the existing native soils. An overreaching historical observation that has been confirmed by studies conducted outside of the EIS is that proscriptive SMCRA regulations regarding compaction are the chief detractors to

reforestation on mined areas. As noted in the following paragraphs of the EIS narrative:

> **Prior to the passage of SMCRA, most surface-mined land in the east and Midwest was reclaimed with trees. The quality and productivity of these lands varied, but, in general, reforestation was successful and commercially valuable forests were created. With the implementation of SMCRA-based rules and regulations, the percentage of land reclaimed forest dropped significantly. The rules, as typically interpreted and enforced, resulted in intensely graded landscapes with erosion control provided by herbaceous vegetation. In this post SMCRA environment, reforestation was difficult and productivity of those lands was disappointing.** 7-6-4
>
> **Deep rocky soils with the appropriate chemical composition can be produced through mining and reclamation, and will support forests that are more productive than those supported by the thin natural soils typical of the Appalachian Mountains. EIS III.B-12.**

Page III.F-7, second paragraph:

> *This change in habitat has resulted in a shift in the distribution of birds throughout southern West Virginia* with an increase in the abundance of edge and grassland species at reclaimed mine sites.

While the technical studies do indicate that edge and grassland species are occurring on reclaimed mine sites, it is entirely inappropriate to extrapolate these results into the conclusion that a "shift" has occurred throughout southern West Virginia. As noted in our previous comments, the Cumulative Impact Study DOES NOT indicate that past, current or future mining will eliminate or substantially reduce existing forest cover. West Virginia and the majority of the region will remain dominated by dense forest cover. Further, both the Woods and Edwards 7-3-4 research and the Canterbury research has documented the occurrence of forest interior species in the forest edge habitats created by mining activity, including the presence of species that are of conservation concern. This statement also conflicts with subsequent paragraphs in the EIS narrative:

> **Eighty-four of 92 "probable" or "confirmed" breeding birds, based on data presented by Buckalew and Hall (1994) in the West Virginia Breeding Bird Atlas were confirmed at mountaintop mining sites in southern West Virginia in 1999 and 2000 (Woods and Edwards). The eight species identified by Woods and Edwards (2001) are not associated with habitats associated with mountaintop mining sites (residential and urban habitats**). EIS III.F-7.

The presence of 84 of the 92 expected species clearly does not indicate a "shift" in the bird community. The Associations suggest that the statement referring to a "shift" in the bird community be deleted since it is unsupported. 7-3-4

Page III.F-7, fourth paragraph under Birds section:

> *Species richness and abundance of songbirds is higher in shrub/pole habitats of mountaintop mining sites than in grasslands, fragmented forest, and intact forest habitats (Woods and Edwards, 2001).*

Page III F-7, fifth paragraph under Birds section:

> *Mountaintop Mining sites are known to support at least ten grassland and shrub bird species not previously listed in the WV BBA (Woods and Edwards). Grassland birds are declining throughout much of the United States. Three grassland species listed as "rare" in West Virginia are known to occupy mountaintop mining sites in southern West Virginia.*

Based on the above referenced statements and the underlying technical research, it is apparent that current mountaintop mining and reclamation practices are creating

habitats that foster terrestrial diversity. EPA's CIS results indicate dense forest will remain the dominant land use of both West Virginia and the region. Unlike the forest habitat, which dominates the study area, grasslands/shrub habitats are rare in West Virginia. This data leads to a logical conclusion that the diversity created by these mining produced habitats far outweighs the site-specific declines observed in the forest-interior species.

> *In general, species richness and abundance are expected to be greatest from diverse habitats like the shrub/pole communities and lowest in the least diverse habitats like grasslands.*

While this statement may be factually correct, it implies bias since intact or dense forest can be expected to be equally less diverse as the grassland areas.

> *It is possible that some of the grassland bird populations on mountaintop mining sites reclaimed with herbaceous cover are existing as "sinks". "Sink populations are maintained by immigration because death rates exceed birth rates.* 7-3-4

This statement is unsupported by the technical research, especially considering the conclusions regarding available breeding habitats for the grasshopper sparrows which are summarized in subsequent sentences in the same narrative paragraph. Further, since the largest habitat of the area is dense forest cover and grasslands is one of smallest, where would the birds be migrating?

Page III.F-8, second paragraph:

> *Some argue that mountaintop mining has the potential to negatively impact many forest songbirds, in particular neotropical migrants, through direct loss and fragmentation of mature forest habitats. Forest interior species... have significantly higher populations (at least one year of the two-*

year study) in intact forests than fragmented forests. Furthermore, cerulean warblers... are more likely to be found in a forested area as distance from a mine increases. These data suggest that forest-interior species are negatively impacted by mountaintop mining through direct loss of forest habitat and fragmentation of the terrestrial environment.

The data presented in the EIS technical studies DO NOT support such a conclusion. Higher populations of forest interior species in intact forests versus fragmented forest in one year of a two year study are far from conclusive. 7-3-4

Page III.F-9 Mammals section

Small mammal species richness does not differ between grassland, shrub/pole, fragmented forest, and intact forest habitats from mountaintop mining sites in southern West Virginia. Small mammal species abundance tends to be greater in grassland and shrub/pole than in fragmented and intact forest habitats.
Of a possible 58 species expected to occur in the study area, 41 were encountered.
The 41 species included 12 salamander species, 10 toad and frog species, 3 lizard species, 13 snake species, and 3 turtle species.

This statement provides even further evidence that mining and current reclamation practices create valuable habitat in the study area that results in mammal diversity as opposed to the dominant land cover of dense forest . 7-1-4

Mountaintop mining results in greater soil disturbance than forest clearing so a longer time may be required for recovery of salamander populations.

While recovery of the salamander populations on mountaintop mining areas may be slower when compared to rates associated with other disturbance, the most important fact is that salamanders do frequent the habitats created by current reclamation.

Page III.F-9 through F-10, Interior Forest Habitat and Area Sensitive Species

Interior forest habitats are relatively rare and easily lost.

This may be a true statement nationally, but is simply not the case in the study area. As previously cited, the CIS found the study area will remain 87.5 percent forested if all future mining impacts are combined with all human disturbances. The CIS also assumes a worst case scenario for mining by assuming that all reclamation areas will be returned to grasslands and no renewed emphasis on tree reclamation will take place.

Studies conducted at reclaimed mountaintop mining sites in southern West Virginia have yielded forest interior bird species in shrub/pole and fragmented forest habitats as well as intact forest habitats. However, the abundance of forest interior bird species was significantly lower in fragmented forests than intact forest suggesting a detrimental impact. 7-6-4

The presence of these traditional forest interior species in the edges and shrub/pole habitats created by the reclamation process do not support the conclusion that forest fragmentation is negatively impacting these species in the study area. The next statement, that interior species were significantly lower in fragmented forest, is not supported by the Woods and Edwards Report. A lower abundance was found for only six of the forest interior species. Six species out of 47 clearly does not support the conclusion that detrimental impact is occurring.

Page III.F-11, second paragraph under Deforestation

It follows that deforestation of large portions of the Appalachians through mountaintop mining is a significant concern from the standpoint forest-dwelling wildlife, in particular, forest interior species.

This statement conflicts with the findings of the CIS and the terrestrial technical studies. The CIS found that abundant habitat will continue to exist in the region even when mining disturbance is assumed to have the greatest impact (no reforestation) and mining is considered along with all other human activities. According to the CIS, the area will remain 87.5% forested. The Woods and Edwards terrestrial technical study found that forest-interior species were present in the fragmented forest area created by mining. As noted in a subsequent paragraph in this same section, a majority of species have the same abundance in the fragmented forest as the intact forest: 7-1-4

Furthermore, with the exception of a few rare species, the densities of songbirds on grassland and shrub/pole mountaintop mining sites was similar to that reported in other studies indicating the quality of habitat and availability of resources is similar to the other sites. EIS III.F-11.

In other words, mining has created habitat favored by these traditionally forest interior species.

The above findings provide evidence that mountaintop mining practices provide favorable conditions for some species. However, these advantages may not surpass the disadvantages these practices have on the sustainability of plants and wildlife in the region.

The technical studies do not indicate that mining and reclamation practices have a disadvantageous effect on plants and wildlife in the region. First, greater growth

rates of trees and plants have been demonstrated to be technically feasible if the traditional SMCRA barrier of over compaction is addressed. Second, the CIS determined that future mining and other disturbances will not result in a dramatic shift in the existing land cover of the region, with 87.5% of the study projected to remain dense forest cover. With regards to wildlife, the technical studies have shown that traditional forest-dependent species are present on reclaimed areas and that grassland and shrub/pole habitat species not associated with study area are also present on reclaimed areas. At worst, mining and reclamation is increasing the biodiversity of the area. 7-1-4

Page III.F-12, first full paragraph, general comment:

The EIS has already acknowledged that existing rules and regulations imposed by SMCRA are the biggest factor preventing reforestation. With the renewed emphasis on reforestation and tree growth that will result from the EIS alternatives, it is reasonable to assume that tree reclamation will increase in the study area. However, if tree reclamation was not advocated in the EIS alternatives, scientific research indicates that these grassland and shrub/pole habitats are supporting a healthy and diverse terrestrial community with species of both forest-interior and grasslands being recorded on reclaimed areas. The CIS has found that neither mining nor any other human activity will result in a massive conversion of the study area from dense forest to another land cover indicator. 7-5-4

Page IV.C-5, first paragraph:

There are also indirect effects related to removal of forest associated with mining. Studies have shown that trees help remove certain elements from our air and sequester them. This process is known as "carbon sequestration."

According to the tables summarized on the pages preceding this paragraph, all the states within the study area will remain dominated by forest cover and continue to provide the valuable carbon sequestration function. Further the U.S. Forest Service's Forest Inventory and Analysis indicates that the average annual cubic feet of forest growth exceeds the average annual rate of forest loss for all states in the region.[42] This information is summarized on page IV.C-2:

> **data, based on the forest census in West Virginia (1989), Virginia (1992), and Tennessee (1999), shows that the average annual cubic feet of forest growth exceeds the cubic feet of forest loss by 10 million cubic feet in Virginia, 241million cubic feet in Tennessee and 257 million cubic feet in West Virginia.**

These growth to loss ratios will increase as new reforestation efforts are implemented by OSM and state regulatory authorities to encourage tree growth on mined areas. Therefore, it is apparent that the carbon sequestration ability of the region will persist and even improve.

Page II.C-87, Flooding, General Comment, entire section:

This section summarizes various site-specific technical evaluations of the flooding potential of surface mining and associated valley fills. Collectively, the results of these various studies lead to one conclusion:

[42] Data for similar cut/growth ratios was not available for Kentucky.

> **...the study findings generally support a conclusion that downstream flooding potential is not significantly increased by existing mining practices so long as approved drainage control plans are properly applied. EIS IV.I-7.**

Any possible increased flow potential from mined and/or filled areas are site-specific issues that must be addressed on a permit-by-permit basis. Because of the wide variability in results where flow increases where detected, no programmatic or endemic conclusions can be drawn, as this section correctly notes:

> **Studies prepared as part of this EIS and other available literature indicates that peak runoff increase or decrease below mining can occur. Site-specific analysis is required based on many factors...**

> **It is difficult to generalize mining impacts on runoff. Due to site conditions, increases in peak runoff may not cause or contribute to flooding.** 17-3-4

Other sections of the EIS note that the study area is naturally prone to flooding given the topographic characteristics of the region:

> **The rugged terrain of this region is generally characterized by steep mountain slopes, confined river valleys and narrow ridge tops. EIS III.A-1.**

> **Because of the topography and terrain in steep-sloped Appalachia, flooding occurs in severe weather conditions. Draft EIS IV.H-1.**

Repeated, severe flooding has plagued certain areas within the study region for centuries, certainly before the advent of surface mining. The stark reality is that topographic influences lead the area to be more prone to flooding events . These same influences forced residential, infrastructure, transportation and commercial development into documented floodplain areas. On page III.R-5, the EIS presents the results of the Land Use technical study confirming these observations:

> **The steep slopes and narrow, flood-prone valleys have limited the availability of land parcels suited for large scale development.**

Despite these observed restrictions, development and residential construction as a matter of practicality has occurred in these flood-prone areas, subjecting residents to repeated and unfortunate flooding.

Surface mining provides a unique, no public cost opportunity to alleviate some of these conditions by providing flat, stable land that is far elevated from the "narrow, flood prone valleys" that possess most of residential settlements in the study area. Historically, periods of government attention were focused on relocating flood prone communities to reclaimed, non-AOC surface mined areas. Unfortunately, what would otherwise serve as a tool of stabilization both economically and socially- massive relocation of these areas- has never been succinctly expressed or implemented and emerging environmental restrictions such as excessive mitigation requirements and fill minimization mandates may bar this from ever occurring.

Page III.G-3, General Comment, Peak Flow Study:

17-3-4

The Associations generally agree with the conclusions of the Peak Flow Study, **insofar as the results highlight the need for site-specific permit analysis** as the

decreases and increases in flow indicated by the various models differed for each area analyzed.

The OSM-COE studies presented in this section underscore the reality that an increase in flow does not translate into an increased flood potential. Based on the results of the OSM-COE models, even the highest peak flows indicated by the studies did not cause a rise in water levels that would exceed channel capacities and lead to flooding downstream under the 10 and 100 year scenarios modeled for these areas:

> **...the predicted increases in peak flow would not have caused flooding on the banks outside the receiving stream channel. EIS III.G-4.**

> **...increases in peak flow did not cause a rise in water level overtopping the receiving stream channels. EIS III.G-6.** 17-3-4

Even though the water levels predicted by these site-specific analysis increased compared to pre-mining conditions, **these increases DID NOT result in or cause flooding.** As noted on page III.G-6 of this section:

> **Flooding typically occurs only when water levels exceed channel capacities and spread across the floodplain where residential settlements may occur.**

Additionally, as runoff travels farther downstream, any increases in flow become less discernible. Thus, the downstream impact from any possible runoff increase in the headwater areas becomes less pronounced the farther removed a location is from the disturbed area:

> **The influence of changes in the headwater areas will decreases as the point of analysis is moved farther downstream.**

EIS III.G-6.

In terms of results, the actual data from the various studies are only partially presented in Appendix H. While the HEC-HMS computer model data appears in each of the 10 studies, the SEDCAD 4 modeling data presented in the chart on page III.G-5 does not. The SEDCAD 4 models returned results similar to the HEC-HMS, but predictions of peak flow were significantly different under certain conditions. Without the opportunity to review the SEDCAD 4 data in detail, the Associations are without sufficient information to offer specific comments. Unless the supporting data is provided, the SEDCAD 4 results should be removed from the final EIS.

Page III.G-7, Fill Hydrology Study:

The technical study summarized here, *Comparison of Storm Response of Streams in Small, Unmined and Valley-Filled Watersheds* (Appendix H draft EIS) determined that the mined and filled watershed exhibited higher peak flows than the non-mined "control" watershed when rainfall exceeded 1 inch per hour. This veracity of this finding is compromised by the location of the sampling station on the filled watershed. On page seven of the technical study, the USGS indicates that the measurement point for the filled stream was located between the toe of the valley fill and the sediment pond, thereby excluding any possible flow attenuations provided by the sediment pond.

> *During most storms however, peak flow from the unmined watershed exceeded peak from the filled watershed.*

17-3-4

This finding comports with other observations and technical research that generally found sustained base flow and lower peak flows in mined areas results from the hydrologic characteristics of backfilled spoil and valley fills:

> **Creation of valley fill aquifers change the hydrology of streams receiving baseflow from valley fill aquifers by diverting a greater percentage of precipitation into the fill allowing water to be released at a much slower and less intense rate compared to normal storm-induced stream hydrographs. EIS III.H-9.**

On page 20, the authors of the technical study properly observe that:

> **Rainfall-runoff relations on altered landscapes are site specific and reclamation practices that affect storm response may vary among mines.**

This statement further supports the Associations' position that no programmatic conclusions can be drawn with respect to mining and/or valley fill influences on flooding potential. 17-3-4

Page III.G-7, July 2001 Floods Study:

Titled *Comparison of Peak Discharges Among Sites With and Without Valley Fills for the July 8-9 Flood in the Headwaters of Clear Fork, Coal River Basin, Mountaintop Coal-Mining Region, Southern West Virginia*, this study attempted to determine whether mining had any adverse impact in the July 8-9 severe flooding event experienced across central and southern West Virginia including the Clear Fork area.

The basic premise of this study- that there was equal rainfall among the six analyzed basins proved to be incorrect. The flood recurrence intervals (and therefore rainfall amounts) in the six basins were unequal, compromising any possible conclusions, since a watershed receiving more rainfall is going to exhibit higher runoff than one receiving less rainfall.

Given the confounding factors that have compromised the basic assumptions of the study, the Associations believe the Report offers little of real value and its reference should be deleted from the final EIS.

Page III.G-8, Citizen Complaint Study:

A review of the underlying citizen complaints that support this section confirms past assertions made by the mining industry with respect to flooding: The areas where mining occurs are naturally prone to flooding and provided that the approved drainage control plan is followed and the drainage control system is functioning per regulatory requirements, mining has no adverse impact on either flooding potential or the severity of flooding. Despite 126 complaints in West Virginia from 1995-1999, only **eight** of these complaints resulted in enforcement actions related to drainage control structures. Similar results were found in a review of Kentucky (35 investigations, **five** enforcement actions) and Virginia (three investigations, no enforcement actions) SRA records. 17-3-4

Page III.G-8, Other Studies:

This section presents the results of two state specific studies undertaken in response to specific severe flooding events. This first, *Runoff Analysis of Seng, Scrabble, and Sycamore Creek* was conducted by the West Virginia SRA. The

summarized results of this study confirm the general conclusions of the draft EIS and the suggested alternatives related to flooding potential: Mining can influence the degree of runoff, but the extent to which a decrease or increase may have reduced or increased flooding potential is site specific. The West Virginia coal industry was intimately involved in the preparation and review of this study as one of several stakeholders on the Flooding Advisory Committee, and feels compelled to identify in further detail the findings of this review:

1. Mining may either have a positive or negative effect on total runoff and that effect appears dependent upon the extent to which the original, steep-sloped flood prone terrain and topography of the mined is restored through the reclamation process. 17-3-4
2. In all three of the mined watersheds, the effects of documented, increased flows were relatively small.
3. The rain event of the study period was so intense that flooding would have occurred absent any possible influences from mining activity.
4. No programmatic conclusions was reached in the study regarding runoff increase or decreases attributable to mining activity, as this would require "long-term investigation and analyses , including an investigation of every reach of stream" in the relevant watersheds.

Unlike the West Virginia undertaking, very little information is provided in the EIS with respect to the Kentucky initiative, *Joint OSM-DSMRE Special Study Report on Drainage Control*. This is unfortunate, as the most pertinent conclusion of this study is one that deserves prominent replication in the EIS because it serves to confirm the results of the other technical research and the ultimate conclusion reached in the draft EIS with respect to this issue:

17-3-4

> **Factual results garnered from the study indicate that the majority of the alleged downstream flooding problems were more a result of localized, extremely heavy precipitation events that led to flash flooding, which would have occurred with or without the mining operations being present.** [43]

III.I-1, Overview of Appalachian Region Coal Mining Methods

> *National industry trends have favored surface mining over underground mining in recent decades, driven by the advent of very large earthmoving equipment, and surface mining now accounts for the majority of nationwide coal production.*

The shift in coal production methods from underground mining to surface mining can be attributed to events that occurred independent of the availability of large equipment. Relatively large scale surface mining has occurred for decades in coal producing regions other than the study area, where surface mining is generally a recent phenomenon that can be attributed to shifting coal markets. In the anthracite fields of Pennsylvania, the lignite regions of Texas and the coal fields of the Midwest large scale surface mining has a history dating back to before the 1950's. By 1971, the amount of coal produced from surface mines exceeded the amount produced from underground mines nationally. Since then, surface mines have accounted for an increasing percentage of the nation's coal production with

[43] *Joint OSM-DSMRE Special Study Report on Drainage Control*, 1999.

much of the increase occurring at western surface mines and in particular mines developed in ~~of~~ the Powder River Basin:

> **Much of the increased coal production in the United States...is from large open pit mines in the western region.**[44]

The coals seams and overburden characteristics in this region make underground mining difficult if not impossible. Unlike coal regions in the southwest, midwest and eastern United States, overburden to coal ratios in the Powder River Basin are extremely low. What overburden material that does exist is unconsolidated, "weak" material better characterized as "soil":

> **...the coal lands of the Western region are underlain by flat lying or gently dipping beds of lignite or sub bituminous coal. Some of the seams of sub bituminous coal are 70 feet thick or more and lie at relatively shallow depths; overburden ratios commonly are 1:1 or less. Thus most of the coal produced in this region is from large surface mines in such seams.**[45]

The second driving force behind a movement towards surface mining can generally be seen in the Central Appalachian study area. With the passage of the 1990 amendments to the CAA, a substantial market was created for steam coal that could satisfy new emission mandates. The coal seams and reserves in Central Appalachia developed as a result of this market demand lend themselves better to surface mining than to underground mining for a number of reasons, including the cost benefits realized from larger surface mining equipment. Prior to passage of the 1990 amendments to the CAA, mining in the study region was largely linked

[44] U.S. Department of the Interior Office of Surface Mining: *Environmental Impact Statement, Revisions to Permanent Regulatory Program*, 1983.
[45] Ibid.

to metallurgical coal production. These seams are better accessed by underground mining methods as they are deeper in the geologic column than seams associated with steam coal production. Historically, steam coal production in Appalachia was concentrated in the Pittsburgh seam in northern West Virginia and associated more with longwall underground mining. Commensurate with the increased demand for "compliance" stream coal was a precipitous drop in the demand for metallurgical coal production. Reduced domestic coke production, a result of decreased raw steel production and increasingly restrictive emission standards for coke ovens has drastically lowered demand for metallurgical coal.

> *The term "mountaintop mining" used in this EIS encompasses three different kinds of surface mining operations (contour mining, area mining, and mountaintop removal mining) that create valley fills.*

The final EIS should be revised to more fully acknowledge the potential affects the various policy options under consideration will have upon underground coal mining operations. On page III.K-15of the EIS, the agencies identified 719 valley fills that were permitted for underground mines. As this statistic reflects, underground mines in this steep sloped area also require the construction of valley fills. These fills facilitate creation of a flat, level bench that allows access to the coal seam and permits construction of underground support facilities such as ventilation fans, raw coal belts and stockpile areas, bathhouses and electrical installations such as battery charging stations. These benches also serve as "staging areas" for the underground mining operation where supplies are stockpiled and equipment is serviced. Past interim regulatory initiatives such as 13-3-4

the 250-acre watershed restriction on valley fills have applied to fills constructed for underground mining, as will the alternatives considered in this EIS. To provide a true picture of mining in the region and likely results of the various alternatives, underground mining must be included in this and other descriptions contained in the final EIS. 13-3-4

Page III.I-2

> *Current technology achieves nearly the highest possible recovery of the coal reserves beneath a typical tract of Appalachian land; however, this is neither always economically feasible nor acceptable from an environmental standpoint.*

Mining in general and surface mining in particular is one of the most heavily regulated industrial activities in the nation. Several major environmental statutes have jurisdiction over coal extraction, including a single environmental program that was developed by Congress specifically for coal mining. If mining was "not acceptable from an environmental standpoint", the vast statutes and regulations and the various federal and state agencies that regulate this activity would not allow a mining permit to be issued. In fact, this EIS confirms the viability of these existing regulatory programs in that no more than temporary, minimal impacts could be linked to surface mining in the region. A more proper statement would be "not acceptable to some", as this EIS can be attributed not only to misguided litigation but hyperbole surrounding mining and valley fills and exaggerations regarding the scope and scale of these activities within the study area.

Page III.I-3, Underground Mining Methods

Although not directly related to the focus of this EIS on surface mining valley fill impacts, underground mines are part of the overall coal industry within the study area...

The statement above repeats a very serious error already cited by the Associations: the failure to associate underground mining with valley fill construction. This statement also fails to acknowledge to interrelationship of surface mining to underground mining. Many underground mines exist solely to provide blending stock for coal produced through surface mining methods as part of large mining complex much like the one described on page III.I-26. Since surface mined coal is generally of a better quality than coal mined using underground methods (because rock partings and other impurities present in the coal seam can be removed in the pit), many underground mines could not produce a marketable product unless blended with a surface mined product. 13-3-4

Page III.I-26 Mountaintop Mining Complexes, general comment, entire section:

This section provides fairly accurate description of current mining and coal processing practices in the Central Appalachian region, with one exception. As with other sections of the EIS, it neglects to mention the interrelationship of underground mining to surface mining. As we have stated previously, raw or unprocessed coal produced by both methods of mining is usually needed to produce a marketable "clean" product that meets the emission and volatile requirements of the customer. Should any either source of raw coal be eliminated,

the ability of the "complex" to provide a greater range of clean coal suitable for a number of applications and customers is reduced:

> **Many deep mines are co-dependent on related surface mines for quality blending requirements and even economic averaging arrangements. Eliminating or reducing the surface mining has direct impact on the viability of the deep mining in these instances.** [46]

III.K-1, Excess Spoil Disposal

There is also concern regarding long-term fill stability

This statement is misleading and it should either be removed from the final EIS or revised to reflect the findings of the EIS Valley Fill Stability technical study. "Concern regarding valley fill stability" was indeed raised during the scoping process of the EIS, although the majority of these public comments appeared to mistake valley fills for coal refuse impoundments. Nevertheless, from these "scoping concerns", OSM initiated a through and comprehensive review of valley fills constructed in the study area to assess any potential stability problems. This technical report concluded: 13-2-4

> **A review and analysis of the data indicates that valley fill instability is neither commonplace nor widespread. Only 22 known cases of instability occurred (all during the mining and reclamation phase) out of more than 4,000 fills constructed in the past eighteen years.** [47]

The results of this technical review led the agencies to conclude that no programmatic action needed to emerge from this EIS. The above referenced

[46] *EIS Appendix H: Final Report, Coordinated Review of Mountaintop Mining/ Valley Fill EIS Economics Studies, pages 8-9.*

[47] U.S. Department of the Interior Office of Surface Mining. *Long-Term Stability of Valley Fills, Final Report.* Appendix A of the Draft EIS.

statement should be revised to more clearly reflect the conclusions of the technical review.

Page III.K-2:

> *In the late 1970's and early 1980's the durable rock fill method became the predominate excess spoil disposal technique due to the cost efficiencies of the technique.*

As a general matter this statement is correct, but it should be expanded to include safety considerations and the implications for direct stream loss.

Cost considerations drove development of this spoil placement method but other considerations also influenced the move towards durable rock fill construction such as truck haulage. On page IV.I-8, the EIS describes the operational effects of increased backfilling. Similar conclusions could be drawn regarding conventional lift construction with the added dimension of operator safety. Haulage trucks would be transporting spoil down grade on steep roads. Not only would equipment endure increased physical wear in terms of brakes and other essential systems, but instances of haulage accidents could be expected to increase. Conventional lift construction also assures maximum disturbance to the permitted footprint area. Durable rock fills provide the operator with the flexibility to respond to unforeseen geologic conditions and economic factors by discontinuing fill placement and reducing the direct impacts to streams. In convential lift construction, the entire footprint area is constructed during installation of the initial lift. 13-3-4

120

Page III.K-10, c. Valley Fill Stability

> *There has been anecdotal evidence that valley fill instability (landslides or land slips on fills) are neither commonplace nor widespread; and, that properly constructed valley fills are well-engineered and stable structures.*
>
> *The EIS Steering Committee chartered a study of fill stability to corroborate perception with empirical information.*

The remainder of this section fails to confirm that the technical study corroborated the anecdotal information, even though it was stated goal of the evaluation:

> **A review and analysis of the data indicates that slope movements in valley fills are neither commonplace nor widespread. As of the completion of this study in November 2000, only 20 occurrences of valley fill instability are recorded out of more than 4,000 fills constructed in the past 23 years. While these instances of fill instability might have been "major" as regards the cost of re-engineering and corrective action to mitigate the mass movement, the consequences were not loss of life or significant property damage.[48]**

The technical study also serves to dispel the notion that isolated movement of material on the face of a valley fill equates to "failure" and that the results would not be similar to the effects of the 1972 failure of an un-engineered coal refuse dam at Buffalo Creek, West Virginia:

> **...catastrophic impacts over a great distance down valley...should not occur. An unstable valley fill would not be expected to impact distant areas because:**
>
> **-[Unlike the pre-SMCRA coal dam at Buffalo Creek] fill designs build in a substantial, long-term factor of safety against instability and have specific drainage control measures.**

13-2-4

[48] Ibid.

121

-No large quantity of water should be present in properly designed valley fills to lubricate the fill material into a flowing mass that could transport for any great distance. The regulations prohibit ponds on fills or fills impounding water behind them. Even improperly designed fills should have minimal impounding potential.[49]

Despite the overwhelming conclusion of the technical study that valley fills are stable structures, the EIS narrative is misleading, as the results of the technical study are never firmly presented in relationship to first paragraph regarding anecdotal evidence. 13-2-4

Page III.K-2:

In the late 1970's and early 1980's the durable rock fill method became the predominate excess spoil disposal technique due to the cost efficiencies of the technique.

As a general matter this statement is correct, but it should be expanded to include safety considerations and the implications for direct stream loss.

Cost considerations drove development of this spoil placement method but other considerations also influenced the move towards durable rock fill construction such as truck haulage. On page IV.I-8, the EIS describes the operational effects of increased backfilling. Similar conclusions could be drawn regarding conventional lift construction with added the dimension of operator safety. Haulage trucks would be transporting spoil down grade on steep roads. Not only would equipment suffer increased physical wear in terms of brakes and other essential systems, but instances of haulage accidents could be expected to increase. 13-3-4

[49] Ibid.

Conventional lift construction also assures that maximum impact to downstream areas. Durable rock fills provide the operator with the flexibility to respond to unforeseen geologic conditions and economic factors by discontinuing fill placement and reducing the direct impacts to streams. In conventional lift construction, the entire footprint area is constructed during installation of the initial lift. 13-3-4

Page IV.F-1, Energy, Natural, or Depeletable Resource Requirements

The three action alternatives and the No Action Alternative may also provide significant environmental benefit if mitigation proves infeasible in certain locations, causing no mining to occur.

This statement, as worded is very misleading, ignores the results of the EIS technical studies and should be removed from the final EIS. Inclusion of such a statement assumes that mining and valley fill construction activities have resulted in more than minimal impacts on the environment of the region. This is simply not true. As we have noted throughout our other comments regarding the environmental concerns associated with mining in this area, it is clear that mining and valley fill activities have not, nor will they ever have more than minimal impacts on the environmental and social resources of the study area. What environmental effects have been documented can be characterized as improvements (wildlife diversity has increased, more stable sources of downstream energy have been established, flat, stable, useable land can be created). Absent voluminous studies and data to affirm this position with respect 5-6-4 to individual environmental and social issues, past, current and future mining will only affect a relatively small portion of the Central Appalachian landscape, communities, and streams.

Significant environmental benefit will most certainly never occur in areas where mitigation efforts could have alleviated existing degraded streams through any number of water quality and habitat improvements. These existing environmental detriments, identified elsewhere in the EIS present far greater threats to the overall environmental health and stability of the region than does surface mining and valley fill construction. These existing stressors affect a far greater scale of the region that surface mining has or is forecast to affect, and the environmental degradation associated with such stressors as AML-AMD discharges is far more serious than the loss of a headwater stream.

> *Some limited number of reserves may be recoverable by underground mining or a combination of contour and auger/highwall mining.*

This statement too requires revision to be accurate. One of the pervading mistruths regarding surface mining is that other extraction methods allow removal of the same coal resource. The reality is that most seams currently being mined using surface mining and valley fill extraction methods cannot be recovered using underground mining. The seams are either physically too thin, the overburden too unconsolidated to allow for safe mining or the reserve so isolated or small that underground extraction is either impossible or hopelessly uneconomic.

5-6-4

124

This statement also fails to acknowledge the dependence of underground mining on valley fill construction. Assuming that the environmental restrictions envisioned under all the EIS alternatives will apply equally to all mining related fill construction (as they have in the past), in the limited situations where an expansion of underground extraction can replace lost surface mine production, this expansion will be constrained by the same restrictions that may ultimately make surface mining implausible:

> **...It is an egregious mistake to ignore impacts of valley limitations on deep mines, especially new ones. First, many deep mines are co-dependent on related surface mines for quality blending requirements and even economic averaging arrangements. Eliminating or reducing the surface mining has a direct impact on the viability of deep mining in these instances. Second, the typical reject rate in Central Appalachia from a wash plant associated with a deep mine is about 50%. Thus, for every one ton of coal mined, one ton of refuse is placed in a valley fill or related impoundment. In fact, the valley fills associated with wash plant refuse are generally among the larger valley fills associated with coal mining (with generally larger watershed) but are fewer in number than surface mining valley fills. Third, the construction of a new deep mine involves other valley fill issues. Often, a new deep mine is accompanied by a new wash plant with a new valley fill for refuse. Plus, in order to "face up" the entrances to the new deep mine, a new valley fill for the mine entrance is typically needed.[50]**

With respect to underground mining, a proper characterization would be "it is unlikely that underground mining can replace surface mining in the extraction these reserves."

[50] EIS Appendix H: Final Report, Coordinated Review of Mountaintop Mining/ Valley Fill EIS Economics Studies..

125

The second component of this statement, "...a combination of contour and auger/highwall mining" is simply absurd and it ignores the underlying fact behind the entire EIS: The Central Appalachian study region is steep-sloped and any excavation for underground mine development, any variation of surface mining or any other human development activity will result in the generation of spoil that cannot be safely placed anywhere but in a fill. Because of the very nature of the native terrain, with rare exceptions, "fill-less" mining or disturbance is simply not possible. Very isolated opportunities may exist for the placement of generated spoil on adjacent flat areas such as AML benches:

> **Abandoned mine benches, reclaimed mine sites or active mining areas may accommodate some volume of excess spoil...**
> EIS IV.I-2

However, these occurrences would be so rare and dependent on such a wide range of factors that they deserve no mention as a reasonable alternative to valley fill construction. No substantial amount of coal could ever be produced from an operation that was dependent such an area for spoil placement.

Any reference to these two surface mining techniques should be deleted from this statement.

> *...resources in U.S. coal basins within or outside of Appalachia and in other countries exist to offset lost reserves from the study area, if market conditions change for regulatory or other reasons.*

Fortunately, the U.S. has been blessed with an abundant reserve base of recoverable coal resources to feed the energy needs of an expanding and evolving

126

society. However, not all of these coal resources are equal, and for the agencies preparing this EIS to assume that lost Central Appalachian production can simply be replaced from other regions is a serious error. Coal mined in Central Appalachia represents some the highest quality coal found anywhere in the world. Because it is low in constituents targeted by emission legislation yet high enough in heating properties to satisfy utility input requirements, it may be the most valuable coal in existence. Other regions, particularly the Power River Basin and southwest, produce coal that is generally superior as far as emission standards are concerned. However, resources from these areas fall far short in comparing to the heating properties of coal from the study region.

This EIS has made no effort to analyze the available capacity of the Powder River Basin, both in terms of coal production and more importantly transportation, to assume the burden of energy production should policy and regulation sterilize the substantial coal resources of Central Appalachia.

As for the other regions of Appalachia and the Mid-West, the continued marketability of coal from this region is hampered by emission standards enacted as part of the CAA. As we have noted in our other comments, it was the imposition of these restrictions that ultimately spurred development of the resources being extracted using surface mining and valley fill methods.

Further, there is no domestic substitute source for the metallurgical coal produced in this region. Once the production of industrial and metallurgical coal is lost to Central Appalachia, it is lost to the U.S. compelling reliance on imported coal or

127

imported finished coke- A truly regretful situation. Reliance on foreign resources can be tolerated where domestic sources are finite or nonexistent (as with petroleum) but in the case of coal, the U.S. has ample reserves, a highly trained, well-compensated workforce and developed infrastructure to facilitate coal extraction. At the same time, mature regulatory programs exist to assure minimal environmental and social impacts of coal mining. Thus, there is simply no palatable excuse, given the minimal effects of mining, for misplaced environmental policy to drive dependence on foreign resources.

> *... economic impacts resulting from decreased coal mining could be locally significant.*

This is a gross understatement and one that requires revision to be accurate. A more proper characterization would be "profound". At the request of the West Virginia legislature, Marshall University conducted an analysis of the economic effects of a severe restriction on surface mining within the state. Published in 2000 this study determined that the economic results of restricting surface mining equated to the effects of the Great Depression: widespread economic and social and devastation and dislocation.[51] 11-9-4

G. Cultural, Historic, and Visual Resources, general comment, entire section:

Central Appalachia is indeed an area of rich culture and history worthy of protecting. However, as the Associations have noted previously, mining will

[51] Marshall University Center for Business and Economic Research. *Coal Production Forecasts and Economic Impact Simulations in Southern West Virginia: A Special Report to the West Virginia Senate Finance Committee*. 2000.

never occur on a scale large enough to eliminate or even substantially impact these values. Localized impacts can, and will occur, but existing regulatory mechanisms exits to protect the resources in these areas. As for community displacement, again localized occurrences are possible, but because of the small scale of mining activity, instances of displacement are no more likely than community displacement in the same region or other areas from publicly funded projects such as flood control and road construction.

H. Social Conditions, general comment, entire section:

The Central Appalachian region faces many social and economic challenges that is without dispute. However, the description of these conditions characterizes these challenges as relatively recent phenomena and leaves the uninitiated with the impression that they are attributable to mining. For decades government programs such as the Appalachian Regional Commission have sought to enhance the social and economic conditions of the study area. Despite all these positive influences such as aggressive highway construction, problems persist: 10-2-4

> **Income statistics from the 1980 and 1990 Censuses indicate that the study area, as a whole, has a starkly lower income than the individual states.**
>
> **Census statistics for 1980 and 1990 depict a poverty problem throughout most of the EIS study area.**
>
> **In twenty-four of the study area counties, over one in every three residents was estimated to live below the poverty level.**
> **EIS IV.H-1.**

These demographic realities further stress the economic and social importance of the coal industry. Coal mining activity creates substantial economic activity through high-paying wages for coal miners and demand for goods and service related directly to coal extraction. The ripple effect of this activity is tremendous and mining is the *only* economic driving force in a majority of the study area:

> **The establishment of a new mine or the expansion of an existing one affects both the economy of the local community where the mine is located and the economy of communities far removed from the mine site. This is because the United States has a highly interdependent economy. What happens in the mining industry eventually impacts many other industries. This is referred to as the ripple or multiplier effect. Recent studies...using an input-output model indicates that the multiplier effect for a new mine is several times the magnitude of production, income and employment of the mine itself. It is estimated that a one dollar increase in coal production stimulates a total of $6.30 of production throughout the economy.**
>
> **Likewise, the creation of one full job in a new or expanded mining operation stimulates the creation of a total of 11 other jobs elsewhere in the economy. As expected, personal income also increases but not in proportion to employment. For every dollar increase in personal income associated with coal mining activity, there is a $4.83 increases in personal income elsewhere in the economy.[52]**

Just as it stimulates economic growth and earnings, the coal industry provides the social infrastructure for much of the region through taxes. The draft EIS summarizes the taxes collected on the coal industry beginning on page III.Q-9.

[52] U.S. Department of the Interior Office of Surface Mining. *Draft Environmental Impact Statement, Valid Existing Rights*, 1995.

In short, the substantial economic activity created by mining in the region serves to alleviate these existing social problems, and coupled with the opportunities provided by post-mining land use development, offers tangible expectancy for a stable, diversified post-coal economy:

> **Most leaders are also keenly aware that its coal resources are its best sources for leverage of investments needed to build an economy that can flourish after the inevitable decline of coal mining.** EIS IV.h-2.

I. Economic Role of Coal in the Economy

> *As long as coal is required to supply a dominant portion of local and national energy needs, the ability to extract low sulfur coal reserves efficiently and cost effectively will occur somewhere in the nation (or the world) to meet energy demands and clean air standards.*

This statement is key to understanding the effect that increased restrictions will have on the energy security of the nation, particularly the regions and industries that have historically relied on coal supplies from Central Appalachia. Given the current energy needs of the nation, utility, industrial, metallurgical or otherwise, lost production from the study area will replaced by coal from other regions or foreign sources. As we noted previously, the ability of other coal regions in the U.S. to replace this lost production is limited for several reasons. First, the low sulfur coal produced in the west has substantially lower heating values than similar low sulfur Central Appalachian coal. Second, coal from other regions such as the mid-west and northern Appalachia is high in constituents targeted by clean air legislation. Finally, a substantial portion of production from the study area is used for steel making other industrial applications that demand specific heating, fusion and chemical compositions that can only be found domestically in Central Appalachian coal. Hence it is possible, if not likely that lost production from the study area will be replaced by coal from foreign sources further reducing the energy independence of the nation.

> *Higher mining costs due, in part, to environmental compliance... will result in coal supplies originating from coal basins outside the EIS study area where compliance can occur.*

This statement unfairly conveys the impression that compliance within the study area has not occurred. This is simply not the case, as the EIS demonstrates. The only issue that has been identified is related to new mitigation requirements imposed by revisions to the COE's general permit program and the constantly evolving interpretation of these mitigation requirements by the various COE districts: 11-8-4

> **Increased environmental costs...have not been a constant factor in environmental compliance in the study until the 2002 renewal of NWP 21. EIS IV.I-2.**

As we have noted in our previous comments on other sections of the EIS, application of these new requirements, particularly conservation easements, to the study area is inappropriate and may not be the most environmentally beneficial measures for the region. This statement should be revised in the final EIS to properly reflect this reality.

132

In instances where coal traditionally supplied from Central Appalachia is replaced by foreign sources, no "environmental compliance can occur" because the agencies have failed to export the vast environmental controls imposed in the study region to foreign coal basins. The statement should be revised to reflect the knowledge that displaced production will likely be supplanted at least in part by coal from other regions of the world that lack the environmental controls of the U.S.

> *New capital will be required to "ret-tool" in order to conduct more contour/auger mining to reduce valley fill sizes, lower mitigation costs and still meet coal market demand.*

As with other sections of the EIS, this statement incorrectly leaves the reader with the impression that these particular mining methods are conducted without valley fill construction and that they are mutually exclusive production methods. Since they are activities that require excavation in the steep-slopes of the study area, these two mining methods by definition will result in valley fill construction. Further, as the EIS notes on page III.I-26, these surface extraction methods usually occur in conjunction with underground and other surface mining developments. All of these mining methods are usually necessary to produce marketable coal: 11-8-4

> **Many mines rely on blending the products of different surface mines or a combination of surface and underground coal to conform to supply contracts for particular coal quality. Also, transportation and coal preparation costs associated with smaller and underground mines are sometimes related to the proximity of larger mines with existing infrastructure. If the infrastructure is not available, new smaller mines may not be practical.** EIS IV.I-4.

133

A proper revision would delete reference to these two mining methods and associate "re-tooling" costs to the smaller equipment associated with reduced operations and reduced recoverable coal reserves.

...Declines in surface mining production typically result in some amount of commensurate increases in underground production and employment.

This statement requires revision to accurately portray the realities of mining and the anticipated results of new, restrictive environmental policy. As we noted previously the effects of the alternatives contemplated in the EIS will affect underground mining, either directly through valley fill constraints or indirectly by reducing surface mined coal that is blended with underground production to produce a saleable product. Consequently, a short-term increase in underground mining employment may result from a decline in surface mining production, but given the interrelationship of mining methods, any increase will be short-lived. A reduction in surface mining employment will eventually equate to a reduction in all mining employment as the effects of surface mining restrictions are extended to underground mining. The cited statement should be revised in the final EIS to properly reflect this relationship.

It is reasonable to assume that required mitigation costs (i.e., to offset valley fills) will result in future MTM designs with reduced valley fill sizes.

This statement requires revision to properly frame increased mitigation costs within the context of other regulatory requirements imposed by SMCRA and

11-8-4

134

CWA. As we have noted previously in our comments, maximum fill minimization is already achieved through application of SMCRA's AOC requirement and compliance with the CWA's section 404(b)(1) guidelines. Since there is simply no other way to facilitate coal removal by any extraction method absent the existence of a valley fill, increased mitigation costs will act as punitive measure for unavoidable direct impacts and could unfairly hinder post-mining land uses in a region in serious need of flat developable land. A Revised Version of the sentence would properly acknowledge that operations assure fill minimization by satisfying the AOC mandate of SMCRA and the 404(b)(1) analysis of the CWA. Any further fill reduction that occurs will result from mitigation costs reducing the economic or practical viability of the operation.

The Hill & Associates sensitivity analysis projected....

The Hill & Associates (H&A) work summarized in the EIS provides only a "vision" of what will happen to the mining industry if valley fills are restricted directly (watershed specific prohibition on fills) or indirectly (increased mitigation requirements reducing the viability of a mining operation). The results of the H&A work produced very conservative estimates of the possible effects of fill restrictions because of certain restraints inherent in the model(s).

The H&A analysis relied on another EIS technical study conducted by Resource Technologies Corp. (RTC) known as the "Phase I" economics study, which used macro-GIS models to estimate the amount of available coal recoverable if valley

11-8-4

135

fills were limited to certain specific watershed acreage. The validity of this analysis is questionable, as the cover sheet to Appendix H notes:

> **Valley fill locations used in the study exceeded the watershed size thresholds established by the study (i.e. fills were placed in watersheds greater than the scenario limits). <u>The Phase I study fill locations were inconsistent with basic engineering principles</u> and typical mining practice to locate fills in valleys as opposed to on hillsides.**
>
> **Further, the phase I study relied on consideration of future mining based on areas where past mining had not occurred. A number of the potential mining sites utilized in the Phase I analysis have subsequently been determined to have been mined, consequently <u>overestimating the available future resources for the Phase I scenarios</u>. The study attempted to take into account mining engineering considerations such as overburden ratios, the volume of resource block, topography, etc., to assess resource recovery feasibility. However, the computer model was not designed, nor did the data exist, to account for every critical mining engineering factor, such as coal quality, mineral and surface ownership conflicts, and other very site-specific elements.**
>
> **<u>The Steering Committee consequently found that the site-specific results of the Phase I Economics study have limitations and should not be relied on to be representative of potential future mining and fill areas...with respect to production change estimates.</u>**
>
> **Despite the study limitations, the computer modeling <u>clearly indicates a trend related to reduction in available valley fill storage and the amount of reserves recoverable</u>. The study illustrates, from a regional perspective, <u>that restricting valley fills to small watersheds would commensurately restrict mining feasibility and minimizes full resource utilization</u>.**

The H&A work, or "Phase II" of the economics analysis, relied on flawed inputs from the Phase I study:

11-8-4

136

> **Because the Phase II Economic Study used the results if the Phase I Economic Study, the [phase II] study results also have limitations.**

In addition to receiving flawed data from the initial analysis, the H&A work also failed to properly account for the increased mining costs associated with smaller fills:

> **In the original Phase II study, no adjustments in costs were made to reflect changes in material handling and haulage methods resulting from fill restrictions. The costs were also not adjusted to reflect the reality that fill restrictions would likely necessitate a change from large mining equipment to smaller equipment. A shift from fewer larger fills to many smaller fills would require construction costs for additional sediment ponds-not part of the initial Phase II assumptions. Finally, the initial modeling runs in the Phase II Economic Study did not project an increase [in] the required return on investment (ROI) capital, which is estimated to be as high as 20%.**

The serious limitations in the initial Phase II study lead the agencies to commission H&A to conduct a "sensitivity analysis" to more accurately reflect the reality of mine economics:

> **The EIS Steering Committee sanctioned a sensitivity study by Hill and Associates to evaluate these limitations. The sensitivity study was designed to determine how the results of the initial Phase II study would change if a different set of Phase I assumptions and inputs were used. Modeling inputs, drawn from mining experience were used to indicate the direction and the magnitude of Phase II study output change resulting from adjusted sensitivity inputs.**
>
> **The sensitivity runs confirmed earlier results indicating that coal production was sensitive to lower reserve recovery because of smaller fills. Production decreased by approximately 20 percent over the initial study results. The price of coal was somewhat sensitive to the model assumptions adjustments, reflected by**

11-8-4

137

approximately $2.00 more per ton under the most restrictive scenario over the base scenario. This impact is double that of the original Phase II run for the same scenario.

In summary, the EIS economics studies used super-presumptive models that overestimated recoverable reserves, failed to account for the interrelationship of surface and underground mining and underestimated the economic results. 11-8-4

138

Chapter 1 - Introduction and Motivation

If there is any single element that defines the bounds of a regional economy, it is the intensity of the interrelationships that inexorably bind the economic fate of one group to the well-being of all others. Thus, as policy-makers ponder the potential impacts of reduced coal production in West Virginia's southwestern counties, there is a clear understanding that the foreseeable decline in coal-related economic activity will very quickly affect the nature and magnitude of all other commercial activity within the region. This conclusion is hardly in need of validation by the academic community. Coal mines and miners' pay define the southern coal field region of the State.

Most of those concerned also understand that the markets in which West Virginia's coal is sold are changing rapidly. Increasingly stringent domestic and international air quality standards are reflected in the increasing demand for low sulfur western coal and in measurable declines in at least some of the coal produced east of the Mississippi River. Increased production in Columbia and Australia has brought new and voracious competition to international fuel markets and the on-going restructuring of the US electric utility industry appears to favor natural gas over coal as a fuel source. These economic forces have already had readily observable impacts on the fiscal vitality of West Virginia's coal producers.[1]

Finally, pending court rulings that further restrict surface mining methods will place additional economic pressure on coal producers and the communities they help to sustain. While many question the dire claims proffered by the mining community with regard to mountaintop mining, the vast sums that mining companies have spent to protect this practice stand as unshakable testimony to the importance West Virginia's mining industry places on mountaintop mining. Even the mining industry's most ardent detractors must realize that mining management would have preferred to distribute these monies as profits and would have, indeed, done so if not for the belief that protecting the controversial form of surface mining is essential to their future prosperity.

[1] For example, Arch Coal Inc. experienced a 166.1% decrease in earnings growth over the last 60 months. (Source: Zacks Investment Research, http://za.zacks.com/advisor).

1

While many understand the challenges facing the State's coal producing region, few have attempted to quantify the degree to which increased competition and additional surface mining restrictions will affect the level of coal production or the broader regional economy. It is within this context and in response to a request from West Virginia Senate Finance Committee Chair Oshel Craigo, that Marshall University's Center for Business and Economic Research is attempting to provide the first glimpse of what the future may hold for West Virginia's southwestern coal producing counties. Readers should note that the following analysis is not intended to provide the sort of comprehensive information necessary to a formal cost-benefit analysis. Specifically, we do not seek to estimate the magnitude of any environmental costs within the region nor do we attempt to value the extent to which some regional residents are negatively impacted by coal mining operations.[2] Instead, the current analysis is strictly focused on foreseeable changes in coal production and the ways in which these changes may be expected to affect regional commerce, employment, and incomes in the near future.

The remainder of the current study is organized into five sections and a set of appendices. The first of these, Chapter 2, is an examination of the historical role of coal production within the study region. Chapter 3 details the current economics of coal production, including the impact of increased international competition, more strict air quality standards, and the potential impacts of electric utility restructuring. Within Chapter 4, we develop a county-level model for forecasting the supply of and demand for coal. In addition to a baseline forecast, this Chapter contains two alternative scenarios that depict varying regulatory outcomes. Chapter 5 extends the variations in coal production forecasted under each scenario to broader economic impacts within each study region county. Finally, we provide concluding comments in Chapter 6. Appendix A contains county level data, while Appendices B and C explain and demonstrate the models and estimation techniques used in the study.

[2] West Virginia University's Bureau for Business and Economic Research is currently working in conjunction with the U.S. Environmental Protection Agency to conduct a long-run, comprehensive economic analysis within the Environmental Impact Statement process.

Chapter 2 - The Study Region, Coal Production, & Regional Economy

2.1 Study Region Definition

The study region, pictured in Figure 2.1, is comprised of Boone, Fayette, Kanawha, Logan, McDowell, Mingo, Nicholas, Raleigh, and Wyoming counties. This study region was established based on a number of criteria. First, these contiguous counties provide a rough outline of West Virginia's southern coal fields. Second, this regional definition includes counties with largely homogeneous economies and coal reserves. Were we to extend the analysis to include northern coal producing counties, it would be necessary to account for the measurably different economic conditions observed in those counties, as well as the vastly different characteristics of the coal mined within that region. Finally, the study region was defined based on the historical (and current) dominance of coal production within the region's nine counties. Current population, personal income, and employment data for these counties is summarized in Table 2.1. These data indicate that as late as 1998 (the last year for which data are currently available) coal production directly represented an overwhelming portion (over 18%) of the economic activity within the study region.

Figure 2.1
The Study Region

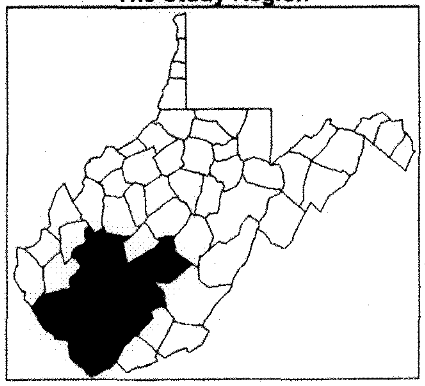


Table 2.1
The Study Region, 1998

	Population	Per-Capita Income	Total Employment	Direct Coal-Related Employment	Percentage of Coal-Related Employment
Boone	26,347	$17,735	9,436	3,116	33.0%
Fayette	48,566	$15,961	16,540	625	3.8%
Kanawha	203,195	$24,489	134,345	2,296	1.7%
Logan	41,294	$16,383	15,682	1,902	12.1%
McDowell	30,558	$13,482	7,213	908	12.6%
Mingo	32,475	$15,923	11,189	2,713	24.2%
Nicholas	27,580	$14,743	10,508	593	5.6%
Raleigh	78,970	$18,421	36,612	1,836	5.0%
Wyoming	27,662	$13,816	7,214	1,329	18.4%

2.2 A Brief Historical Context

Bituminous coal underlies more than two-thirds of West Virginia. These coal deposits are divided by a geological "hinge line" into northern and southern fields. Generally, coal mined in the southern fields has a higher heating value and lower sulfur content than northern West Virginia coal. Historically, however, the development of the State's coal industry first occurred in the north.[3]

While coal production in "western Virginia" dates to the early 19th century, development of the southern West Virginia coal fields did not begin until after the Civil War. The Flat Top-Pocahontas Field, located primarily in Mercer and McDowell counties, first shipped coal in 1883 and grew quickly from that time. Smaller operations within the area were consolidated into larger companies and the Pocahontas Fuel Company, organized in 1907, soon dominated McDowell County production.

Many of the southern coal fields, such as the Kanawha, New River, Winding Gulf, Logan and Greenbrier, owed their success to the development of the Norfolk Southern and Chesapeake & Ohio Railways. As the railway expanded into the region, coal was more easily marketed and the southern coal fields prospered. The Logan field, lying in Logan and Wyoming counties, did

[3] See US Energy Information Administration, State Coal Profiles, Washington, DC, 1998.

not open until 1904, when the railway finally reached that area. Once opened, Logan soon became the State's largest coal producing county.

Over the years, mining techniques and equipment have varied considerably. Early on, progress in mechanization was slow. Nonetheless, by 1890 electric coal cutting, loading, and hauling machines were in wide use. Beginning in the middle 1930s, mechanization moved forward even more rapidly, as shuttle cars, long trains, conveyor belts, and a variety of other equipment came into common use. Large-scale surface mining did not begin until 1913, but with the development of large earth moving equipment and draglines, the overburden could be removed more efficiently, so in recent years surface mining has become a major method of mining coal within the study region. Technological advancements, increasing concerns for health, and rising workers' compensation costs have lead to mine safety improvements.

2.3 Coal Production and the Study Region Economy

Table 2.3A provides estimates of coal production, employment, and mine-mouth prices from 1980 through 1998. Section 3 describes the largely exogenous market forces that have lead to variations in these outcomes. However, it is clear, even without these explanations, that the economic well-being of the study region has been directly tied to the magnitude of coal production. Table 2.3B provides an intertemporal glance at the relationship between the study region's coal production, populations, and incomes. When the demand for the study region's coal has been relatively strong (as in the 1970's), the regional economy was able to support a population of 611,175 in 1979, with an average real per-capital income of $13,797. In contrast, when the demand for the region's coal has been slack (as in the middle 1980's), incomes changed marginally while population fell measurably. During this latter period, region population declined by 12.8 percent in the decade from 1979 to 1989.

The study region is currently home to over 515,000 persons, who comprise roughly 200,000 households. Virtually every measure of economic well-being reflects the damage done by a 15 years of sustained out-migration. The 1999 unemployment rate, weighted by a county population of 8.3 percent was more than twice the national average of 4.1 percent and 125 percent of the West Virginia average of 6.6 percent. The average regional per-capita income of $16,772 is only 87.17 percent of the national average. Home values within the study region average only $38,700, while the State-wide figure is $47,600. And finally, in some counties the high school non-completion rate for those over 25 is substantially greater than 50 percent[4].

Table 2.3A

Year	Regional Coal Production (Tons x 1,000)	Real Mine-Mouth Price / Ton (92 $)	Direct Mining Employment	Tons per Mining Employee (Tons x 1,000)
1980	60,317	$46.00	40,391	1.493
1987	60,228	$35.08	19,813	3.040
1992	84,119	$28.15	18,657	4.509
1993	78,339	$26.88	14,021	5.587
1994	87,288	$26.14	15,153	5.760
1995	87,552	$25.26	15,073	5.809
1996	91,989	$24.23	14,017	6.563
% Change	53%	-47%	-65%	439%

Indeed, eight of the nine study region counties have been classified as "distressed" by the Appalachian Regional Commission.[5] There are those who would blame coal producers for these negative economic outcomes. To do so would, however, be largely unfair. Instead, the economic conditions within the study region reflect a lack of economic diversity coupled with the significant volatility observed in fuel markets. Figure 2.3 depicts real coal prices over a period of nearly 120 years. This figure reveals two important points. Over the long-run inflation-adjusted coal prices have proven remarkably stable. In the short-run, however, coal prices have been remarkably volatile.

While economic conditions within the study region generally lag behind those observed within the remainder of the State, there are indications that at least some study region counties have become less reliant on coal-based economic activities. Certainly, Kanawha County, with its diversity of manufacturing, service sector, and governmental activities, is less susceptible to

[4] U.S. Census Bureau, 1990 Census.

[5] These substandard economic conditions are reflected in other negative outcomes. For example, the widely dispersed population and lagging economic conditions have made it difficult for the region's residents to obtain adequate health care. As a result, health attainment within a number of study region counties ranks among the lowest in the nation. Appalachian Regional Commission Distressed Counties, FY 2000.

6

coal-related economic disruptions. Moreover, both Fayette and Raleigh Counties have enjoyed a measurable increase in tourist-related economic activity over the past decade. Indeed, since 1994, the number of tourism-related establishments and jobs in these two counties have both grown at an annual rate of over 20 percent.[6]

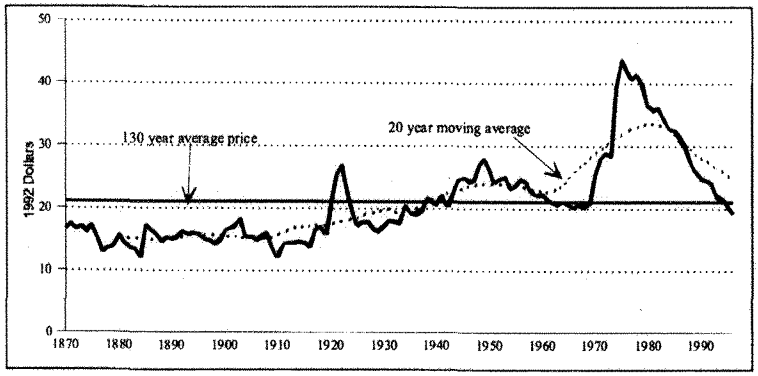
Table 2.3B

Year	Regional Coal Production (Tons x 1,000)	Real Mine-Mouth Price / Ton, WV Coal (92 $)	Regional Population	Average Regional Per-Capita Income (92 $)
1970	-	$28.67	557,238	$10,419
1971	-	$33.05	563,817	$10,834
1972	-	$34.61	569,593	$11,845
1973	-	$36.69	570,666	$12,187
1974	-	$61.61	569,551	$12,279
1975	-	$76.54	581,358	$13,003
1976	-	$74.27	594,416	$13,326
1977	-	$71.84	604,190	$13,552
1978	-	$71.33	609,506	$13,841
1979	-	$67.14	611,175	$13,797
1980	73,948	$59.39	608,400	$13,699
1981	69,590	$58.73	606,979	$13,279
1982	74,468	$54.84	605,500	$13,472
1983	64,857	$49.94	602,329	$12,614
1984	73,293	$46.15	593,899	$13,016
1985	76,619	$43.64	584,673	$12,973
1986	81,172	$39.56	574,445	$13,153
1987	83,728	$36.00	562,124	$13,059
1988	89,420	$33.47	546,257	$13,170
1989	93,870	$32.46	532,660	$13,216
1990	110,021	$30.72	524,998	$13,704
1991	109,060	$29.48	524,551	$13,852
1992	107,278	$28.15	524,838	$14,206
1993	92,860	$26.78	525,694	$14,132
1994	108,902	$25.96	523,698	$14,417
1995	112,616	$25.02	522,573	$14,433
1996	117,871	$22.11	520,353	$14,504
1997	120,666	$23.29	516,647	$14,662
1998	116,208	-	513,022	-

[6] This figure is based on the growth of employment and establishments within the categories of lodging, restaurants, and recreational establishments within the county. U.S. Bureau of the Census, County Business Patterns 1994-1998.

7

Figure 2.3
Long Run Bituminous Coal Prices in West Virginia, 1992 Constant Dollars



Chapter 3 - The Economics of the Coal Industry

Historically, coal and other related fuel markets have exhibited a significant degree of short-run volatility which has translated into instability and a paucity of economic development within those study region counties that rely heavily on coal production[7]. As West Virginia enters the 21[st] century, there is no indication that this pattern of instability or volatility will abate. To the contrary, a number of new pressures have emerged that make the course of coal production within the study region less, rather than more, certain. Among the issues affecting the State's coal industry are increased international and domestic competition, uncertain international petroleum prices, electric utility restructuring, and new environmental regulations. These affect both the production and consumption of West Virginia coal[8]. Within the remainder of this chapter, we carefully evaluate how each of these sources of instability may be expected to affect the study region's coal producers. The chapter also attempts to dispel various myths regarding production costs and alternative production techniques that cloud the debate surrounding further regulatory intervention and its impact on coal production.

3.1 The Demand for Study Region Coal

Like most raw materials, the demand for coal produced within the study region is derived from the demand for the products that coal is used to create and the technologies available for producing these "downstream" goods or services. Within the current context, this "derived demand" implies that the willingness to pay for study region coal depends on the demand for electricity and steel products, as well as the availability and pricing of other fuel substitutes. This includes coal from other regions, natural gas, and fuel oil, and generating and steel producing technologies. Changes in any of these other factors can materially affect the demand for coal produced in southern West Virginia. The demand for study region coal is further complicated, since bituminous coal is sold in commodity markets that recognize qualitative differences in

[7] Specifically, the volatility of regional economic activity within the study region has served to weaken investment, hindering economic growth relative to other regions.

[8] The 1990 Clean Air Act Amendments (CAAA), which became effective January 1, 2000, outline stricter sulfur emission reduction requirements of Phase II.

sulfur dioxide, ash, moisture, and Btu content.[9] Metallurgical coal users and utilities that face few air quality compliance issues may be attracted to the relatively high Btu content of study region coal, while other electricity users may favor the low sulfur content and relatively low transportation costs of western coal, even though most such coal has a significantly lower Btu content.[10]

As the opening paragraph of this chapter indicates, a number of evolving forces will potentially impact the volume of coal produced within the study region over coming decades. With the exception of environmental restrictions on surface mining practices, these emerging forces represent demand-side changes that are effecting consumers' willingness to pay for study region coal.

3.1.1 Clean Air Standards and the Demand for Study Region Coal

The *U.S. Environmental Protection Agency's* implementation of the 1990 amendments to the *Clean Air Act* have increasingly restricted electric utility emissions of a variety of pollutants. These pollutants include sulfur dioxide, nitrogen oxides, and particulate matter. Coal burning utilities generally have four options or strategies available for compliance with these standards – (1) high-emission facilities can be retired; (2) high-emission facilities can be retrofitted to burn low-sulfur coal, a low-sulfur/high sulfur coal mix, or an alternative fuel; (3) high-emission facilities can be modified to include scrubber equipment that reduces the volume of pollutants emitted from the burn of high-sulfur coal; or (4) operators of high-emissions facilities can acquire (either internally or through purchase) emissions credits that will allow the facility to legally exceed the applicable emission standards.

[9] The British Thermal Unit (Btu) is the most common measure of heat producing capacity. It reflects the amount of heat required to raise the temperature of one pound of pure water by one degree Fahrenheit.

[10] The complexity of coal markets is, perhaps, highlighted by the diversity of coal products available in the western United States. Powder River Basin (PRB) coal from Montana and Wyoming is of the low sulfur, low Btu variety noted in the text. However, the low sulfur coal produced in Colorado, Utah, and British Columbia has a consistently higher Btu content. However, the non-PRB western coal does not routinely compete in eastern fuel markets because moving it through the Rocky Mountains requires relatively high expenditures for transportation.

Some compliance strategies allow electricity producers to continue the use of study region coal, while other strategies preclude this use[11]. However, just as emission standards have made southern Appalachian coal less desirable for some customers, the same regulations have caused other users to substitute study region coal for Illinois basin and northern Appalachian coal that has an appreciably higher sulfur content. Thus, it is difficult to assess the current net effect of clean air standards on the demand for study region coal.

If there is one clear outcome associated with more stringent air quality standards, it is the growth in popularity of Powder River Basin (PRB) coal mined in Wyoming and Montana.[12] PRB coal is mined at a cost of roughly $4.50 per ton and can be transported into the Illinois and Ohio River Basins at rates that result in delivered prices that are comparable to the mine-mouth price of study region coal.[13] The difference, of course, is that the low Btu content of PRB coal means that much more coal must be burned to achieve the same power generation. To date, it appears that PRB coal is primarily displacing Illinois Basin coal, but the same qualities that make western coal attractive to users in Illinois and Indiana may eventually sway utilities further east.[14]

Air quality issues are also leading many utilities to substitute natural gas for coal as a generating fuel. Tampa Electric Company (TECO) recently announced plans to convert all coal-fired generating facilities to natural gas within the next two years and Ontario Hydro is rumored to be contemplating similar changes. Both utilities have historically consumed West Virginia Coal.

[11] The purchase of sulfur dioxide permits cellars for continued burning of study region coal without retrofitting plants with emissions curtailing technologies.

[12] Historically, the relatively high costs of mining and transporting eastern coal allowed PRB coal to compete in markets west of the Mississippi River. Relative declines in transportation costs from the Powder River Basin during the 1990's moved the east-west boundary between eastern and western coal dominance further east into the Illinois and Ohio River basins. More recently, however, the continued eastern expansion of western coal appears to owe to the effects of more stringent clean air standards, rather than any further decline in relative transport rates.

[13] The Energy Information Administration Coal Industry Annual 1998 reports a real mine price (1992$) of $4.80. However, anecdotal evidence suggests that Powder River Basin coal costs have lowered since 1998.

[14] For a discussion of the expanded use of PRB coal, see Energy Information Administration. While there is no evidence at this point to support our contention, the authors suspect that the attractiveness of using PRB coal as a compliance strategy is enhanced by the knowledge that this strategy will be effective for the foreseeable future, whereas alternative strategies – for example blending – may cease to be effective if standards are raised further.

3.1.2 International Competition and the Demand for Study Region Coal

Table 3.1 summarizes West Virginia coal exports between 1993 and 1997. On average, exports accounted for roughly 25% of all sales during that period.[15] Tables 3.2 and 3.3 provide additional information on the export destinations of the State's coal production. These data, in combination with additional anecdotal data, tell a clear story of increased international competition.

Table 3.1

Year	WV Sales to Domestic Users (x 1,000)	WV Sales to International Users (x 1,000)	Total WV Sales (x 1,000)	Percentage of Export Sales
1993	102.7	33.2	135.9	24.43%
1994	122.8	36.2	159.0	22.77%
1995	120.9	44.3	165.2	26.82%
1996	127.2	42.0	169.2	24.82%
1997	133.8	38.4	172.2	22.30%

The majority of West Virginia's coal exports (47% in 1997) are bound for European destinations. However, throughout the period of record, European nations have been purchasing less coal from West Virginia and more from other exporting nations, such as Columbia.[16] Columbian coal is even making inroads into US domestic markets. Unpublished sources suggest that Alabama Power, beginning in 2001, plans to import more than four million tons of Columbia coal over the Port of Mobile.

The second largest importer of West Virginia coal (23% in 1997) is Canada. Of the coal shipped to Canadian users, roughly one-third is purchased by Ontario Hydro, with the remainder going to other generating and industrial users. During the 1993-1997 period, annual Canadian use of West Virginia coal grew by 2.9 million tons (71%). This growth clearly helped offset

[15] Energy Information Administration data do not allow the segregation of study region exports from other West Virginia exports.

[16] The decline in European coal purchases would appear greater still if the 112 percent increase in West Virginia exports to Romania are excluded from calculations.

export losses to other international customers. It is important to note, however, that the growth in Canadian usage reflects a one-time increase in Ontario Hydro's consumption that resulted from the utility's need to rapidly replace generating capacity lost with the unplanned shutdown of nuclear facilities.[17]

Increased low sulfur, high Btu Australian coal production is also placing additional competitive pressures on West Virginia exports. In 1996, Australia embarked on a program designed to increase coal production by approximately 5 percent annually through 2002.[18] This increased production is principally aimed at Asian markets which accounted for roughly 11 percent of West Virginia exports in 1997.[19] However, there are secondary effects arising from the Australian expansion. Anecdotal information suggests that Australian coal has displaced a significant amount of low-sulfur, high-Btu coal mined in British Columbia. As British Columbian producers seek alternative markets, it may well affect West Virginia's ability to export coal to eastern Canada.

[17] It is worth noting that one issue that has arisen in the proposed railroad merger between Burlington Northern - Santa Fe and the Canadian National - Illinois Central is the degree to which a combined system would allow for the more efficient transport of Powder River Basin coal to eastern Canada customers. If this merger is allowed, it could place additional competitive pressure on West Virginia coal exports.

[18] See "Australian Coal Supply: Risks and Prospects to 2002," *Australian Commodities*, Vol. 4, No. 2, June 1997, pp. 214-26.

[19] *Ibid.*

Table 3.2
West Virginia Coal Exports

Destination Country	1993 Tons (x 1,000)	1994 Tons (x 1,000)	1995 Tons (x 1,000)	1996 Tons (x 1,000)	1997 Tons (x 1,000)
Argentina	132	35	----	----	----
Belgium	1,396	1,302	1,175	1,261	822
Brazil	2,496	4,109	4,329	4,247	3,927
Bulgaria	644	1,571	1,360	1,152	1,008
Canada	4,071	5,605	5,759	6,907	6,956
Chile	----	----	----	43	----
China	141	284	355	353	188
Croatia	63	----	----	----	----
Egypt	601	593	714	303	807
Finland	212	375	683	507	324
France	2,864	3,514	3,594	2,859	2,286
Germany	286	382	254	584	419
India	----	----	----	11	----
Italy	3,111	2,927	2,873	2,361	2,084
Japan	2,260	2,148	3,222	2,062	2,585
Korea	318	523	1,013	1,050	829
Mexico	----	----	----	----	25
Netherlands	2,014	1,717	1,523	1,223	1,977
Nigeria	43	----	----	----	----
Portugal	151	----	33	164	118
Romania	820	925	1,623	1,315	1,737
South Africa	577	771	946	947	706
Spain	1,071	1,255	1,084	818	681
Sweden	603	866	1,352	882	857
Turkey	1,370	1,468	1,560	1,643	1,295
United Kingdom	1,261	1,212	1,182	1,024	897
Total	29,498	31,582	34,634	31,716	30,528

14

Table 3.3
West Virginia Coal Exports

Destination Country	1993 % of Total Exports	1994 % of Total Exports	1995 % of Total Exports	1996 % of Total Exports	1997 % of Total Exports
Argentina	0.50%	0.11%	---	---	---
Belgium	5.27%	4.12%	3.39%	3.98%	2.69%
Brazil	9.42%	13.01%	12.50%	13.39%	12.86%
Bulgaria	2.43%	4.97%	3.93%	3.63%	3.30%
Canada	15.36%	17.75%	16.63%	21.78%	22.79%
Chile	---	---	---	0.14%	---
China	0.53%	0.90%	1.03%	1.11%	0.62%
Croatia	0.24%	---	---	---	---
Egypt	2.27%	1.88%	2.06%	0.96%	2.64%
Finland	0.80%	1.19%	1.97%	1.60%	1.06%
France	10.81%	11.13%	10.38%	9.01%	7.49%
Germany	1.08%	1.21%	0.73%	1.84%	1.37%
India	---	---	---	0.03%	---
Italy	11.74%	9.27%	8.30%	7.44%	6.83%
Japan	8.53%	6.80%	9.30%	6.50%	8.47%
Korea	1.20%	1.66%	2.92%	3.31%	2.72%
Mexico	---	---	---	---	0.08%
Netherlands	7.60%	5.44%	4.40%	3.86%	6.48%
Nigeria	0.16%	---	---	---	---
Portugal	0.57%	---	0.10%	0.52%	0.39%
Romania	3.09%	2.93%	4.69%	4.15%	5.69%
South Africa	2.18%	2.44%	2.73%	2.99%	2.31%
Spain	4.04%	3.97%	3.13%	2.58%	2.23%
Sweden	2.28%	2.74%	3.90%	2.78%	2.81%
Turkey	5.17%	4.65%	4.50%	5.18%	4.24%
United Kingdom	4.76%	3.84%	3.41%	3.23%	2.94%
Total	100%	100%	100%	100%	100%

3.1.3 The Potential Impacts of Electric Utility Restructuring

As of December 1, 1999, 12 states enacted restructuring legislation, six states had comprehensive regulatory orders issued, and seven states had legislation/orders pending.[20] The status of these regulatory reforms is summarized in Table 3.4. This electric utility industry

[20] FL and SD have no significant ongoing activity. TX allows competitive wholesale wheeling, as authorized by SB 373, 1995. CA, MA, and NH have regulatory orders and legislation in place. See "Challenges of Electric Power

15

restructuring is predicted, in the long-run, to measurably impact the markets in which study region coal is bought and sold in a number of important ways. According to the *U.S. Department of Energy's Energy Information Administration*, electric utility deregulation will simultaneously place downward pressure on coal prices, favor the use of natural gas – even in base-load generation, reduce or eliminate long-term contracts for coal, and introduce greater levels of uncertainty for coal producers.[21]

For two reasons, the full implications of electric utility restructuring on study region coal production will not be apparent for several years. First, under most restructuring scenarios, states will retain residual regulatory powers. Moreover, any federal regulatory restructuring will take considerable time to reach fruition, so that competition and its effects on fuel markets will emerge gradually. Second, existing coal-fired plants – particularly those already adapted to meet more stringent air quality standards – are likely to remain in use until these assets can be efficiently retired. Any premature retirement of coal-fired facilities will leave the utilities "stranded" with the capital costs of those facilities. The ability of utilities to recover such costs is uncertain.[22]

Industry Restructuring for Fuel Suppliers," U.S. Department of Energy, Energy Information Administration, DOE/EIA-0623, September, 1998.

[21] *Ibid.*

[22] The treatment of "stranded costs" – capital costs that are unrecoverable due to the transition from regulation to competition – remains as a complex issue within the topic of electric utility restructuring. Certainly, while most states' restructuring plans provide some relief in this area, it is to the utility's advantage to minimize the value of such costs. Moreover, the costs of investments made during an era when restructuring is foreseeable may be *completely* vulnerable.

Table 3.4
Electricity Restructuring

Restructuring Legislation Enacted	Comprehensive Regulatory Order Issued	Legislation/ Orders Pending	Commission or Legislative Investigation Ongoing	
CA	AZ	AK	AL	NE
CN	MD	DE	AR	NM
IL	MI	KY	CO	NC
ME	NJ	MO	GA	ND
MT	NY	OH	HI	OR
NV	VT	SC	ID	TN
NH		WV	IN	TX
OK			IO	UT
PA			KS	WA
RI			LA	WI
VA			MN	WY
			MS	
			District of Columbia	

3.2 The Cost Structure of Study Region Coal Producers

Changing demands will not act in isolation to affect changes in study region coal production levels within the study region. Instead, it is the interaction of changing demands with cost-dependent supply conditions that will ultimately determine the region's economic outcomes. With the exception of pending additional restrictions on surface mining methods, the future structure of study region mining costs is largely devoid of any public policy influence. Instead, it is the mining interests who will decide how and where coal may be efficiently produced.

3.2.2 Capital, Labor, and Labor Productivity

The structure of coal mining has changed dramatically since the widespread introduction of the continuous miner in the 1950's. The once labor intensive production process has been replaced by the use of capital assets that resulted in a precipitous decline in mining employment. The southern West Virginia coal fields primarily employ long-wall and continuous miner technologies. The productivity gains resulting from these techniques are reflected in the significant increase in output per worker (see Table 2.3A).

Many have concluded that the decline in employment is strictly attributable to the growth in surface mining – mining that now accounts for roughly one-third of all West Virginia production. Indeed, State-wide underground mining employment fell from 45,000 in 1980 to 16,000 in 1996, while surface mining's share of State output increased from 21 percent to 33 percent. However, the conclusion that surface mining is at the root of employment declines largely ignores two critical facts.

First, without regard to surface operations, the productivity of underground miners increased dramatically over the 1980-1996 period. In 1980, 45,000 underground miners produced roughly 96 million tons of coal – about 2,100 tons per worker. In 1996 16,000 underground miners, only one-third of those employed in 1980, produced more than 112 million tons of coal, or approximately 7,000 tons per employee. Thus, it appears that improvements in underground mining productivity are more responsible for declines in mining employment than the continuing emergence of surface mining. Finally, it is worth observing that surface mining employment also declined. In 1980, there were 7,500 West Virginians employed in surface mining operations. By 1996, their number had fallen to 4,118, due to strong productivity growth.

In considering the future costs of regional producers, it is reasonable to examine any potential inter-firm variations that might make it possible for some sellers to respond more effectively than others to changing demand conditions. If such variations exist, they are more than likely the result of accidents of geography rather than any structural differences between firms. Indeed, the productivity-enhancing technologies noted above appear to spread rapidly across producers, so that it is unlikely that large scale inter-firm cost differences are attributable to equipment use. Similarly, there may be modest differences between the productivity of unionized and non-union mining operations, but these differences are also likely tied to geography-dictated mining methods rather than actual productivity differences[23]. In the end, variations in the costs incurred by mining firms are dictated primarily by the disaggregated spatial nature of the natural resource they extract. Simply put, in coal mining, geology plays a

[23] In 1997 firms east of the Mississippi River produced 3.89 short tons of coal per miner per hour compared to firms west of Mississippi River, who produced 16.04 short tons of coal per miner per hour. 1997 Productivity Data, Energy Information Administration.

critical role in determining the overall costs of production. Though new cost-reducing technologies will continue to emerge, firms have remarkably little control over their individual production costs.

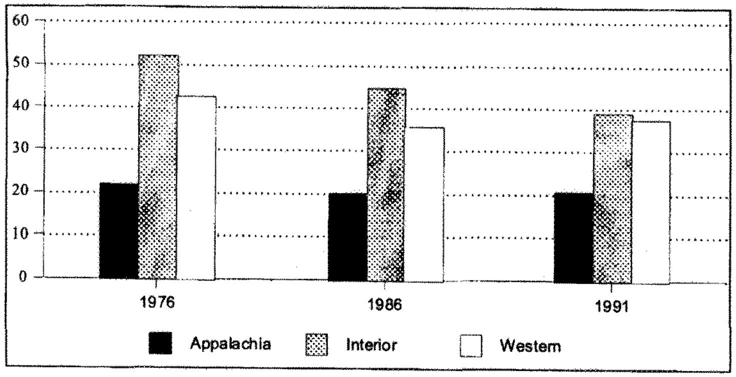
3.2.3 The Issues of Scale and Scope Economies

The conclusion that regional coal producers have only minimal control over production costs differs from the typical case in which firms may affect unit costs by pursuing different scales of production. However, the current analysis of the regional production process directly supports the contention that firms are not able to improve productive efficiency by increasing the scale of their operations. This issue is empirically modeled and further described in Appendix C. In many ways, this outcome relates to the distinction between "plant level" and "firm level" scale economies. In many instances, firms can reduce unit costs by making individual plants bigger. In the case of regional mining operations, however, the "plant" is the mine property which, absent regulatory constraint, is limited in size by the geography and geology of coal reserves. As a consequence, the only additional scale economies available to regional producers are the "firm" level savings that might come from averaging administrative and overhead costs over the output from a number of consolidated mining operations."[24]

Based on this discussion, the relevant question is whether or not there are significant potential cost savings attainable through the consolidation of regional coal producers. While the evidence is limited, the answer to this question would appear to be "No". Figure 3.1 depicts the four firm concentration ratio (the percentage of market output produced by the largest four producers) for Appalachian coal producers, other interior coal producers, and mining operations in the western US from 1970 forward. Certainly, Appalachian coal producers have had the incentive to reduce costs in any way possible, yet the level of concentration has remained constant. One implication of this relatively static concentration ratio is that attainable cost reductions through consolidation are minimal at best.

[24] This conclusion that available scale economies are firm level in nature appears to be largely shared by the Energy Information Administration (EIA). In its evaluation of the probable impacts of electric utility restructuring, the EIA suggests capturing scale economies through consolidations may be important. However, it also suggests that the source of available economies is limited to lowering per-unit overhead costs and by, "[increasing] producer's negotiating power to deal with larger generating and transportation counterparts." See "Challenges of Electric Power Industry Restructuring for Fuel Suppliers," Ch. 1, p. 6. U.S. Department of Energy, Energy Information Administration, DOE/EIA-0623, September, 1998.

Figure 3.1
Share of Regional Coal Production by Four Largest Producers in Region



The potential savings from the capture of firm level economies are illustrated in Figure 3.2. Within this figure, mine-level Average Total Costs are depicted by ATC_0. The ability to lower these average costs by expanding the mine size is, however, constrained by the geography and geology of the mining region. It is impossible to move downward along this curve beyond the quantity denoted as Q_{MX}. Any additional cost savings can only be achieved by lowering average overhead and administrative costs by averaging these expenditures across additional output from other mining facilities. Doing so would result in a new mine-specific Average Total Cost curve represented in the figure as ATC_1.

20

Figure 3.2

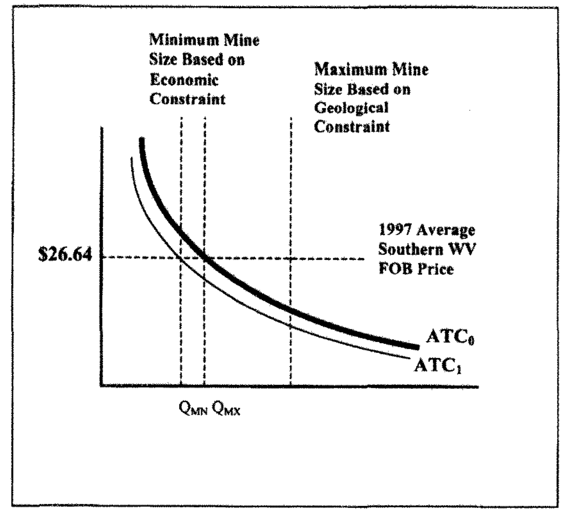


Figure 3.2 can also be used to illustrate the "scope" economies that exist between underground and surface operations. Economies of scope exist when a product can be made more cheaply when it is produced, in combination with one or more other products. For example, many have argued that electricity can be produced more cheaply when generating activities are combined with electricity distribution.[25] In the case of coal, underground and surface mining operations may exist independently of one another – even at separate locations, yet the delivered cost of each output can be made lower by the production of the other. This outcome is the result of scale economies in the blending and transportation of coal. Output quantities from both underground and surface mines are routinely combined in blending operations and the blended coal is routinely shipped as a single product. Both unit blending and transport costs are lowered

[25] Kaserman, David L.; Mayo, John W. "The Measurement of Vertical Economies and the Efficient Structure of the Electric Utility Industry." Journal of Industrial Economics; v39 n5 September 1991, pp. 483-502.

21

by additional quantities – quantities that are only made possible by combining the output from distinct surface and underground operation.[26] Within Figure 3.2, ATC_0 may be viewed as the Average Total Cost curve for an underground surface operation in the absence of a companion facility of the other sort. ATC_1, then, reflects the operation's Average Total Cost when the companion production facility is in operation. The implications of these scope economies are fully discussed in Appendix C. However, the results of the current analysis suggest that study region counties that have a relatively balanced mix of mining methods enjoy strong scope economies. The critical implication of this finding is that the loss of mines of either type may actually *increase* the costs of producing coal by the alternative method.

3.2.4 Additional Environmental Restrictions And Production Costs

The introduction to this chapter notes that most of the foreseeable changes that may affect regional coal production are demand-side in nature. The one major exception is the implementation of judicial decisions that may substantially reduce the size of certain surface mining operations. Figure 3.3 continues the same graphical construct in order to demonstrate the potential impacts of these additional restrictions on study region mining costs.

The judicial ruling in question – known as the "Haden decision" – is likely to have two impacts on the costs of *some* coal producers.[27] First, by limiting the locations in which valleys may be filled with the overburden from mountaintop mining, the Haden decision is likely to reduce the size of many surface operations or eliminate some entirely. The impact of this restriction on producer costs is depicted by a movement along ATC_0, in association with a reduction in quantity from Q_{MX} to Q_H.

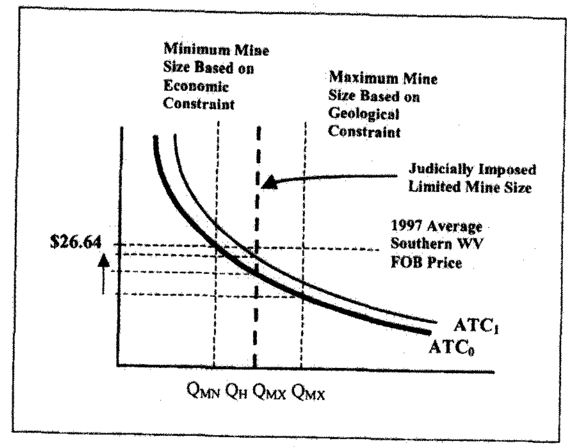
The second potential impact of the Haden decision on production costs owes to the additional uncertainty this decision introduces. Economic decisions regarding continued production hinge on the short-run and long-run profitability of this production. To the extent that

[26] Study region coal producers have acknowledged the relationship between quantity and average blending costs, but have been unwilling to quantify this relationship.. The relationship between shipment quantity and transportation rates is, however, well documented. See for Example, Mark L. Burton, "Railroad Deregulation, Carrier Behavior and Shipper Response: A Disaggregated Analysis," *Journal of Regulatory Economics*, Vol. 5, No. 4, December, 1993, pp. 417-34.

[27] Patricia Bragg, et al, Plaintiffs, vs. Colonel Dana Robertson, et al, Defendants. Civil Action 2:98-0636, U.S. District Court for Southern West Virginia, Charleston Division.

the Haden decision clouds assessments of this profitability, it may reduce investment, limiting future production capacity and causing future costs to rise. Within Figure 3.3, the additional uncertainty is reflected by a movement from ATC_0 to ATC_1.

Figure 3.3



3.3 Coal Pricing and Future Producer Profitability

The preceding two sections outline the ways in which ongoing changes are likely to affect the demand for and supply of study region coal. Chapter 4 quantifies these impacts in order to predict the overall economic impact on study region counties. Still, even in advance of these forecasts, it is possible to evaluate the qualitative effects of the foreseeable changes in West Virginia coal output quantities. Absent the Haden decision, the reduced demand for study region coal should result in a continued decline in mine-mouth prices and a measurable decline in output quantities. If the Haden decision is upheld, production costs at some mines will increase. These cost increases will further exacerbate the problems of regional producers by making it unprofitable to mine coal that is only marginally profitable under current conditions. Ultimately some producers may not survive this process. Whether firms are publicly owned or held privately, the long-run response to sustained negative firm profits is the same – market exit.

There is already evidence that the uncertain future facing regional coal producers is affecting economic outcomes and the fiscal health of regional coal producers. After reaching an all-time high of over 180 million tons in 1997, West Virginia coal production has declined over the past two years. Industry estimates suggest that 1999 totals may be as low as 162 million tons, a reduction of roughly 10 percent. While a two year output decline certainly does not constitute evidence of a long-run trend, it is consistent with the expected impacts of changing demand conditions.

It is also likely that effects of changing demands have been slowed somewhat by the existence of long-term contracts between producers and utilities made popular by uncertain supplies and rising fuel prices during the 1970's. Now, however, most West Virginia coal is sold via short-term contracts, so that the market for the study region's output is, in many ways, similar to a spot market, with only a smaller subset sold through long-term, fixed-price contracts.[28] The recent decline in spot market or short-term coal prices has made long-term contracts less attractive to customers, so that long-term contract volumes continue to fall.[29] Anecdotal evidence, as well as discussions with industry representatives, suggests that the last of the long-term contracts will have expired by 2003. This transition to short-term market pricing has interjected additional uncertainty into the transaction process and amplified the competitive pressure facing regional producers.

[28] The long-run, fixed price contracts were popular with consumers during the 1970's and early 1980's, as nominal prices soared, concurrent with oil shortages.

[29] This is also the suggestion that long-term contracts are becoming less popular with electricity generators as they prepare for electric utility restructuring, "Challenges of Electric Power Industry Restructuring for Fuel Suppliers. Energy Information Administration".

Chapter 4 - Forecast Model & History

4.1 The Forecast Model & Simulations

Energy demand and the supply of fossil fuels are among the most heavily forecasted economic outcomes. These forecasts are typically of three types: consumer and industrial demand for electricity, geologic assessments of remaining reserves, and price forecasts of extracted fossil fuels. The forecasting efforts of the *Department of Energy's Energy Information Administration* provide detailed long-term assessments of the latter two, while a number of regional forecasting centers, as well as the *U.S. Geological Survey*, project the United States' extractable fossil fuel reserves. Similar international agencies and foreign governments also undertake these types of forecasts. These forecasts are critical to both individual firms, and state and federal planners in developing their own inventories and revenue assessments. An additional level of forecasting is available from academic sources, especially journals dedicated to energy research and forecasting method. However, these models often seek to illustrate a specific issue or methods and are therefore not typically of immediate value to a forecaster interested in a generalized prediction model from which simulations can be constructed.

Forecasting techniques involve the use of a purely statistical method (the time series approach), a structural model that evaluates causation, or a combination of these techniques. The model we have used here is the final type, a structural-time series model. We have selected this forecasting tool for a variety of reasons. The most important of these is the need to simulate policy changes and trends in other variables (e.g. electricity demand) on the quantity of coal produced in West Virginia. This purpose recommends a structural model that also captures historical information and relationships.

Use of a structural time series model for a short-run forecast and simulation is quite common. Indeed, it is the preferred method for this type of industry specific forecast.[30] However, this model differs from most existing coal models because it projects regional coal production from a supply and demand model. We were unable to identify any similar regional production forecast and simulation model within the economics literature. This study is unique in that

[30] For a more detailed explanation, see Appendix B. For a non-technical discussion of this technique, see Kennedy [1994]. For a technical treatment, see Granger [1989].

respect and offers an important tool for economic and fiscal planning in West Virginia. The model employed in this study incorporates the major supply and demand issues identified in Chapter 3 in order to evaluate the total effect of each on production of coal in the State. The data and variables selected for this estimation are derived primarily from data collected from the *Energy Information Administration* and the *U.S. Department of the Census*.[31] The full model is outlined in a technical form in Appendix B. This appendix describes the mathematical derivation of the model, the data, and the assumptions that were employed in its construction. In general, the model evaluates the quantity of southern West Virginia coal produced as a function of quality, end use demand, price, imports and exports of coal, the price of capital equipment, the price of labor, a technology trend and the county level industry structure (the number and share of surface and underground mines). See Table 4.1.

Table 4.1
Model Variables

Variable	Supply	Demand	Statistical Significance at the 5% level
Btu content	✓	✓	✓
Electricity Demand		✓	✓
Price per Btu unit	✓	✓	✓
Total Imports		✓	✓
Total Exports		✓	✓
Technology Variable	✓		✓
Interest Rate on Capital	✓		✓
Wages Paid to Miners	✓		✓
Underground Share	✓		✓ (for some counties)
Total Surface Mines	✓		✓ (for some counties)
Time Trend (autoregression)	✓	✓	✓ (for some counties)

As intended, this model proved to be especially effective in short run forecasting. In order to test this, we conducted an in-sample evaluation. This was accomplished by calibrating or estimating the model on data from 1980 through 1998, the latest data available at the time (March 2000). The 1999 levels of coal production were then forecast. Upon the release of the official 1999 coal production figures by the *Office of Miner Heath, Safety and Training* in April 2000, the forecast and actual values were compared.[32] The model performed well, under-predicting the 1999 regional totals by only 1.06 percent. This suggests that the model is useful in forecasting short-run regional coal production. Due to the limited data length and the general study motivation, we have not attempted to perform long-run forecast evaluations [33]

[31]EIA data from *Monthly Energy Update*, various issues, Census Data from the *Regional Economic Information System*, 1997.

The satisfactory performance of this model permits the construction of a baseline forecast and two simulations. The baseline forecast illustrates the expected change in output without considering currently pending regulatory changes (primarily the Haden Decision). The two simulations involve evaluating the impacts of a phase-in of the surface mining restrictions contained within the Haden Decision and the simulation of an immediate curtailment of valley fill (effectively ending surface mining). In this context, the baseline forecast should be viewed as the production ceiling, while the restrictive Haden Decision simulation represents the production floor. There were an unlimited choice of potential simulation scenarios available. These were selected to simply provide a reasonable upper and lower bound on production levels to assist in local planning. The actual impact of the Haden Decision, especially in the technical restrictions on valley fill, are well outside the scope of this study. The predictions of each of these three scenarios are employed in a local impact analysis in each of the counties. The impact on the region, and the results of each forecast and simulation, will be outlined in Chapter 5.

4.2 The Baseline Forecast

The baseline forecast involved a shift in the real Btu quality price of West Virginia coal consistent with the previous three year history, and a change in regional exports consistent with the previous three years. All other variables remained unchanged, making the baseline forecast the expected output levels absent regulatory changes or market fluctuations that are not part of recent history. Changes in the *economies of scope* of production from our production function (Appendix C), were added to this forecast model. This resulted in minimal adjustments to the

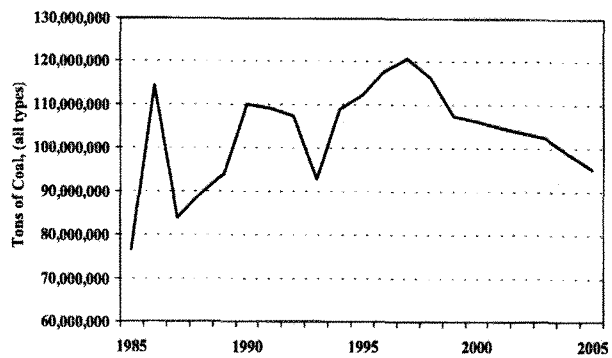
[32]The OMHST data is available on their world wide web site, www.msha.gov. These data were obtained directly from the OMHST, as extracted from their CADE19xx.exe data files. A reliable secondary source is the *West Virginia Coal Association*.

[33]There appears to have been a structural break (a cointegration break) in the early 1980's production trend that presents serious theoretical challenges to forecasting models that incorporate observations prior to that period.

baseline forecast, since the mild change in the total output did not affect the counties' production economies of scope.

The baseline coal forecast for 2000 predicts a regional output decline of just over 7.1 percent, or just under 7.3 million short tons of coal. The direct dollar value of this decline, in coal only, is roughly $170 million. This baseline estimate is very consistent with the 1999 annual production decline of roughly 7.9 percent[34]. See Figure 4.2. The implication of these results is that, even ignoring potential additional restrictions on surface mining, the market forces described in Chapter 3 continue to erode regional coal production.

Figure 4.2
Total Regional Coal Production (Baseline Forecast)



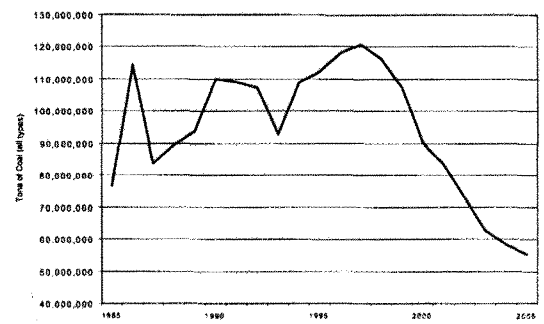
4.3 Phase In of The Haden Decision

An interpretation of the Haden Decision that restricts permitting of *new* valley fill generated our first alternative simulation. Under this scenario, mines that are currently operating, and have engaged in valley fill under permits may continue to produce. However, new mine permits that include valley fill allowances will not be issued. In practice, this virtually precludes further surface mining. There is no indication that, given the current economic climate, surface mining, on a significant scale, can continue without valley fill.

28

As a result, when currently permitted seams are mined to exhaustion and cease operations, surface mining will migrate from the region. This migration should occur at roughly the rate at which firms mine coal seams to the point where they cannot recover their production costs. This would be approximately the average life of a seam of coal under production. This study has not identified existing research establishing the average seam life in southern West Virginia. In order to provide a conservative estimate of this impact, we selected an average seam life of seven years, and assumed that all currently producing seams were newly permitted.[35] We then phased-in the impact of valley fill restrictions over a seven year period. This simulation should closely mirror the impact of mine closings resulting from the currently pending litigation already observed (e.g. the Daltex Mine). This scenario also includes the impact of the *economies of scope* issues on underground mining, whereby decreased surface mining imposes a higher cost on underground mining through its related production technologies (primarily in transport and processing), and hence will impact the level of production. The simulation results generated from the model project an output decline of roughly 16 million tons, with a value of $386 million, see Figure 4.3.

Figure 4.3
Total Regional Coal Production (Haden Decision Phase-In)



[34] Indeed, our county level baseline forecasts were very consistent with the *Beckley-Bluefield Region Outlook: 1999 – 2004* released in May, 2000 by WVU's Bureau of Business and Economic Research. In particular, the high growth in Raleigh, and sluggish growth in McDowell they predict coincided closely with this study's results.
[35] The selection of seven years was made following several unscientific discussions regarding the average life of a seam of coal. We feel the seven year period overestimates the lifespan of a coal seam, especially since we assumed all were originally permitted in 2000.

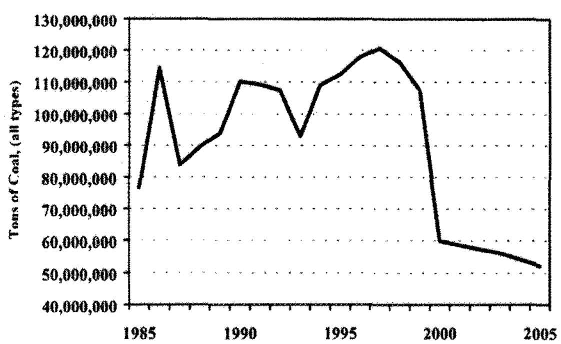
29

4.4 The Restrictive Haden Decision – A More Severe Case

The application of the Haden Decision's interpretation of the *Clean Water Act* is currently under appeal and will likely continue in litigation and/or arbitration for some time to come. The final resolution of mining and permitting practices is unforeseeable. However, to provide a lower bound to production, an extremely restrictive interpretation of the Haden Decision was employed in which all surface mining is forced to immediately cease. Remarkably, this is not the most potentially restrictive interpretation of this decision that could have been used. Here, we only simulate declines in surface mining production. It must be noted, however, that underground mines (and a variety of other types of construction in the region) also deposit spoil into valleys. Therefore, this scenario, though providing the lower bound to regional coal production in this study, is not as restrictive as it might have been.

Forecast estimates based on the restrictive Haden scenario suggest that an immediate cessation of surface mining would result in production declines of 47.5 million tons, with a first-year value of $1.093 billion. See Figure 4.4. This decline reflects not only lost surface production, but also some modest amount of lost underground production due to an inability to capture available economies of scope.

Figure 4.4
Total Regional Coal Production (Restrictive Haden Decision)



4.5 Short Run Price Effects of Reduced Study Region Production

The study region currently supplies roughly 10 percent of the nation's steam coal. If the Haden Decision is upheld, we estimate that as much as 50 percent of that production could be lost in a relatively short time period.[36] Mining industry advocates have suggested that this sudden reduction in coal supplies could lead to significantly higher fuel and electricity prices. Under such a scenario, currently unprofitable underground and (surviving) surface operations could become financially viable for a short period of time, so that study estimates of reduced regional output would be, to some degree, overstated. We do not, however, find this argument compelling and have not treated it with the current analysis. We have exercised this judgement for a number of reasons.

First, the movement from long-term contract to spot markets for coal means that utilities are already accustomed to searching for low-priced coal. Indeed, by the time the Haden Decision is implemented, we strongly suspect that most users of West Virginia coal will have developed contingencies that allow them to move easily to a reasonably competitive alternative market source.[37] This supposition is further strengthened by the fact that air quality standards are already forcing some utilities to begin the shift away from West Virginia coal. Secondly, to the extent that lost *economies of scope* affect underground mining costs, currently marginal underground operations may become far less feasible, even at mine-mouth prices that are made somewhat higher by lost surface production. Finally, given the intensity of competition in fuel and electricity markets, as well as the vast array of alternative fuel sources, it is likely that any variation in coal prices attributable to lost surface production in West Virginia will be very transitory in nature, so that the economic impacts detailed in Chapter 5 might be momentarily delayed, but in no way forestalled.

---

[36]In 1999, the study region produced roughly 120,000,000 tons of the 942,000,000 tons demanded for the generation of electricity. The end use statistics are not disaggregated sufficiently to note final destination of the study region coal. Nationwide, roughly 90 percent of domestic coal is used for power generation. Though the study area production of coking coal is higher proportionately than the national average, the difference does not substantially effect this estimate. Data obtained from EIA, *Freme and Hong, U.S. Coal Supply and Demand: 1999 Review*. Proportions calculated by CBER.

[37]There is evidence that the railroad industry is already contemplating how the Haden Decision will affect the demand for coal transport (see *Traffic World*, November 15, 1999, pg. 19).

4.6 Summary

This chapter presents the non-technical outline of our forecasting and simulation model. The technical model and estimation techniques are provided in Appendix B. The technical exposition of the production function model appears in Appendix C. The baseline forecast and simulations used to drive the economic impact analysis that follows also appear in this chapter. The strong forecast model performance suggests it is an appropriate tool for developing short run predictions, yielding results that provide a solid basis for regional impact analyses.

The inclusion of *economies of scope* within the analysis and the role these economies play in producing accurate forecast results is particularly important. To some, these outcomes may seem counter-intuitive. However, the estimation results clearly demonstrate that any supposition that underground mining will fill the void of curtailed surface mining is incorrect. Quite to the contrary, the empirical analysis suggests that reduced surface volumes will increase the cost of coal mined underground within most study region counties.

Chapter 5 - Total Regional Impact

5.1 The Impact Analysis

The impact of the baseline forecast, the Haden Decision phase-in, and restrictive Haden Decision simulation were performed using the econometric models outlined in Chapter 4, and Appendixes B and C. The reduction in coal production under each scenario was used to generate estimates of industry income declines and these foregone incomes were, in turn, used to predict study region economic impacts. The local impact analysis performed using the IMPLAN simulation software, produced by MIG, Inc. This commercial software employs *Regional Impact Multipliers II* (RIMS II), collected by the *U.S. Bureau of Labor Statistics*. These multipliers quantify the regional flow of goods and services associated with each of the industries and all households in the region. For example, the RIMS II multipliers capture the local goods and services such as engineering services, transport, and fuel used by the coal producers. Similarly, the multipliers capture the coal industry employees' consumer goods purchases. Thus, the displacement of production and the incumbent loss of employee income is included within all calculations, and its impact on the regional economy is tallied by the IMPLAN software. This is the most commonly used and widely accepted method of analyzing local economic impacts. In this study, we present our estimate of the baseline forecast and the two study area simulations. Appendix A outlines the individual county-level impacts. Given that inter-county variations in impacts are sizable, the reader is encouraged to carefully consider these findings.

5.2 The Baseline Forecast

As outlined in Chapter 4, the total regional output decline in the baseline forecast for 2000 resulted in a regional output decline of just over 7.1 percent, or just under 7.3 million short tons of coal. The direct dollar value of this decline, in coal only, will be roughly $170 million in 2000. This baseline estimate is very consistent with the 1999 annual production decline of roughly 7.9 percent. The economic impact of this baseline forecast for year 2000, representing a roughly seven percent *reduction* in output, is illustrated in Table 5.2.

The analysis does not account for the full range of fiscal impacts that might be expected under this scenario. As noted, the loss of commercial activity is likely to spawn changes in both the demand for public services and the tax revenues collected. The (uncertain) rate of demand and revenue changes will affect the fiscal balance of the State and its individual counties. The loss of public employees resulting from a lower demand for school, public safety and administrative services will, in some part, balance the loss of tax revenues. The speed at which this occurs complicates a one year analysis, but does not forestall the final impact. We do anticipate a loss of commercial activity reducing public sector employment by 341 jobs. The direct loss of Severance Taxes to the State is estimated at roughly $8,367,000 under this scenario. Of this amount, we estimate that $6.28 million is the direct county share.

Table 5.2
Baseline Impact

Industry	Employment	Wages	Output
Agriculture	7	$68,180	$124,930
Mining	810	39,902,000	214,544,000
Construction	51	1,766,000	3,821,000
Manufacturing	16	443,700	1,827,000
TCPU	69	2,686,000	9,401,000
Trade	369	6,225,000	14,233,000
FIRE	52	981,400	8,307,000
Services	262	5,951,000	12,066,000
Other	10	78,620	78,630
Total	-1,646	-$58,101,900	-$264,402,560

Note: columns may not sum due to independent rounding. **TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

5.3 The Haden Decision Phase-In

The first alternative simulation estimates the effect of new seam permit stoppage. Based on the methodology outlined in Chapter 4, we estimate this prohibition would result in output reductions of roughly 14 percent annually. The simulation results this model generates project an output decline of roughly 16 million tons, with a first-year value of $386 million. The economic impact of this phased-in simulation for year 2000 is depicted in Table 5.3. The projections only account for first year reductions in coal output. Given no abatement in the production effects of restricted permits, this scenario predicts continuing declines in coal outputs and escalating economic impacts in each subsequent year.

34

Table 5.3
Haden Decision Phase-In Impact

Industry	Employment	Wages	Output
Agriculture	16	$155,000	$294,000
Mining	1,564	78,907,000	493,459,000
Construction	129	4,431,000	10,274,000
Manufacturing	41	1,456,000	7,115,000
TCPU	167	7,019,000	24,091,000
Trade	812	13,830,000	31,915,000
FIRE	140	2,964,000	21,863,000
Services	676	16,240,000	31,146,000
Other	30	226,000	226,000
Total	-3,575	-$125,228,000	-$620,383,000

Note: columns may not sum due to independent rounding. **TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

Under this scenario, we forecast the first-year loss of an additional 922 public sector jobs and a decline in State Severance Tax revenues of roughly $19.24 million, of which $14.43 million is the direct county share.

5.4 The Restrictive Haden Decision

The third simulation generated within this analysis is based on a scenario where all surface mining is immediately eliminated by Judge Haden's interpretation of the *Clean Water Act*. In this scenario, the loss of surface mining is compounded by a decline in underground mining in selected counties. Here, we estimate the restrictive Haden Decision will result in a coal production decline of 47.5 million tons, with a value of $1.093 billion. The economic impact of this phase-in simulation for year 2000 is outlined in Table 5.4. These figures reflect a dramatic, rapid loss in employment, wages, and output across the region.

35

Table 5.4
Restrictive Haden Decision Impact

Industry	Employment	Wages	Output
Agriculture	43	$182,021	$781,000
Mining	5,091	202,482,163	1,407,626,000
Construction	376	7,152,149	28,283,000
Manufacturing	115	1,606,054	19,796,000
TCPU	467	13,105,143	68,155,000
Trade	2,174	25,707,644	85,320,000
FIRE	388	4,257,164	60,982,000
Services	1,889	26,059,724	86,911,702
Other	89	429,026	7,539,000
Total	-10,632	-$280,981,088	-$1,765,393,702

***Note: columns may not sum due to independent rounding*. TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

The third scenario offers the most dramatic commercial impact. Here, we anticipate the loss of an additional 2,612 public sector employees. Likewise, the expected State Severance Tax collections are forecasted to decline by roughly $54.89 million, of which $41.17 million comprise the counties' direct share.

Chapter 6 - Concluding Remarks

The preceding analysis yields a number of very important conclusions for West Virginia policy-makers. First, even if the Haden decision is not upheld, the near-term economic future of the State's southern coal producing region is unsure. Changes in both domestic and international markets for fuel owing to electric utility restructuring, stricter clean air standards, and increased international competition will almost certainly continue to place downward pressures on the price of West Virginia coal. These pressures are likely to result in lower output quantities and may ultimately lead some producers to exit the region. If the baseline forecast presented in Chapter 4 is correct, planners may encounter a 7 percent reduction in coal-related employment within the study region over the coming year. This reduction will, in turn, lead to a $58 million reduction in regional incomes and a $264 million reduction in overall regional economic activity. Outcomes in subsequent years are similar.

If the Haden decision is upheld, regional production will be further reduced. The actual magnitude and intertemporal course of these reductions is very difficult to predict. The foregoing analysis considers two scenarios that are both within the realm of reason. In the first of these scenarios, surface mining is gradually reduced, as currently permitted mines are retired and no new surface permits are granted. Even under this restricted scenario, the economic effects on the counties that comprise the study region are likely to be devastating. Total regional employment is predicted to decline by 4.3 percent, while overall regional economic activity is predicted to decline by $620 million within the first year. The economic impacts observed under the extreme scenario, in which the Haden decision leads to the immediate curtailment of surface mining, are even more extreme. A sudden cessation in surface mining is predicted to cost the study region more than 10,500 jobs, $281 million in incomes, and $1.8 billion in total economic activity.

Clearly, even the economic disruptions predicted under the baseline scenario are likely to demand policy responses on the part of both the State and local governments. In the very near term, reduced production, combined with falling prices, will diminish State Severance Tax collections. Indeed, current estimates suggest that severance tax collections are already falling at a rate that may approach 13 percent for the current fiscal year.[38] Likewise, the predicted reduction in coal production will likely lead to a reduction in a number of other State funding sources including, but not limited to, corporate net income tax collections, business franchise tax collections, personal income tax collections, and revenues from the collection of State sales taxes. To the extent that additional restrictions on surface mining methods further reduce regional coal production, the near-term strains on State revenue sources will be even more pronounced. Moreover, if the short-run trends predicted under the three scenarios considered here continue over even a few years, property values within the study region are likely to be negatively affected, so that local governments' ability to generate funds through property taxes will also be constrained.

Just as State policy-makers are likely to face declines in coal-related revenues, the short-run demand for State services is likely to increase. Almost certainly, a sustained decline in coal production will lead to the out-migration of study region residents, but this exodus is likely to occur with a lag as regional residents attempt to weather declining economic conditions before exiting the region. Thus, State and local governments may expect increased claims for unemployment benefits, Medicaid benefits, and other forms of public assistance. The magnitude of the short-run increase in the demand for governmental services will directly reflect the degree to which coal-related economic activity is reduced. Even if reduced coal production does ultimately reduce the demand for government-provided services by reducing local populations, reacting to these reduced demands may present a number of challenges to policy-makers. Absent the current population base, it may be necessary to further consolidate the provision of educational, social, law enforcement, and medical services. Such consolidations are rarely accomplished with ease.

The reader is urged to recall the short-run nature of the current analysis. The very near-term vantage adopted here largely obscures two points that are routine issues within more comprehensive discussions of the link between coal production and the economic viability of the study region. First, many may argue that the rather dire economic predictions proffered here fail to consider the potential replacement of coal-related economic activity with alternative

[38] Because the State's severance tax is levied against gross receipts, the effect of reduced production on collected revenues is compounded by the impact of falling regional coal prices. The 13 percent figure is based on information obtained through the West Virginia Department of Tax and Revenue.

commerce. This is, in fact, true. Countless State and regional employees and policy-makers quietly and tirelessly endeavor to bring new non-coal economic activity to the study region and, at least in some study region counties, these efforts are yielding some successes. The growth of tourism in Fayette and Raleigh Counties described in Chapter 2, is a poignant example. Still, the task of bringing a vibrant, broad-based economy to a region that faces so many challenges cannot be accomplished with great speed. Thus, while current development efforts may eventually yield tangible and laudable results, it is our judgement that these efforts will provide little shelter for the region's current residents.

The second argument that is routinely encountered during discussions of the coal industry suggests that the more stringent regulation of surface mining activities will only hasten what is likely to be the same long-run outcome. It is argued that the increased competition in fuel markets documented here, when combined with the steady reduction in economically mineable reserves, points to a "West Virginia without coal" under any circumstance. We have neither the desire, nor the ability, to refute such claims. There are, however, two associated points that deserve equal treatment.

First, dramatic swings in the prosperity of coal producers and coal producing communities are more the exception than the rule. One need only contrast the almost manic coal production of the 1970's with the industries slump during the 1980's to understand this point. Thus, to pin predictions of significant long-run reductions in coal production on currently observable economic circumstances is, at best, perilous. Easily conceivable events, such as prolonged disruptions in international petroleum or coal production or the development of more efficient coal gassification processes, could, once again, renew the importance of West Virginia's coal reserves within domestic and international fuel markets.

Perhaps more importantly, even if all roads do lead to permanent and diminished role of coal production within the West Virginia economy, some roads are likely to be much bumpier than others. Given that our principal concern is the short-run economic consequences of various policies on the coal producing counties in the study region, we must conclude that a more gradual transition away from a coal-centered economy would be far less disruptive than a rapidly accelerated cessation in production.

In conclusion, the evidence developed within the current study implies that the coal producing region of West Virginia is likely to face significant challenges over the coming few years – challenges that will severely tax the energy and tenacity of the region's inhabitants, as well as the wisdom and resourcefulness of its leaders. However, there is nothing within these results that indicates helplessness. To the contrary, the variations in the predicted outcomes across populations, commercial sectors, and policy alternatives suggests that there are good choices to be made and bad choices to be avoided. This realization, in turn, obligates each of us to continue to investigate, discuss, and search for the most productive policy course.

Joint Statement Of

MARK L. BURTON*

And

MICHAEL J. HICKS**

Center for Business and Economic Research
Marshall University***
Huntington, West Virginia

June 6, 2002

---

1. Introduction

In 1999, Charles Haden, Federal District Judge for southern West Virginia entered a decision that would have substantially limited the placement of valley fills in connection with surface coal mining within the State.[1] At that time, surface operations accounted for roughly 30 percent of West Virginia's total coal production. Consequently, economic concerns prompted numerous policy discussions in a variety of venues, including the State's legislature.

In March of 2000, West Virginia State Senator Oshel Craigo requested that Marshall University's Center for Business and Economic Research (CBER) undertake an investigation designed to identify the probable economic impacts of Judge Haden's decision on West Virginia's southern coal producing counties. The resulting analysis, titled *Coal Production Forecasts and Economic Simulations in Southern West Virginia: A Special Report to the West Virginia Finance Committee*, was released in June of 2000 and is included here as attachment A. This study found that, depending on the form of judicial implementation, the Haden decision could reduce economic activity within the nine-county study region by as much as eight percent in the immediate future.

---

* Dr. Burton is Director of the Center for Business and Economic Research at Marshall University in Huntington, West Virginia. His curriculum vita is provided here as Attachment C.

** Dr. Hicks is Director of Research at the Center for Business and Economic Research at Marshall University in Huntington, West Virginia. His curriculum vita is provided here as Attachment D.

*** The positions and opinions expressed in this statement are strictly those of its authors and do not necessarily reflect the positions or opinions of the Lewis College of Business, Marshall University, or the State of West Virginia.

[1] We are not attorneys and, therefore, are completely unqualified to comment on the legal appropriateness of Judge Haden's decision..

The June 2000 CBER report sparked immediate concerns regarding potential fiscal outcomes related to reduced coal production. Consequently, the West Virginia Legislature commissioned a second CBER study designed to estimate more comprehensive State-wide economic impacts of reduced surface mining, as well as associated fiscal outcomes. This second report titled, *The Fiscal Implications of Judicially Imposed Surface Mining Restrictions in West Virginia*, was released in February of 2001 (Included here as Attachment B). The study found that annual State tax revenues would decline by as much as $168 million under a scenario in which Judge Haden's decision was phased in over a seven year period. County tax collections would have fallen by $83 million annually under the same scenario.[2]

While Judge Haden's original decision was overturned by the US Fourth Circuit, his subsequent rulings in other litigation have, again, threatened to restrict the use of valley fills in connection with surface coal mining. Consequently, policy-makers are likely to revisit questions surrounding the economic and fiscal effects of potential reductions in West Virginia coal production. Within this context, the purpose of our current statement is threefold. First, we wish to review our earlier analyses, highlighting salient points regarding both methodology and outcomes. Second, we hope to summarize both the nature and magnitude of economic and demographic changes that may distinguish the current setting from the period in which the earlier analyses were conducted. Finally, to the extent possible we will attempt to assess the degree to which the earlier results remain valid.

2. *Summary of Earlier Methods and Findings*

The Analytical process was comprised of four distinct steps. The first step involved creating baseline coal production forecasts and translating Judge Haden's ruling into probable coal production impacts.[3] We accomplished the latter task through repeated and prolonged consultation with officials from West Virginia's Department of Environmental Protection (DEP), mining engineers from Marshall University's College of College of Information Technology and Engineering, and officials from the US Office of Surface mining (OSM). Ultimately, we elected to pursue a scenario in which DEP would issue no new permits for surface mine sites, but under which existing surface mines could continue to operate so long as valid permits remain in force.[4]

The second analytical step involved empirically relating surface mining to underground operations. In doing so we established that surface and underground mining exhibit what economists refer to as *economies of scope*. That is to say, underground operating costs are made

[2] Importantly, coal related State and County revenues also fell under the baseline scenario. This reflects moderate (13%) declines in State-wide coal production even in the absence of Judge Haden's decision.

[3] CBER estimated county-specific baseline forecasts. In the aggregate, however, our State-level production forecasts were nearly identical to those produced by Regional Economic Models, Inc. (REMI).

[4] This treatment suggests that the prohibition on valley fills in perennial and intermittent stream beds would ultimately eliminate opportunities for surface mining. Detractors argued that this approach was too extreme. However, evidence suggests that any remaining surface production would be minimal.

2.

lower by the presence of surface mining. Thus, the elimination of surface operations would make a small percentage of the State's underground operations unprofitable.

Next, we translated policy-related reductions in coal production into county-specific economic impacts through the use of regional simulation software.[5] Finally, estimated fiscal impacts were derived from the projected economic impacts based on methods developed in earlier CBER studies.[6]

Estimated State-wide economic and fiscal impacts of a phased-in elimination of surface mining in West Virginia at year five are summarized in Table 1. County-specific impacts are provided in the original study documents. Forecast reductions in coal production under the

Table 1
Summary of Earlier Findings

Impact Area	*Annual Policy-Induced Differential*	*Percentage of State Total*[7]
Change in Coal Production (tons)	-41,100,000	24.29%
Chang in Employment (All Sectors)	-15,579	2.86%
Change in Labor Income (All Sectors)	-$689,100,000	5.40%
Change in Output (All Sectors)	-$2,460,000,000	4.10%
Coal Severance Tax Revenues	-59,921,000	30.63%
Property Tax Revenues (All Sources)	-59,107,000	n/a
Sales and Use Tax Revenues	-19,985,000	2.34%
Personal Income Tax Revenues	-20,191,000	2.53%
Corporate Net Income Tax Revenues	-5,513,000	3.43%
Business Franchise Tax	-3,651,000	4.03%
Total - All State Taxes	**-168,368,000**	n/a
School Funding Impacts	-21,800,000	n/a
Other County-Level Impacts	-60,800,000	n/a
Total County-Level Revenue Impacts	**-82,600,000**	n/a

[5] County-level impacts were generated through the use of IMPLAN, a software product produced by MIG, Inc., Stillwater, Minnesota.

[6] See *The Projected Economic Impacts of the Governor's Fair Tax Plan: Revised Preliminary Estimates*, West Virginia Department of Tax and Revenue / Center for Business and Economic Research, January, 1999.

[7] Coal production, employment and income totals are based on year 2000 values. Tax revenue percentages are based on 1997 tax collections.

3.

baseline conditions suggest that increased domestic and international competition, in conjunction with increasingly strict air quality standards will continue to erode West Virginia's share in many fuel markets. However, increased restrictions on surface mining methods could bring about considerable economic and fiscal hardship for the State. The $2.5 billion projected decline in output represents a roughly four percent reduction in State-wide economic activity.

While the potential State-wide economic impacts are significant, the possible disruptions in coal-dependent counties are far more severe. For example, the 1,061 projected reduction in jobs associated with reduced mining activity in Boone County, represents 12.5 percent of that county's civilian labor force. County-specific fiscal impacts may also be extreme. Many poorer coal producing counties rely heavily on Severance Tax revenues as a source of operating funds.[8] As Table 1 indicates, reductions in property tax revenues would also make it more difficult for all West Virginia counties to fund public school operations.[9] To the extent that county governments might find it difficult to provide even the most basic public services, they would almost certainly expect State assistance regardless of whether or not the necessary State funds are available.

3. Misconceptions Regarding the Production of and Markets for Coal

One common hypothesis in the face of potential reductions in surface coal production is that mining firms will replace lost tonnage with additional coal mined underground. We find this outcome extraordinarily unlikely. First, if additional quantities of underground coal could be mined profitably given current market conditions, mining companies would be doing so. Thus, if mining companies are to replace lost surface quantities with underground coal, one of two things must occur. Either the cost of mining underground coal must go down as surface mining disappears or the mine-mouth price of underground coal must increase as surface coal production is eliminated.

That underground production costs would decline as surface operations are eliminated is virtually impossible. As the June 2000 CBER report describes (p. 21), the evidence is that *economies of scope* exist between underground and surface operations. Thus, eliminating surface operations would cause underground production costs to go up not down.

The second scenario in which underground production increases as surface production declines is one in which the mine-mouth price of underground coal is greater than what is currently observed. Again, this is highly unlikely. The long-run trend in real coal prices is unmistakably downward. Moreover West Virginia's annual surface production of roughly 36 million tons is less than four percent of the total US production, so that it is unlikely that the

[8] As Table 1 indicates, the State's Severance Tax is a State tax. However, 75 percent of Severance Tax revenues are eventually returned to the county in which they were generated.

[9] While property taxes are levied at the county level, they are redistributed by the State based on an enrollment-based funding formula. Thus, if property tax collections diminish in coal producing counties, it will affect the financial viability of the education system in every West Virginia county.

withdrawal of that coal from the supply-side of US-served markets will lead to any abatement in the long-run price trend.[10]

4. Coal and the West Virginia Economy since 1999

The two CBER studies summarized in Section 2 were based on economic and coal industry data through 1999. One of the primary tasks we presently face is the identification of any structural changes that may call into doubt the current validity of results based on less than current data.

Nationally, there have been a number of important occurrences between 1999 and the present. A decade-long economic expansion gave way to a modest recession. Petroleum and national gas prices spiked during the first half of 2001, and painful experiences in California slowed the national trend toward electric utility restructuring.[11]

Taking each of these occurrences in turn, the national economic slowdown has had a relatively benign impact on the West Virginia. During the rapid expansion of the 1990's, West Virginia saw only very modest economic growth. However, as the national economy has cooled, employment, incomes, and output in West Virginia have continued to grow at very moderate rates. This pattern has been reflected in similarly tepid, but positive growth rates for State tax revenues which are expected to increase again during the current fiscal year by three to four percent. The rapid increase in petroleum and natural gas prices during 2001 had a predictable effect on the mine-mouth price of coal sold in spot markets. For a brief period, spot market coal prices were nearly double the $23 per ton value that had been relatively constant over the past few years. However, just as spot market coal prices tracked upward moving petroleum prices, coal prices have followed other fuel prices downward as they approach sustainable long-run levels.[12] Finally, events in California have noticeably slowed the national trend toward electric utility restructuring. This trend was largely viewed as favoring natural gas as a generating fuel source.[13] Thus, the demand for coal has been steadier than might have, otherwise, been

[10] It is also unlikely that even short-run price increase would lead to increased underground production. In 2001, when spot market prices nearly doubled, underground production increased by only one percent. Coal producers simply will not undertake the investment necessary to respond to transient price increases in any sort of meaningful way.

[11] In addition to the occurrences noted in the main body of the text, we also considered whether or not mining in West Virginia had been effected by the US decision not to sign the Kyoto Protocol, litigation by eastern states aimed at lowering midwestern emissions, and the scheduled increase in NOX standards scheduled under the 1990 amendments to the Clean Air Act. We could, however, identify no immediate impacts.

[12] Part of the strength in State revenue collects is attributable to the swell in Severance Tax collects resulting from higher coal prices. This burst in revenues as crested and the stream Severance Tax payments is returning to more typical levels.

[13] See *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, US Department of Energy, Energy Information Administration, Washington, DC, September, 1998.

predicted. Nonetheless, in West Virginia, both of the two new generating projects currently in the planning stages are gas fired.

Coal production and employment values are provided in Table 2. The period between 1999 and the present generally consistent with already observed trends in which overall production is relatively stable in the range of 175 million tons a year, surface mining's share of total output is increasing, and mining industry employment is on the decline. Additionally, in all but one year the absolute magnitude of underground coal mined in West Virginia has declined.

Table 2
Coal Production and Employment

Year	*Mining Employment*	*Surface Share of Total Production*	*Total Production (Tons)*
1996	20,038	31.57%	174,008,217
1997	17,806	31.18%	181,914,000
1998	18,201	30.31%	180,794,012
1999	14,854	32.57%	169,206,834
2000	14,254	35.41%	169,370,602
2001	15,729	36.82%	175,052,857

Generally, in the southern West Virginia counties where most of the State's coal is mined, economic conditions were abysmal in 1999 and they are more so today.[14] Table 3 compares incomes in the nine southern coal field counties to State and national averages. This is only one measure of the extreme economic distress evident within these counties. As economic theory would suggest the paucity of economic opportunities in this region has induced a reluctant out-migration of many of the region's inhabitants. Newly released 2000 census figures indicate that, overall, the region's population declined by 6.5% between 1990 and 2000. In the last two years, the economic conditions within the region have been made worse by extensive flooding that destroyed many rural communities in both June of 2001 and April of 2002.

In summary, coal production within West Virginia between 1999 and the present has been bolstered to some small extent by the spike in petroleum and natural gas prices and by a slowing in the trend toward electric utility restructuring. These two factors contributed to the observed largely constant levels of production (as opposed the very modest predicted decline). Coal producers continue to improve productivity and the surface share of total coal production continues to increase. The West Virginia economy, while not sharing in the boom of the 1990's,

[14] In truth, the southern coal field region is not as homogeneous as it appears. In particular, the eastern counties of Raleigh, Fayette, and Nicholas exhibit less economic distress largely due to the growing presence of tourism activities. Also, as noted, Kanawha County is home to Charleston, the State capitol. Conversely, Boone, Logan, McDowell, Mingo, and Wyoming couties are in desperate economic condition.

Table 3
Incomes in Southern Coal Producing Counties

County	*Annual Household Income*	*Deviation from State Average*	*Deviation from National Average*
Boone*	26,808	-624	-10,197
FayetteI	23,528	-3,904	-13,477
Kanawha	32,456	5,024	-4,549
Logan*	24,600	-2,832	-12,405
McDowell*	18,582	-8,850	-18,423
Mingo*	24,642	-2,790	-12,363
Nicholas*	25,872	-1,560	-11,133
Raleigh*	27,864	432	-9,141
Wyoming*	23,994	-3,438	-13,011

*** Indicates the county has been identified as "Distressed" by the Appalachian Regional Commission**

has remained largely insolated from the recent economic downturn, instead exhibiting a barely perceptible, but positive level of growth. Meanwhile, economic conditions within the State's coal producing region continue to deteriorate measurably. All told, conditions in 2002 differ little from those observe in 1999. Thus, the current reference to the earlier CBER analyses seems entirely prudent.

5. The Effect of the Recent Haden Decision

The economic and fiscal effects of the recent judicial decision prohibiting the placement of valley fills is entirely dependent on how this decision is interpreted and implemented. If, as West Virginia's Department of Environmental Protection (DEP) suggests, the prohibition only is applicable to fills that do not have functions in post-mine use plans, then the economic impacts will likely be less than those predicted by the earlier CBER studies. The current DEP interpretation is certainly different from Department's assessment in 2000 when we were conducting the initial analyses. Alternatively, if Judge Haden's ruling, in fact, prohibits all future valley fills in perennial and intermittent streams, it will effectively end surface mining in West Virginia, so that the earlier CBER predictions will again be valid. Finally, if the same standards are applied the fills used to create prep plant impoundments, underground mining will also be significantly effected and the CBER analyses contains predictions of economic and fiscal outcomes that are probably too optimistic.[15] Without knowing more about the form and extent of the decision's implementation, we simply cannot judge which scenario is the most likely.

[15] CBER's 2000 and 2001 analyses were harshly criticized by coal producers because we did not include the potential impacts of restricting the valley fills associated with underground mining. However, our decision to exclude these potential impacts was based on the fact that there had been no legal attempt to apply the same standard to prep plant impoundments.

It is important to realize that Judge Haden's decisions are probably already impacting the West Virginia economy. As our June 2000 report (pp. 22-23) explains, the tremendous uncertainty created by current circumstances is not without effect. Both surface and underground mines are productive assets with lives that are often measured in decades. Coal producers are understandably hesitant to make such investments when there is a question of whether or not regulatory restrictions will prohibit these assets' use. Even if producers could be induced to make new investments, the uncertainty would increase the necessary return, leading in turn, to higher production costs – an outcome that is really not tenable given the highly competitive nature of fuel markets. While we have engaged in no formal assessment of mining investment, there is certainly ample anecdotal evidence to support the suggestion that regulatory uncertainty has dampened mining industry investment in West Virginia.

6. Summary Remarks

The extreme emotion that surrounds the policy debate over mining practices has lead to a number of equally extreme statements that are not supportable by fact. For example, some have claimed that prohibitions that end surface mining will actually help the economies of West Virginia's coal field counties by opening them for increased tourist-related commerce. This, we believe, is absurd. In those areas of the region where tourist activities are present and growing, mining and tourism seem to coexist with little difficulty.[16] In the remainder of the region there is little or nothing to attract tourists, so that the point is moot. On the other extreme, some have claimed that prohibitions that end surface mining in West Virginia would create a national energy crisis by leading to markedly higher coal prices. Again, surface production in the State accounts for less than four percent of domestic production. The loss of this tonnage over multi-year period would be entirely unremarkable as far as fuel markets are concerned. Even if Judge Haden's decision is extended to surface mining operations in Kentucky and Virginia, our conclusion remains the same – the impact of the decision is a substantial local and regional issue it is not a national issue. The ruling likely does not have national implications, so long as it does not effect the industry's ability to place fills in association with underground mining operations.[17]

The West Virginia economy is still dependent on coal as a major source of commercial activity. The loss of surface coal production would create State-wide economic hardships at a time when there is very little surplus available to remedy new distress. Moreover, the impacts on individual coal-producing counties could be extreme. There is no chance that underground production will increase to offset the loss of surface production and there are virtually no alternative commercial opportunities. Many of the region's counties are places where few people lived before mining and where only a relatively few people will live if mining ceases. This is not conjecture. One need only look at the breathtaking correlation between mining employment and population that is evident over the past century.

[16] For a discussion of tourism growth in Fayette, and Raleigh County, West Virginia, see *Feasibility Study for the Thurmond, Glen Jean & Great New River Railroad*, Center for Business and Economic Research, Marshall University, February 2000.

[17] Total surface production in eastern Kentucky, Virginia, and West Virginia accounts for just over 11 percent of total cost production in the US. Combined surface and underground production from these states represents roughly 30 percent of the US total.

Our earlier studies address only the economic and fiscal impacts of further restrictions on surface mining activities and we stand firm in our belief that our assessment was and is valid. There are, however, other economic issues that have gone largely unexplored. Almost certainly mining generates environmental and other social impacts that should rightfully be measured and included in a comprehensive accounting of the benefits and costs associated with mining activities.[18] Only a thorough and balanced review of *all* economic outcomes can provide policy-makers with the information they need to make appropriate decisions for West Virginia. We hope such analyses will be forthcoming.

Respectfully submitted June 6, 2002,

Mark L. Burton Michael J. Hicks

[18] While the general public perception is that these social or "external" impacts are negative. This is not always the case. There are certainly instances in which post-mine-use planning has been combined with more general land-use planning to create new economic and recreational opportunities.

Draft

Aquatic Life Water Quality Criteria for

Selenium

2002

Prepared by

Great Lakes Environmental Center
Traverse City, Michigan 49686

Prepared for
U.S. Environmental Protection Agency
Office of Water
Office of Science and Technology
Washington, D.C.

EPA Contract No. 68-C6-0036
Work Assignment No. 3-34

March 2002 Draft

Aquatic Life Water Quality Criteria for

Selenium

2002

February 2002

U.S. Environmental Protection Agency
Office of Water
Office of Science And Technology
Washington, D.C.

March 2002 Draft

NOTICES

This document has been reviewed by the Health and Ecological Effects Criteria Division, Office of Science and Technology, U.S. Environmental Protection Agency, and approved for publication.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

This document can be downloaded from:
http://www.epa.gov/waterscience/standards/

Questions or comments may be directed to Charles Delos, U.S. EPA, delos.charles@epa.gov

ACKNOWLEDGMENTS

Dennis O. McIntyre
Tyler K. Linton
William H. Clement
Gregory J. Smith
Manoel Pacheco
Great Lakes Environmental Center
Columbus, Ohio

Larry T. Brooke
University of Wisconsin-Superior
Superior, Wisconsin

Charles Delos
(document coordinator)
USEPA
Health and Ecological Effects Criteria Division
Washington, D.C.

Table of Contents

List of Tables

List of Figures

Introduction

This document provides guidance to States and Tribes authorized to establish water quality standards under the Clean Water Act (CWA) to protect aquatic life from toxic effects of selenium. Under the CWA, States and Tribes are to establish water quality standards to protect designated uses. While this document constitutes the U.S. Environmental Protection Agency's (U.S. EPA) scientific recommendations regarding ambient concentrations of selenium, this document does not substitute for the CWA or U.S. EPA's regulations; nor is it a regulation itself. Thus, it cannot impose legally binding requirements on the U.S. EPA, States, Tribes or the regulated community, and might not apply to a particular situation based upon the circumstances. Interested parties are free to raise questions and objections about the substance of this guidance and the appropriateness of the application of this guidance to a particular situation. State and Tribal decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance when appropriate. The U.S. EPA may change this guidance in the future.

For selenium this document establishes water quality criteria for protection of aquatic life. Under Section 304(a) of the CWA, U.S. EPA is to periodically revise water quality criteria to accurately reflect the latest scientific knowledge. Toward this end, a U.S. EPA-sponsored Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation on May 27-28, 1998 brought together experts in selenium research to discuss issues related to the chronic criterion for selenium. As a result of findings from the workshop and the fact that a substantial body of literature on the chronic toxicity of selenium has accumulated since the 1987 document was published, U.S. EPA has decided to update the acute and chronic criteria for selenium.

The criteria presented herein supersede all previous national aquatic life water quality criteria for selenium (U.S. EPA 1976, 1980a, 1987a, 1995).

Chemical and Physical Properties

Water quality criteria are being derived for total selenium measured as selenite-Se plus selenate-Se, but a variety of forms of selenium can occur in water and tissue. Three oxidation states (selenide = II, selenite = IV, and selenate = VI) can exist simultaneously in aerobic surface water at pH = 6.5 to 9.0. In natural surface waters, inorganic selenite and selenate dominate and exist primarily in the dissolved state. A fourth oxidation state (elemental = 0) exists in sediment, but is insoluble in water. In laboratory studies, Tokunaga et al. (1997) observed the reduction of Se(VI) in the water column to Se(0) in the sediments.

Thompson-Eagle and Frankenberger (1990) observed the volatilization of selenium from pond water. Chemical conversion from one oxidation state to another often proceeds at such a slow rate in aerobic surface water that thermodynamic considerations do not determine the relative concentrations of the oxidation states. Thus, although selenium(VI) is thermodynamically favored in oxygenated alkaline water, substantial concentrations of both selenium(II) and selenium(IV) are not uncommon (U.S. EPA 1987a).

In living organisms, selenides can also exist as organic molecules. Inorganic forms of selenium are converted by plants to L-selenomethionine, several free amino acids and volatile organoselenium compounds. Organisms can also oxidize elemental selenium to selenium(IV) (U.S. EPA 1987a), reduce selenium(VI) to selenium(IV) (Fujita et al. 1997; Losi and Frankenberger 1997; USEPA 1987a), produce gaseous dimethyl selenide and dimethyl diselenide (U.S. EPA 1987a), volatilize selenium (Azaizeh et al. 1997; Zhang and Moore 1996), methylate selenium (microbial methylation) to volatile $(CH_3)_2Se$ (Flury et al. 1997), and reduce selenium(IV) and selenium(VI) to selenium (II) and incorporate it into amino acids and proteins, such as selenomethionine (Gao and Tanji 1995; Hu et al. 1996; Oyamada et al. 1991; U.S. EPA 1987a). A substantial portion of selenium in surface waters may exist in organoselenium forms or complexes.

Sources of Selenium to Aquatic Systems

Selenium occurs in many soil types and enters ground and surface waters through natural weathering process such as erosion, leaching and runoff. The national average concentration of selenium in uncontaminated surface waters ranges from 0.1 to 0.4 µg Se/L (Maier and Knight 1993). Elevated levels of selenium occur in surface waters when substantial quantities of selenium enter surface waters from both natural and anthropogenic sources. It is abundant in the drier soils of North America from the Great Plains to the Pacific Ocean. Some ground waters in California, Colorado, Kansas, Oklahoma, South Dakota and Wyoming contain elevated concentrations of selenium due to weathering of and leaching from rocks and soils. Ecological impacts have been observed where selenium is concentrated through irrigation practices in areas with seleniferous soils. Selenium also occurs in sulfide deposits of copper, lead, mercury, silver and zinc and can be released during the mining and smelting of these ores. In addition, selenium occurs in high concentrations in coal and fuel oil and is emitted in flue gas and in fly ash during combustion. Some selenium then enters surface waters in drainage from fly-ash ponds and in runoff from fly-ash deposits on land. Notable examples of systems that have been affected by selenium originating from coal ash include Belews Lake, North Carolina where 16 of the 20 species originally present were eliminated within a few years after discharge began, and Hyco Reservoir, North Carolina where selenium toxicity was associated with fish larval mortality (Gillespie and Baumann 1986).

Narrow Margin Between Sufficiency and Toxicity

Of all the priority and non-priority pollutants, selenium has the narrowest range of what is beneficial for biota and what is detrimental. Selenium is an essential element required as a mineral cofactor in the manufacture of glutathione peroxidase, an anti-oxidant enzyme that neutralizes the damaging (oxidizing) hydrogen peroxide. Aquatic and terrestrial organisms require 0.5 µg/g dry weight (dw) of selenium in their diet to sustain metabolic processes, whereas concentrations of selenium that are only an order of magnitude greater than the required level have been shown to be toxic to fish. Selenium deficiency has been found to affect humans (U.S. EPA 1987a), sheep and cattle (U.S. EPA 1987a), deer (Oliver et al. 1990) fish (Thorarinsson et al. 1994; Wang and Lovell 1997; Wilson et al. 1997; U.S. EPA 1987a), aquatic invertebrates (Audas et al. 1995; Caffrey 1989; Cooney et al. 1992; Cowgill 1987; Cowgill and Milazzo 1989; Elendt 1990; Elendt and Bais 1990; Harrison et al. 1988; Hyne et al. 1993; Keating and Caffrey 1989; Larsen and Bjerregaard 1995; Lim and Akiyama 1995; Lindstrom 1991; U.S. EPA 1987a; Winner 1989; Winner and Whitford 1987), and algae (Doucette et al. 1987; Keller et al. 1987; Price 1987; Price et al. 1987; Thompson and Hosja 1996; U.S. EPA 1987a; Wehr and Brown 1985).

Selenium has been shown to mitigate the toxic effects of arsenic, cadmium, copper, inorganic and organic mercury, silver, ofloxacin, methyl parathion and the herbicide paraquat to biota in both aquatic and terrestrial environments (Bjerregaard 1988a, b; Cuvin and Furness 1988; Ding et al. 1988; Krizkova et al. 1996; Malarvizhi and Usharani 1994; Micallef and Tyler 1987; Patel et al. 1988; Paulsson and Lundbergh 1991; Pelletier 1986b, 1988; Phillips et al. 1987; Ramakrishna et al. 1988; Rouleau et al. 1992; Salte et al. 1988; Siegel et al. 1991; Szilagyi et al. 1993; U.S. EPA 1987a). Selenium pretreatment resulted in reduced effects in 128-hr old, but not 6-hr old, embryos of *Oryzias latipes* from cadmium and mercury, whereas prior exposure to selenium did not affect the sensitivity of white suckers to cadmium (U.S. EPA 1987a). In contrast, Birge et al. and Huckabee and Griffith reported that selenium and mercury acted synergistically in producing toxic effects to fish embryos (U.S. EPA 1987a). Selenium is reported to reduce the uptake of mercury by some aquatic species (Southworth et al. 1994; U.S. EPA 1987a), to have no effect on uptake of mercury by a mussel, and to increase the uptake of mercury by mammals and some fish (U.S. EPA 1987a). Selenium augmented accumulation of cadmium in some tissues of the shore crab, *Carcinus maenas* (U.S. EPA 1987a). The available data do not show whether

the various inorganic and organic compounds and oxidation states of selenium are equally effective sources of selenium as a trace nutrient, or as reducing the toxic effects of various pollutants.

Selenium Document Information

All concentrations reported herein are expressed as selenium, not as the chemical tested. Although Se(VI) is expected to be the predominant oxidation state at chemical equilibrium in oxygenated alkaline waters, the rate of conversion of Se(IV) to Se(VI) seems to be slow in most natural waters. Therefore, it was assumed that when Se(IV) was introduced into stock or test solutions, it would persist as the predominate state throughout the test, even if no analyses specific for the Se(IV) oxidation state were performed. Similarly, it was assumed that when Se(VI) was introduced into stock or test solutions, it would persist as the predominant state throughout the test, even if no analyses specific for Se(VI) were performed.

An understanding of the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (Stephan et al. 1985), hereinafter referred to as the Guidelines, and the response to public comments (U.S. EPA 1985a) is helpful for understanding the derivation of the acute criteria for selenium. Briefly, the Guidelines procedure involves the following steps: (1) Acute toxicity test data is gathered from all suitably conducted studies. Data are to be available for species in a minimum of eight families representing a diverse assemblage of taxa. (2) The Final Acute Value (FAV) is derived by extrapolation or interpolation to a hypothetical genus more sensitive than 95 percent of a diverse assemblage of taxa. The FAV, which represents an LC_{50} or EC_{50}, is divided by two in order to obtain an acute criterion protective of nearly all individuals in such a genus. (3) Chronic toxicity test data (longer-term survival, growth, or reproduction) are needed for at least three taxa. Most often the chronic criterion is set by determining an appropriate acute-chronic ratio (the ratio of acutely toxic concentrations to the chronically toxic concentrations) and applying that ratio to the FAV from the previous step. (4) When necessary, the acute and/or chronic criterion may be lowered to protect critically important species.

The chronic criteria procedure explicitly set forth in the Guidelines (Step 3 above) is not well suited to bioaccumulative contaminants for which diet is the primary route of aquatic life exposure. Consequently, that procedure was not used for deriving the chronic criterion for selenium either in the original 1987 criteria document or in this update. Rather, to accord with other provisions of the Guidelines, it was necessary to apply what the Guidelines refer to as "appropriate modifications" of the procedures in order to obtain a criterion "consistent with sound scientific evidence", as will be described in a later section.

Results of such intermediate calculations as recalculated LC_{50}s and Species Mean Acute Values are given to four significant figures to prevent roundoff error in subsequent calculations, not to reflect the precision of the value. The latest comprehensive literature search for information for this document was conducted in August 2001; some more recent information was included.

The body of this document contains only the information on acute and chronic toxicity of selenium that is relevant to the derivation of the acute and chronic criteria. Supporting information on the toxicity and bioaccumulation of selenium, and the data that were reviewed and not used in deriving the criteria are provided in the appendix and include: toxicity to aquatic plants (Appendix A); bioconcentration and bioaccumulation (Appendix B); environmental factors affecting selenium toxicity and bioaccumulation (Appendix C); site-specific considerations (Appendix D); other data (Appendix E); unused data (Appendix F); regression analysis (Appendix G); chronic data summaries (Appendix H); and tissue monitoring data (Appendix I).

Acute Toxicity of Selenite

Data that may be used, according to the Guidelines, in the derivation of Final Acute Values for selenite are presented in Tables 1a and 1b. The following text presents a brief overview of the acceptable data obtained for selenite, followed by a discussion of the more sensitive and commercially and recreationally important species. A ranking of the relative sensitivity of selenite to selenate for each genera is listed in Tables 2a and 2b.

Acute Toxicity of Se(IV) to Freshwater Animals

Acceptable data on the acute effects of selenite in freshwater are available for 14 species of invertebrates and 20 species of fish (Table 1a). These 34 species satisfy the eight family provision specified in the Guidelines. Invertebrates are both the most sensitive and the most tolerant freshwater species to selenite with Species Mean Acute Values (SMAV) ranging from 440 µg/L for the crustacean, *Ceriodaphnia dubia*, to 203,000 µg/L for the leech, *Nephelopsis obscura*. The selenite SMAVs for fishes range from 1,783 µg/L for the striped bass, *Morone saxatilis*, to 35,000 µg/L for the common carp, *Cyprinus carpio*. The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species.

Hyalella (amphipod)

The most sensitive freshwater genus is the amphipod, *Hyalella*, with a Genus Mean Acute Value (GMAV) of 461.4 µg Se/L. The GMAV is derived from five 96-hr acute flow-through measured tests where the LC_{50} values ranged from 340 to 670 µg Se/L (GLEC 1998; Halter et al. 1980). A sixth test conducted under non flow-through conditions is also listed in Table 1a (Brasher and Ogle 1993), but the Guidelines recommend using flow-through measured data in preference to static or renewal data.

Ceriodaphnia (cladoceran)

The second most sensitive freshwater genus is *Ceriodaphnia*, with a GMAV of <515.3 µg Se/L that is derived from the geometric mean of the *C. affinis* (<603.6 µg Se/L) and *C. dubia* (440 µg Se/L) SMAVs. Four static unmeasured 48-hr studies are available for *C. affinis* where the LC_{50} values ranged from <480 to 720 µg Se/L (Owsley 1984; Owsley and McCauley 1986). The one available *C. dubia* acute study was conducted by GLEC (1999) that exposed <24-hr old neonates to sodium selenite for 48 hours under flow-through measured conditions. The resultant 48-hr LC_{50} value was 440 µg Se/L, which is the most sensitive SMAV for selenite in the database.

Daphnia (cladoceran)

The eleven available acute values are used to calculate the *Daphnia magna* SMAV of 905.3 µg Se/L (acute LC_{50} values ranged from 215 to 3,020 µg Se/L), but only one flow-through measured acute LC_{50} test value of 1,987 µg Se/L is used for the for *D. pulex* SMAV (a second static measured test conducted by Reading (1979) is listed, but not used to calculate the SMAV) . The resultant GMAV of 1,341 µg Se/L for *Daphnia* is the third most sensitive for selenite.

Hydra

The fourth most sensitive freshwater genus is *Hydra*, with a GMAV of 1,700 µg Se/L. The GMAV is derived from the one available static-measured test conducted by Brooke et al. (1985).

Morone (striped bass)

Two 96-hr static unmeasured tests are available for the striped bass, *Morone saxatilis*, and the LC_{50} values were 1,325 and 2,400 µg Se/L (Palawski et al. 1985). The geometric mean of the two values yield the GMAV of 1,783 µg Se/L.

Pimephales (fathead minnow)

A total of 16 fathead minnow acute studies are presented in Table 1a, but only the eight flow-through measured LC_{50} values are used to derive the GMAV of 2,209 µg Se/L. The eight flow-through LC_{50} values ranged from 620 to 5,200 µg Se/L (Cardwell et al. 1976a,b; GLEC 1998; Kimball manuscript).

Gammarus (amphipod)

The seventh most sensitive freshwater genus is *Gammarus*, with a GMAV of 3,489 µg Se/L that is derived from the geometric mean of five flow-through measured studies (GLEC 1998, 1999) where the LC_{50} values ranged from 1,800 to 10,950 µg Se/L. Two static measured acute studies were conduced by Brooke et al. (1985) and Brooke (1987), but as recommended by the Guidelines, were not used to calculate the SMAV for this species.

Jordanella (flagfish)

The eighth most sensitive freshwater genus is *Jordanella*, with a GMAV of 6,500 µg Se/L. The GMAV is derived from the one available 96-hr flow-through measured test conducted by Cardwell et al. (1976a,b) that exposed *Jordanella floridae* to selenium dioxide.

Oncorhynchus (salmonid)

The GMAV of 10,580 µg Se/L for the commercially important salmonid *Oncorhynchus* is derived from the geometric mean of the coho salmon (O. *kisutch*; 7,240 µg Se/L), chinook salmon (*O. tshawytscha*; 15,596 µg Se/L) and rainbow trout (*O. mykiss*; 10,488 µg Se/L) SMAVs. Three static unmeasured 96-hr studies are used to calculate the coho salmon SMAV where the LC_{50} values ranged from 3,578 to 13,600 µg Se/L (Hamilton and Buhl 1990b; Buhl and Hamilton 1991). A fourth coho salmon LC_{50} value is available for an acute test initiated with the tolerant alevin life stage (Buhl and Hamilton 1991), but based on Guideline recommendations this value is not used when data are available from a more sensitive life stage.

Six acute chinook salmon static unmeasured 96-hr acute studies conducted with the more sensitive post-alevin life stage of the fish are used to determine the 15,596 µg Se/L SMAV for the species and the LC_{50} values ranged from 8,150 to 23,400 µg Se/L (Hamilton and Buhl 1990b). The two acute studies conducted with the tolerant eyed egg and alevin life stages by the same authors are not used in the SMAV determination as recommended by the Guidelines. Hamilton and Buhl (1990b) noted that chinook salmon fry were consistently more sensitive than either the embryos or alevin to selenite.

A total of seven rainbow trout acute studies are presented in Table 1a, but only the two flow-through measured LC_{50} values are used to derive the SMAV of 10,488 µg Se/L as recommended by the Guidelines. The two 96-hr flow-through test LC_{50} values are 8,800 and 12,500 µg Se/L (Goettl and Davies 1976; Hodson et al. 1980). As with the coho and chinook salmon, the alevin life stage was less sensitive to selenite.

Lepomis (bluegill)

The GMAV of 28,500 µg Se/L for the recreationally important bluegill sunfish, *Lepomis macrochirus*, is derived from the 96-hr flow-through measured test conducted by Cardwell et al. (1976a,b). The static measured acute study conduced by Brooke et al. (1985) was not used to calculate the SMAV for this species, as recommended by the Guidelines.

Se(IV) Freshwater Final Acute Value Determination

Freshwater Species Mean Acute Values (Table 1a) were calculated as geometric means of the available acute values for selenite, and Genus Mean Acute Values (Table 2a) were then calculated as geometric means of the Species Mean Acute Values. Of the 28 genera for which freshwater mean acute values are available, the most sensitive genus, *Hyalella*, is 440 times more sensitive than the most tolerant, *Nephelopsis*. The range of sensitivities of the four most sensitive genera spans a factor of 3.7. The freshwater Final Acute Value (FAV), representing the most sensitive 5th percentile genus, is calculated to be 514.9 µg/L for selenite using the procedure described in the Guidelines and the Genus Mean Acute Values in Table 2a. The Final Acute Value is higher than the lowest Species Mean Acute Value (Figure 1).

Acute Toxicity of Se(IV) to Saltwater Animals

Acute toxicity data that can be used to derive a saltwater criterion for selenite are available for 10 species of invertebrates and eight species of fish that are resident in North America (Table 1b). These 18 species satisfy the eight family provision specified in the Guidelines. The range of SMAVs for saltwater invertebrates extends from 255 µg Se/L for juveniles of the bay scallop, *Argopecten irradians* (Nelson et al. 1988) to greater than 10,000 µg Se/L for embryos of the blue mussel, *Mytilus edulis* (Martin et al. 1981) and embryos of the Pacific oyster, *Crassostrea gigas* (Glickstein 1978; Martin et al. 1981). The range of SMAVs for fish is slightly wider than that for invertebrates, extending from 599 µg Se/L for larvae of the haddock, *Melanogrammus aeglefinus*, to 17,350 µg Se/L for adults of the fourspine stickleback, *Apeltes quadracus* (Cardin 1986). No consistent relationship was detected between life stage of invertebrates or fish and their sensitivity to selenite, and few data are available concerning the influence of temperature or salinity on the toxicity of selenite to saltwater animals. Acute tests with the copepod, *Acartia tonsa*, at 5 and 10°C gave similar results (Lussier 1986). The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species. The genera sensitivity ranking is listed in Table 2b.

Argopecten (bay scallop)

The most sensitive saltwater genus is *Argopecten*, with a GMAV of 255 µg Se/L. The GMAV is derived from the one available bay scallop (*Argopecten irradians)* static-renewal unmeasured test conducted by Nelson et al. (1988) at a salinity of 25 g/kg.

Melanogrammus (haddock)

The second most sensitive saltwater genus is *Melanogrammus*, with a GMAV of 599 µg Se/L. The GMAV is derived from the one available haddock (*Melanogrammus aeglefinus*) static unmeasured test conducted by Cardin (1986) at a salinity of 30 g/kg.

Cancer (dungeness crab)

The third most sensitive saltwater genus is *Cancer*, with a GMAV of 1,040 µg Se/L. The GMAV is derived from the one available static unmeasured test conducted by Glickstein (1978) that exposed *Cancer magister* to selenium oxide at a salinity of 33.8 g/kg.

Penaeus (brown shrimp)

The fourth most sensitive saltwater genus is *Penaeus*, with a GMAV of 1,200 µg Se/L. The GMAV is derived from the one available static unmeasured test conducted by Ward et al. (1981) that exposed *Penaeus aztecus* to sodium selenite at a salinity of 30 g/kg.

Acartia (copepod)

The fifth most sensitive saltwater genus is *Acartia*, with a GMAV of 1,331 µg Se/L that is derived from the geometric mean of the *A. clausi* (2,110 µg Se/L) and *A. tonsa* (839 µg Se/L) SMAVs. Each of the SMAVs is derived from one static unmeasured acute test conducted by Lussier (1986) that exposed each species to selenious acid at a salinity of 30 g/kg.

Americamysis (*Mysidopsis*) (mysid)

The GMAV of 1,500 µg Se/L for the mysid *Americamysis* (formerly *Mysidopsis*) is derived from the one *Americamysis bahia* 96-hr flow-through measured test conducted by Ward et al. (1981). The static unmeasured acute study conduced by U.S. EPA (1978) was not used to calculate the SMAV for this species as recommended by the Guidelines. The flow-through measured test was conducted with selenious acid at a salinity of 15-20 g/kg.

Spisula (surf clam)

The seventh most sensitive saltwater genus is *Spisula*, with a GMAV of 1,900 µg Se/L. The GMAV is derived from the one available static-renewal unmeasured test conducted by Nelson et al. (1988) that exposed *Spisula solidissima* to sodium selenite at a salinity of 25 g/kg.

Morone (striped bass)

Five 96-hr static unmeasured tests are available for the striped bass, *Morone saxatilis*, and the LC_{50} values ranged from 1,550 to 3,900 µg Se/L (Chapman 1992; Palawski et al. 1985). The geometric mean of the five values yielded the GMAV of 3,036 µg Se/L. All the tests were conducted with sodium selenite at a salinity of 1-5 g/kg.

Paralichthys (summer flounder)

The GMAV of 3,497 µg Se/L for the commercially important summer flounder, *Paralichthys dentatus*, is derived from one 96-hr static unmeasured acute test conducted by Cardin (1986) that exposed embryos to selenious acid at a salinity of 30.2 g/kg.

Callinectes (blue crab)

The GMAV of 4,600 µg Se/L for the commercially important blue crab, *Callinectes sapidus*, is derived from one static unmeasured acute test conducted by Ward et al. (1981) that exposed juveniles to sodium selenite at a salinity of 30 g/kg.

Crassostrea (Pacific oyster)

Two static unmeasured tests are available for the commercially important Pacific oyster, *Crassostrea gigas*, and the LC_{50} values were both >10,000 µg Se/L (Glickstein 1978; Martin et al. 1981). The geometric mean of the two values yielded the GMAV of >10,000 µg Se/L. The tests were conducted with selenium oxide and sodium selenite at a salinity of 33.8 g/kg.

Mytilus (blue mussel)

The GMAV for the commercially important blue mussel, *Mytilus edulis*, is also >10,000 µg Se/L, and is derived from the one static unmeasured acute test conducted by Martin et al. (1981) that exposed embryos to selenium oxide at a salinity of 33.8 g/kg.

Pseudopleuronectes (winter flounder)

The GMAV of 14,649 µg Se/L for the commercially important winter flounder, *Pseudopleuronectes americanus*, is derived from two 96-hr static unmeasured acute tests conducted by Cardin (1986) that exposed larvae to selenious acid at a salinity of 28-30 g/kg.

Se(IV) Saltwater Final Acute Value Determination

Of the 17 genera for which saltwater mean acute values are available for selenite (Table 2b), the most sensitive genus, *Argopectin*, is 68 times more sensitive than the most tolerant, *Apeltes*. The sensitivities of the four most sensitive genera differ by a factor of 4.7, and these four include three invertebrates and one fish, of which an invertebrate is the most sensitive of the four. The saltwater Final Acute Value, representing the most sensitive 5th percentile genus, is 253.4 µg/L for selenite, which is slightly lower than the lowest Species Mean Acute Value (Figure 2).

Acute Toxicity of Selenate

Data that may be used, according to the Guidelines, in the derivation of Final Acute Values for selenate are presented in Tables 1a and 1b. The following text presents a brief overview of the acceptable data obtained for selenate, and includes a discussion of the more sensitive and important species. The genera sensitivity ranking is listed in Tables 2a and 2b.

Acute Toxicity of Se(VI) to Freshwater Animals

Acceptable data on the acute effects of selenate in freshwater are available for 12 invertebrate species and 11 species of fish (Table 1a). These 23 species satisfy the eight family provision of the Guidelines. Invertebrates are both the most sensitive and the most tolerant freshwater species to selenate with SMAVs ranging from 246 µg/L for the crustacean, *Daphnia pulicaria*, to 442,000 µg/L for the leech, *Nephelopsis obscura*. The selenate SMAVs for fishes range from 12,282 µg/L for the fathead minnow, *Pimephales promelas*, to 66,000 µg/L for channel catfish, *Ictalurus punctatus*. The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species.

Ceriodaphnia (cladoceran)

The most sensitive freshwater genus is the cladeceran, *Ceriodaphnia*, with a GMAV of 376 µg Se/L. The GMAV is derived from one 48-hr acute flow-through measured test (GLEC 1999). Two additional tests conducted under non flow-through conditions is also listed in Table 1a (Brix et al. 2001a,b), but the Guidelines recommend using flow-through measured data in preference to static or renewal data.

Daphnia (cladoceran)

The second most sensitive freshwater genus is *Daphnia*, with a GMAV of 926.8 µg Se/L that is derived from the geometric mean of the *D. magna* (2,118 µg Se/L), *D. pulex* (1,528 µg Se/L) and *D. pulicaria* (246 µg Se/L) SMAVs. Five static and one static-renewal measured 48-hr studies are available for *D. magna* where the LC_{50} values ranged from 570 to 5,300 µg Se/L (Boyum 1984; Brooke et al. 1985; Dunbar et al. 1983; Ingersol et al. 1990; Maier et al. 1993).

The *D. pulex* SMAV of 1,528 µg Se/L is based on the 48-hr flow-through measured test conducted by GLEC (1999) that exposed <24-hr old neonates to sodium selenate. Two static measured tests conducted by Brix et al. (2001a,b), are not used to calculate the SMAV as recommend by the Guidelines.

The one available *D. pulicaria* acute study was conducted by Boyum (1984) that exposed neonates to sodium selenate for 48 hours under static measured conditions. The resultant 48-hr LC_{50} value was 246 µg Se/L, which is the most sensitive SMAV for selenate in the database.

Hyalella (amphipod)

The third most sensitive freshwater genus is the amphipod, *Hyalella*, with a GMAV of 2,073 µg Se/L. The GMAV is derived from four 96-hr acute flow-through measured tests where the LC_{50} values ranged from 1,350 to 3,580 µg Se/L (GLEC 1998). Three tests conducted under non flow-through conditions are also listed in Table 1a (Adams 1976; Brasher and Ogle 1993; Brix et al. 2001a,b), but are not used to calculate the SMAV as recommended by the Guidelines.

Gammarus (amphipod)

The fourth most sensitive freshwater genus is *Gammarus*, with a GMAV of 2,741 µg Se/L that is derived from the geometric mean of the *G. lacustris* (3,054 µg Se/L) and *G. pseudolimnaeus* (2,460 µg Se/L) SMAVs. The static measured acute test conduced by Brix et al. (2001a) is the only LC_{50} value available for *G. lacustris*.

The *G. pseudolimnaeus* SMAV of 2,460 µg Se/L is based on five 96-hr flow-through measured tests conducted by GLEC (1998, 1999). Two static measured acute studies were conduced by Brooke et al. (1985) and Brooke (1987), but as recommended by the Guidelines, were not used to calculate the SMAV for this species.

Hydra

The fifth most sensitive freshwater genus is *Hydra*, with a GMAV of 7,300 µg Se/L. The GMAV is derived from the one available static-measured test conducted by Brooke et al. (1985).

Pimephales (fathead minnow)

A total of nine fathead minnow acute studies are presented in Table 1a, but only the five flow-through measured LC_{50} values are used to derive the GMAV of 12,282 µg Se/L. The five flow-through LC_{50} values ranged from 5,500 to 42,100 µg Se/L (Spehar 1986; GLEC 1998). The four static tests are not used to calculate the SMAV as recommended by the Guidelines.

Xyrauchen (razorback sucker)

Six 96-hr static unmeasured tests are available for the razorback sucker, *Xyrauchen texanus*, and the LC_{50} values ranged from 7,620 to 20,064 µg Se/L (Buhl and Hamilton 1996; Hamilton 1995; Hamilton and Buhl 1997a). The geometric mean of the six values yield the GMAV of 13,211 µg Se/L.

Paratanyarsus (midge)

The eighth most sensitive freshwater genus is *Paratanyarsus* with a GMAV of 20,000 µg Se/L. The GMAV is derived from the one available static-measured test conducted with *Paratanyarsus parthenogeneticus* by Brooke et al. (1985).

Oncorhynchus (salmonid)

The GMAV of 56,493 µg Se/L for the commercially important salmonid *Oncorhynchus* is derived from the geometric mean of the coho salmon (O. *kisutch*; 33,972 µg Se/L), chinook salmon (*O. tshawytscha*; 112,918 µg Se/L) and rainbow trout (*O. mykiss*; 47,000 µg Se/L) SMAVs. Three static unmeasured 96-hr studies are used to calculate the coho salmon SMAV where the LC_{50} values ranged from 30,932 to 39,000 µg Se/L (Buhl and Hamilton 1991; Hamilton and Buhl 1990b). A fourth coho salmon LC_{50} value is available for an acute test initiated with the tolerant alevin life stage (Buhl and Hamilton 1991), but based on Guideline recommendations this value is not used when data are available from a more sensitive life stage.

Five acute chinook salmon static unmeasured 96-hr acute studies conducted with the more sensitive life stage of the fish are used to determine the 112,918 µg Se/L SMAV for the species with LC_{50} values ranging from 62,900 to 180,000 µg Se/L (Hamilton and Buhl 1990b). The two acute studies conducted with the tolerant eyed egg and alevin life stages by the same authors are not used in the SMAV determination as recommended by the Guidelines.

A total of four rainbow trout acute studies are presented in Table 1a, but only the one flow-through measured LC_{50} value is used to derive the SMAV of 47,000 µg Se/L (Spehar 1986) as recommended by the Guidelines.

Lepomis (bluegill)

The GMAV of 63,000 μg Se/L for the recreationally important bluegill sunfish, *Lepomis macrochirus*, is derived from the 96-hr static measured test conducted by Brooke et al. (1985) that exposed juvenile bluegill to sodium selenate.

Ictalurus (channel catfish)

The GMAV of 66,000 μg Se/L for the commercially important channel catfish, *Ictalurus punctatus*, is derived from the 96-hr static measured test conducted by Brooke et al. (1985) that exposed juvenile catfish to sodium selenate.

Sulfate-dependent Toxicity of Selenate

The toxicity of a number of metals (e.g., copper and cadmium) to aquatic organisms is related to the concentration of hardness in the water. The toxicity of these metals to many different aquatic species has been shown to decrease as the hardness concentration increases. A similar relationship also has been recognized between selenate and dissolved sulfate (a similar relationship is not evident between selenite and sulfate or between either form of selenium and hardness). The studies reviewed in this document indicate that, as the concentration of sulfate increases, the acute toxicity of selenate is reduced (less toxic). Selenate acute toxicity tests conducted at different levels of dissolved sulfate are available with *C. dubia, D. magna, H. azteca, G. pseudolimnaeus*, chinook salmon and fathead minnows (Table 1a). These data indicate that, in general, selenate is more toxic to these species in low sulfate water than in higher sulfate water.

The natural logarithm of selenate acute values was a linear function of the natural logarithm of sulfate concentrations. Regression analysis revealed significant, positive slopes for five of six species that had acute values precisely determined. Taxa with acute values estimated as greater or less than a given threshold were excluded from the analysis. However, the sulfate adjustment was not here incorporated into the water quality criterion for the following reasons. (1) Variation in sulfate concentration did not have a similar effect on the selenate acute value of all species. Analysis of covariance (Zar 1984) revealed that slopes of regression lines projecting selenate acute values as a function of sulfate concentrations (see Stephan et al. 1985) were significantly different among taxa ($F_{5,45} = 5.06$, $P < 0.02$). Slopes ranged from 0.19 (*Hyalella azteca)* to 0.87 (chinook salmon). (2) The influence of sulfate is sufficiently mild, and the acute criterion sufficiently high compared to chronically toxic concentrations, that it was not clear that the additional complexity of a sulfate formula would have any significance in

regulatory applications. (3) If a total selenium criterion were implemented based on the selenate FAV adjusted for the sulfate concentration, then the selenium limit would not adequately protect aquatic organisms when selenite is the predominant form of selenium and sulfate concentrations are high.

Se(VI) Freshwater Final Acute Value Determination

Of the 18 freshwater genera for which mean acute values are available for selenate, the most sensitive, *Ceriodaphnia*, is 1,176 times more sensitive than the most tolerant, *Nephelopsis*. The range of sensitivities of the four most sensitive genera, all invertebrates, spans a factor of 7.3. This is comparatively high variability among taxa. The freshwater Final Acute Value, representing the most sensitive 5th percentile genus, was calculated to be 369.6 μg/L for selenate. This Final Acute Value is lower than the acute value of the most sensitive freshwater species (Figure 3).

Acute Toxicity of Se(VI) to Saltwater Animals

The only species with which acute tests have been conducted on selenate in salt water is the striped bass (Table 1b). Klauda (1985a, b) obtained 96-hr selenate LC_{50} values of 9,790 and 85,840 μg/L using flow-through measured methodology with prolarvae and juvenile striped bass, respectively. In static unmeasured tests, Chapman (1992) determined selenate 96-hr LC_{50} values that ranged from 23,700 to 29,000 μg/L using 24 to 32 day posthatch striped bass larvae. The more sensitive prolarvae life stage test conducted under flow-through conditions is used to yield the SMAV and GMAV of 9,790 μg Se/L for the striped bass.

Se(VI) Saltwater Final Acute Value Determination

The one saltwater species available for selenate does not satisfy the eight family provision specified in the Guidelines. Therefore, a saltwater Final Acute Value for selenate cannot be determined.

Comparison of Selenite and Selenate Acute Toxicity

Species Mean Acute Values have been determined for both selenite and selenate with 20 freshwater species (Table 3a) and one saltwater species (Table 3b). Of these 21 species, 17 are more sensitive to Se(IV). Nevertheless, of the remaining four species that more sensitive to Se(VI), three are in the sensitive portion of the Table 3a distribution. Although most of the Se(VI) acute values are higher than those for Se(IV), the FAV for Se(VI) ends up below the FAV for Se(IV) because the lowest Se(VI) acute value, that for *Ceriodaphnia dubia*, is lower than any acute value for Se(IV), and fewer species have been tested for Se(VI), causing its FAV to be extrapolated below its lowest acute value.

Table 1a. Acute Toxicity of Selenium to Freshwater Animals

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
			FRESHWATER SPECIES			
			Selenite			
Hydra (adult), *Hydra sp.*	S, M	Sodium selenite	-	**1,700**	1,700	Brooke et al. 1985
Worm, *Tubifex tubifex*	R, U	Sodium selenite	245	**7,710**	7,710	Khangarot 1991
Leech (adult), *Nephelopsis obscura*	S, M	Sodium selenite	49.8	**203,000**	203,000	Brooke et al. 1985
Snail (adult), *Aplexa hypnorum*	S, M	Sodium selenite	50.6	**53,000**	-	Brooke et al. 1985
Snail (adult), *Aplexa hypnorum*	S, M	Sodium selenite	49.8	**23,000**	34,914	Brooke et al. 1985
Snail, *Physa sp.*	S, U	Sodium selenite	45.7	**24,100**	24,100	Reading 1979
Cladoceran (<24 hr), *Ceriodaphnia dubia*	F, M	Sodium selenite	127 (sulfate=25)	**440**	440	GLEC 1999
Cladoceran (<24 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**600**	-	Owsley 1984; Owsley and McCauley 1986
Cladoceran (36-60 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**720**	-	Owsley 1984
Cladoceran (84-108 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**640**	-	Owsley 1984
Cladoceran (72-120 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**<480**	<603.6	Owsley 1984
Cladoceran, *Daphnia magna*	S, U	Sodium selenite	214	**2,500**	-	Bringmann and Kuhn 1959a
Cladoceran, *Daphnia magna*	S, U	Selenious acid[c]	72	**430**	-	LeBlanc 1980
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	129.5	**1,100**	-	Dunbar et al. 1983
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	138	**450**	-	Boyum 1984

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	-	**215**	-	Adams and Heidolph 1985
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	40	**870**	-	Mayer and Ellersieck 1986
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	280	**2,370**	-	Mayer and Ellersieck 1986
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	45.5	**700**	-	Ingersoll et al. 1990
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	136	**3,020**	-	Ingersoll et al. 1990
Cladoceran (<24 hr), *Daphnia magna*	R, M	Sodium selenite	80-100	**550**	-	Maier et al. 1993
Cladoceran, *Daphnia magna*	S, M	Selenious acid	220[d]	**1,220**	905.3	Kimball, Manuscript
Cladoceran, *Daphnia pulex*	S, M	Sodium selenite	46.4	3,870	-	Reading 1979; Reading and Buikema 1983
Cladoceran (<24 hr), *Daphnia pulex*	F, M	Sodium selenite	128 (sulfate=25)	**1,987**	1,987	GLEC 1999
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenite	48.3	4,300	-	Brooke et al. 1985
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenite	53.6	1,700	-	Brooke 1987
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	139 (sulfate=24)	**2,260**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	137 (sulfate=138)	**3,130**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	144 (sulfate=326)	**1,800**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	138 (sulfate=758)	**3,710**	--	GLEC 1998
Amphipod (adult), *Gammarus pseudolimnaeus*	F, M	Sodium selenite	128 (sulfate=25)	**10,950**	3,489	GLEC 1999

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Amphipod (2 mm length), *Hyalella azteca*	R, M	Sodium selenite	133	420	-	Brasher and Ogle 1993
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	329	**340**	-	Halter et al. 1980
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	132 (sulfate=64)	**670**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	132 (sulfate=138)	**≤350**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	138 (sulfate=359)	**≤460**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	138 (sulfate=642)	**570**	461.4	GLEC 1998
Midge (4th instar), *Chironomus decorus*	R, M	Sodium selenite	85	**48,200**	48,200	Maier and Knight 1993
Midge, *Chironomus plumosus*	S, U	Sodium selenite	39	**24,150**	-	Mayer and Ellersieck 1986
Midge, *Chironomus plumosus*	S, U	Sodium selenite	280	**27,850**	25,934	Mayer and Ellersieck 1986
Midge, *Tanytarsus dissimilis*	F, M	Selenium dioxide	48.0	**42,500**	42,500	Call et al. 1983
Coho salmon (0.5 g), *Oncorhynchus kisutch*	S, U	Sodium selenite	211	**7,800**	-	Hamilton and Buhl 1990b
Coho salmon (2.6 g), *Oncorhynchus kisutch*	S, U	Sodium selenite	333	**13,600**	-	Hamilton and Buhl 1990b
Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Sodium selenite	41	35,560[f]	-	Buhl and Hamilton 1991
Coho salmon (juvenile), *Oncorhynchus kisutch*	S, U	Sodium selenite	41	**3,578**	7,240	Buhl and Hamilton 1991
Chinook salmon (0.7 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	211	**14,800**	-	Hamilton and Buhl 1990b
Chinook salmon (0.5 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	211	**13,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	333	**23,100**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	333	**23,400**	-	Hamilton and Buhl 1990b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Chinook salmon (eyed egg), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	>348,320[f]	-	Hamilton and Buhl 1990b
Chinook salmon (alevin), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	64,690[f]	-	Hamilton and Buhl 1990b
Chinook salmon (0.31 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	**16,980**	-	Hamilton and Buhl 1990b
Chinook salmon (0.46 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	**8,150**	15,596	Hamilton and Buhl 1990b
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	330	4,500	-	Adams 1976
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	330	4,200	-	Adams 1976
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	272	1,800	-	Hunn et al. 1987
Rainbow trout (alevin), *Oncorhynchus mykiss*	S, U	Sodium selenite	41	118,000	-	Buhl and Hamilton 1991
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, U	Sodium selenite	41	9,000	-	Buhl and Hamilton 1991
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenite	30	**12,500**	-	Goettl and Davies 1976
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenite	135	**8,800**	10,488	Hodson et al. 1980
Brook trout (adult), *Salvelinus fontinalis*	F, M	Selenium dioxide	157	**10,200**	10,200	Cardwell et al. 1976a,b
Arctic grayling (alevin), *Thymallus arcticus*	S, U	Sodium selenite	41	34,732[f]	-	Buhl and Hamilton 1991
Arctic grayling (juvenile), *Thymallus arcticus*	S, U	Sodium selenite	41	**15,675**	15,675	Buhl and Hamilton 1991
Goldfish, *Carassius auratus*	F, M	Selenium dioxide	157	**26,100**	26,100	Cardwell et al. 1976a,b
Common carp, *Cyprinus carpio*	R, U	-	-	**35,000**	35,000	Sato et al. 1980

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Golden shiner, *Notemigonus crysoleucas*	F, M	Sodium selenite	72.2	**11,200**	11,200	Hartwell et al. 1989
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	312 (13°C)	10,500	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	312 (13°C)	11,300	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	303 (20°C)	6,000	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	303 (20°C)	7,400	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	292 (25°C)	3,400	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	292 (25°C)	2,200	-	Adams 1976
Fathead minnow (30 days), *Pimephales promelas*	S, M	Sodium selenite	51.1	1,700	-	Brooke et al. 1985
Fathead minnow (juvenile), *Pimephales promelas*	S, U	Sodium selenite	40	7,760	-	Mayer and Ellersieck 1986
Fathead minnow (fry), *Pimephales promelas*	F, M	Selenium dioxide	157	**2,100**	-	Cardwell et al. 1976a,b
Fathead minnow (juvenile), *Pimephales promelas*	F, M	Selenium dioxide	157	**5,200**	-	Cardwell et al. 1976a,b
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	131 (sulfate=24)	**3,670**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	131 (sulfate=160)	**2,920**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	145 (sulfate=214)	**3,390**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	140 (sulfate=870)	**2,380**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Selenious acid	220[d]	**620**	-	Kimball, Manuscript
Fathead minnow, *Pimephales promelas*	F, M	Selenious acid	220[d]	**970**	2,209	Kimball, Manuscript
Colorado squawfish (fry), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**6,398**	-	Hamilton 1995

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Colorado squawfish (0.4-1.1 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**16,452**	-	Hamilton 1995
Colorado squawfish (1.7 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**14,624**	-	Hamilton 1995
Colorado squawfish (larva), *Ptychocheilus lucius*	S, U	Sodium selenite	199	**7,960**	-	Buhl and Hamilton 1996
Colorado squawfish (juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	199	**17,350**	-	Buhl and Hamilton 1996
Colorado squawfish (0.024-0.047 g), *Ptychocheilus lucius*	S, U	Sodium selenite	144	**20,700**	12,801	Hamilton and Buhl 1997a
Bonytail (fry), *Gila elegans*	S, U	Sodium selenite	197	**8,680**	-	Hamilton 1995
Bonytail (1.1 g juvenile), *Gila elegans*	S, U	Sodium selenite	197	**7,769**	-	Hamilton 1995
Bonytail (2.6 g juvenile), *Gila elegans*	S, U	Sodium selenite	197	**6,855**	-	Hamilton 1995
Bonytail (larva), *Gila elegans*	S, U	Sodium selenite	199	**14,490**	-	Buhl and Hamilton 1996
Bonytail (juvenile), *Gila elegans*	S, U	Sodium selenite	199	**12,870**	9,708	Buhl and Hamilton 1996
Razorback sucker (fry), *Xyrauchen texanus*	S, U	Sodium selenite	197	**6,855**	-	Hamilton 1995
Razorback sucker (0.9 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	197	**4,067**	-	Hamilton 1995
Razorback sucker (2.0 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	197	**7,312**	-	Hamilton 1995
Razorback sucker (larva), *Xyrauchen texanus*	S, U	Sodium selenite	199	**10,450**	-	Buhl and Hamilton 1996
Razorback sucker (juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	199	**8,520**	-	Buhl and Hamilton 1996
Razorback sucker (0.006-0.042 g), *Xyrauchen texanus*	S, U	Sodium selenite	144	**11,300**	7,679	Hamilton and Buhl 1997a

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
White sucker, *Catostomus commersoni*	F, M	Sodium selenite	10.2	**29,000**	-	Klaverkamp et al. 1983a
White sucker, *Catostomus commersoni*	F, M	Sodium selenite	18	**31,400**	30,176	Duncan and Klaverkamp 1983
Flannelmouth sucker (12-13 days), *Catostomus latipinnis*	S, U	Sodium selenite	144	**19,100**	19,100	Hamilton and Buhl 1997b
Striped bass (63 days), *Morone saxatilis*	S, U	Sodium selenite	40	**1,325**	-	Palawski et al. 1985
Striped bass (63 days), *Morone saxatilis*	S, U	Sodium selenite	285	**2,400**	1,783	Palawski et al. 1985
Channel catfish (juvenile), *Ictalurus punctatus*	S, M	Sodium selenite	49.8	16,000	-	Brooke et al. 1985
Channel catfish (juvenile), *Ictalurus punctatus*	S, U	Sodium selenite	41	4,110	-	Mayer and Ellersieck 1986
Channel catfish, *Ictalurus punctatus*	F, M	Selenium dioxide	157	**13,600**	13,600	Cardwell et al. 1976a,b
Flagfish, *Jordanella floridae*	F, M	Selenium dioxide	157	**6,500**	6,500	Cardwell et al. 1976a,b
Mosquitofish, *Gambusia affinis*	S, U	Sodium selenite	45.7	**12,600**	12,600	Reading 1979
Bluegill (juvenile), *Lepomis macrochirus*	S, M	Sodium selenite	50.5	12,000	-	Brooke et al. 1985
Bluegill, *Lepomis macrochirus*	F, M	Selenium dioxide	157	**28,500**	28,500	Cardwell et al. 1976a,b
Yellow perch, *Perca flavescens*	F, M	Sodium selenite	10.2	**11,700**[e]	11,700	Klaverkamp et al. 1983a
			Selenate			
Hydra (adult), *Hydra sp.*	S, M	Sodium selenate	53.6	**7,300**	7,300	Brooke et al. 1985
Leech (adult), *Nephelopsis obscura*	S, M	Sodium selenate	49.3	**442,000**	442,000	Brooke et al. 1985
Snail, *Aplexa hypnorum*	S, M	Sodium selenate	51.0	**193,000**	193,000	Brooke et al. 1985
Cladoceran (<24 hr), *Ceriodaphnia dubia*	S, M	Sodium selenate	52 (sulfate=52)	1,969	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Ceriodaphnia dubia*	S, M	Sodium selenate	52 (sulfate=55)	1,864	--	Brix et al. 2001a,b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Cladoceran (<24 hr), *Ceriodaphnia dubia*	F, M	Sodium selenate	127 (sulfate=25)	**376**	376	GLEC 1999
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	129.5	**5,300**	-	Dunbar et al. 1983
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	138	**1,010**	-	Boyum 1984
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	48.1	**570**	-	Brooke et al. 1985
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	45.5	**2,560**	-	Ingersoll et al. 1990
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	136	**4,070**	-	Ingersoll et al. 1990
Cladoceran (<24 hr), *Daphnia magna*	R, M	Sodium selenate	80-100	**2,840**	2,118	Maier et al. 1993
Cladoceran (<24 hr), *Daphnia pulex*	S, M	Sodium selenate	52 (sulfate=52)	10,123	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Daphnia pulex*	S, M	Sodium selenate	52 (sulfate=55)	8,111	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Daphnia pulex*	F, M	Sodium selenate	147 (sulfate=25)	**1,528**	1,528	GLEC 1999
Cladoceran, *Daphnia pulicaria*	S, M	Sodium selenate	138	**246**	246	Boyum 1984
Amphipod (8-12 mm), *Gammarus lacustris*	S, M	Sodium selenate	116 (sulfate=120)	**3,054**	3,054	Brix et al. 2001a,b
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenate	46.1	75	-	Brooke et al. 1985
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenate	51.0	57	-	Brooke 1987
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	139 (sulfate=25)	**1,180**	-	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	132 (sulfate=125)	**2,870**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	137 (sulfate=367)	**3,710**	-	GLEC 1998

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	134 (sulfate=635)	**3,270**	-	GLEC 1998
Amphipod (adult), *Gammarus pseudolimnaeus*	F, M	Sodium selenate	131 (sulfate=25)	**2,191**	2,460	GLEC 1999
Amphipod, *Hyalella azteca*	F, U	Sodium selenate	336.8	760	-	Adams 1976
Amphipod (2 mm length), *Hyalella azteca*	R, M	Sodium selenate	133	1,031	-	Brasher and Ogle 1993
Amphipod (7-10 days), *Hyalella azteca*	S, M	Sodium selenate	52 (sulfate=55)	1,428	--	Brix et al. 2001a,b
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	143 (sulfate=40)	**2,480**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	132 (sulfate=125)	**1,350**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	137 (sulfate=367)	**1,540**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	133 (sulfate=822)	**3,580**	2,073	GLEC 1998
Midge (4th instar), *Chironomus decorus*	R, M	Sodium selenate	85	**23,700**	23,700	Maier and Knight 1993
Midge (3rd instar), *Paratanytarsus parthenogeneticus*	S, M	Sodium selenate	49.4	**20,000**	20,000	Brooke et al. 1985
Coho salmon (0.5 g), *Oncorhynchus kisutch*	S, U	Sodium selenate	211	**32,500**	-	Hamilton and Buhl 1990b
Coho salmon (1.7 g), *Oncorhynchus kisutch*	S, U	Sodium selenate	333	**39,000**	-	Hamilton and Buhl 1990b
Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Sodium selenate	41	158,422[f]	-	Buhl and Hamilton 1991
Coho salmon (juvenile), *Oncorhynchus kisutch*	S, U	Sodium selenate	41	**30,932**	33,972	Buhl and Hamilton 1991
Chinook salmon (0.7 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	211	**121,000**	-	Hamilton and Buhl 1990b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Chinook salmon (0.5 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	211	**100,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	333	**180,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	333	**134,000**	-	Hamilton and Buhl 1990b
Chinook salmon (eyed egg), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	>552,000[f]	-	Hamilton and Buhl 1990b
Chinook salmon (alevin), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	>176,640[f]	-	Hamilton and Buhl 1990b
Chinook salmon (0.31 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	**62,900**	112,918	Hamilton and Buhl 1990b
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, M	Sodium selenate	51.0	24,000	-	Brooke et al. 1985
Rainbow trout (alevin), *Oncorhynchus mykiss*	S, U	Sodium selenate	41	196,460	-	Buhl and Hamilton 1991
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, U	Sodium selenate	41	13,501	-	Buhl and Hamilton 1991
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenate	45	**47,000**	47,000	Spehar 1986
Arctic grayling (alevin), *Thymallus arcticus*	S, U	Sodium selenate	41	**41,800**	-	Buhl and Hamilton 1991
Arctic grayling (juvenile), *Thymallus arcticus*	S, U	Sodium selenate	41	**75,240**	56,081	Buhl and Hamilton 1991
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	11,800	-	Adams 1976

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	11,000	-	Adams 1976
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	12,500	-	Adams 1976
Fathead minnow (juvenile), *Pimephales promelas*	S, M	Sodium selenate	47.9	2,300	-	Brooke et al. 1985
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	46	**5,500**	-	Spehar 1986
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	136 (sulfate=24)	**6,210**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	127 (sulfate=160)	**10,800**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	131 (sulfate=474)	**18,000**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	147 (sulfate=906)	**42,100**	12,282	GLEC 1998
Colorado squawfish (fry), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**27,588**	-	Hamilton 1995
Colorado squawfish (0.4-1.1 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**119,548**	-	Hamilton 1995
Colorado squawfish (1.7 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**138,358**	-	Hamilton 1995
Colorado squawfish (larva), *Ptychocheilus lucius*	S, U	Sodium selenate	199	**13,580**	-	Buhl and Hamilton 1996
Colorado squawfish (juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	199	**42,780**	-	Buhl and Hamilton 1996
Colorado squawfish (0.024-0.047 g), *Ptychocheilus lucius*	S, U	Sodium selenate	144	**88,000**	53,454	Hamilton and Buhl 1997a
Bonytail (fry), *Gila elegans*	S, U	Sodium selenate	197	**22,990**	-	Hamilton 1995
Bonytail (1.1 g juvenile), *Gila elegans*	S, U	Sodium selenate	197	**102,828**	-	Hamilton 1995

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Bonytail (2.6 g juvenile), *Gila elegans*	S, U	Sodium selenate	197	**90,706**	-	Hamilton 1995
Bonytail (larva), *Gila elegans*	S, U	Sodium selenate	199	**14,570**	-	Buhl and Hamilton 1996
Bonytail (juvenile), *Gila elegans*	S, U	Sodium selenate	199	**24,010**	37,586	Buhl and Hamilton 1996
Razorback sucker (fry), *Xyrauchen texanus*	S, U	Sodium selenate	197	**20,064**	-	Hamilton 1995
Razorback sucker (0.9 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	197	**15,048**	-	Hamilton 1995
Razorback sucker (2.0 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	197	**10,450**	-	Hamilton 1995
Razorback sucker (larva), *Xyrauchen texanus*	S, U	Sodium selenate	199	**13,910**	-	Buhl and Hamilton 1996
Razorback sucker (juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	199	**7,620**	-	Buhl and Hamilton 1996
Razorback sucker (0.006-0.042 g), *Xyrauchen texanus*	S, U	Sodium selenate	144	**15,900**	13,211	Hamilton and Buhl 1997a
Flannelmouth sucker (12-13 days), *Catostomus latipinnis*	S, U	Sodium selenate	144	**26,900**	26,900	Hamilton and Buhl 1997b
Channel catfish (juvenile), *Ictalurus punctatus*	S, M	Sodium selenate	51.0	**66,000**	66,000	Brooke et al. 1985
Bluegill (juvenile), *Lepomis macrochirus*	S, M	Sodium selenate	50.4	**63,000**	63,000	Brooke et al. 1985

[a] S = static; R = renewal; F = flow-through; M = measured; U = unmeasured.
[b] Concentration of selenium, not the chemical. **Note:** The values underlined in this column were used to calculate the SMAV for the respective species.
[c] Reported by Barrows et al. (1980) in work performed in the same laboratory under the same contract.
[d] From Smith et al. (1976).
[e] Calculated from regression equation.
[f] Not used in calculation of Species Mean Acute Value because data are available for a more sensitive life stage.

Table 1b. Acute Toxicity of Selenium to Saltwater Animals

Species	Method[a]	Chemical	Salinity (g/kg)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
			SALTWATER SPECIES			
			Selenite			
Blue mussel (embryo), *Mytilus edulis*	S, U	Selenium oxide	33.79	**>10,000**	>10,000	Martin et al. 1981
Bay scallop (juvenile), *Argopecten irradians*	R, U	Sodium selenite	25	**255**	255	Nelson et al. 1988
Pacific oyster (embryo), *Crassostrea gigas*	S, U	Selenium oxide	33.79	**>10,000**	-	Glickstein 1978; Martin et al. 1981
Pacific oyster (embryo), *Crassostrea gigas*	S, U	Sodium selenite	33.79	**>10,000**	>10,000	Glickstein 1978
Surf clam (juvenile), *Spisula solidissima*	R, U	Sodium selenite	25	**1,900**	1,900	Nelson et al. 1988
Copepod (adult), *Acartia clausi*	S, U	Selenious acid	30	**2,110**	2,110	Lussier 1986
Copepod (adult), *Acartia tonsa*	S, U	Selenious acid	30	**839**	839	Lussier 1986
Mysid (juvenile), *Americamysis bahia*	S, U	Selenious acid	-	600	-	U.S. EPA 1978
Mysid (juvenile), *Americamysis bahia*	F, M	Selenious acid	15-20	**1,500**	1,500	Ward et al. 1981
Brown shrimp (juvenile), *Penaeus aztecus*	S, U	Sodium selenite	30	**1,200**	1,200	Ward et al. 1981
Dungeness crab (zoea larva), *Cancer magister*	S, U	Selenium oxide	33.79	**1,040**	1,040	Glickstein 1978
Blue crab (juvenile), *Callinectes sapidus*	S, U	Sodium selenite	30	**4,600**	4,600	Ward et al. 1981

Table 1b. Acute Toxicity of Selenium to Saltwater Animals (continued)

Species	Method[a]	Chemical	Salinity (g/kg)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Haddock (larva), *Melanogrammus aeglefinus*	S, U	Selenious acid	30	**599**	599	Cardin 1986
Sheepshead minnow (juvenile), *Cyrinodon variegatus*	S, U	Selenious acid	-	6,700	-	Heitmuller et al. 1981
Sheepshead minnow (juvenile), *Cyrinodon variegatus*	F, M	Sodium selenite	30	**7,400**	7,400	Ward et al. 1981
Atlantic silverside (juvenile), *Menidia menidia*	S, U	Selenious acid	30	**9,725**	9,725	Cardin 1986
Fourspine stickleback (adult), *Apeltes quadracus*	S, U	Selenious acid	30	**17,350**	17,350	Cardin 1986
Striped bass, *Morone saxatilis*	S, U	Sodium selenite	1	**1,550**	-	Palawski et al. 1985
Striped bass (24 d posthatch), *Morone saxatilis*	S, U	Sodium selenite	5	**3,400**	-	Chapman 1992
Striped bass (25 d posthatch), *Morone saxatilis*	S, U	Sodium selenite	5	**3,300**	-	Chapman 1992
Striped bass (31 d posthatch), *Morone saxatilis*	S, U	Sodium selenite	5	**3,800**	-	Chapman 1992
Striped bass (32 d posthatch), *Morone saxatilis*	S, U	Sodium selenite	5	**3,900**	3,036	Chapman 1992
Pinfish (juvenile), *Lagodon rhomboides*	S, U	Sodium selenite	30	**4,400**	4,400	Ward et al. 1981
Summer flounder (embryo), *Paralichthys dentatus*	S, U	Selenious acid	30.2	**3,497**	3,497	Cardin 1986
Winter flounder (larva), *Pseudopleuronectes americanus*	S, U	Selenious acid	30	**14,240**	-	Cardin 1986

Table 1b. Acute Toxicity of Selenium to Saltwater Animals (continued)

Species	Method[a]	Chemical	Salinity (g/kg)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Winter flounder (larva), *Pseudopleuronectes americanus*	S, U	Selenious acid	28	**15,070**	14,649	Cardin 1986
			Selenate			
Striped bass (24 d posthatch), *Morone saxatilis*	S, U	Sodium selenate	5	26,300[c]	-	Chapman 1992
Striped bass (25 d posthatch), *Morone saxatilis*	S, U	Sodium selenate	5	23,700[c]	-	Chapman 1992
Striped bass (31 d posthatch), *Morone saxatilis*	S, U	Sodium selenate	5	26,300[c]	-	Chapman 1992
Striped bass (32 d posthatch), *Morone saxatilis*	S, U	Sodium selenate	5	29,000[c]	-	Chapman 1992
Striped bass (juvenile), *Morone saxatilis*	F, M	Sodium selenate	6.0-6.5	85,840[c]	-	Klauda 1985a,b
Striped bass (prolarvae), *Morone saxatilis*	F, M	Sodium selenate	3.5-4.2	**9,790**	9,790	Klauda 1985a,b

[a] S = static; R = renewal; F = flow-through; M = measured; U = unmeasured.
[b] Concentration of selenium, not the chemical. **Note:** The values underlined in this column were used to calculate the SMAV for the respective species.
[c] Not used in calculation of Species Mean Acute Value because data are available for a more sensitive life stage.

Table 2a. Ranked Freshwater Genus Mean Acute Values

Rank[a]	Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
		FRESHWATER SPECIES		
		Selenite		
28	203,000	Leech, *Nephelopsis obscura*	203,000	1
27	42,500	Midge, *Tanytarsus dissimilis*	42,500	1
26	35,356	Midge, *Chironomus decorus*	48,200	1
		Midge, *Chironomus plumosus*	25,934	2
25	35,000	Common carp, *Cyprinus carpio*	35,000	1
24	34,914	Snail, *Aplexa hypnorum*	34,914	2
23	28,500	Bluegill, *Lepomis macrochirus*	28,500	1
22	26,100	Goldfish, *Carassius auratus*	26,100	1
21	24,100	Snail, *Physa sp.*	24,100	1
20	24,008	White sucker, *Catostomus commersoni*	30,176	2
		Flannelmouth sucker *Catostomus latipinnis*	19,100	1
19	15,675	Arctic grayling *Thymallus arcticus*	15,675	1
18	13,600	Channel catfish, *Ictalurus punctatus*	13,600	1
17	12,801	Colorado squawfish, *Ptychocheilus lucias*	12,801	6
16	12,600	Mosquitofish, *Gambusia affinis*	12,600	1
15	11,700	Yellow perch, *Perca flavescens*	11,700	1
14	11,200	Golden shiner, *Notemigonus crysoleucas*	11,200	1

Table 2a. Ranked Freshwater Genus Mean Acute Values (continued)

Rank[a]	Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
13	10,580	Chinook salmon, *Oncorhynchus tshawytscha*	15,596	6
		Coho salmon, *Oncorhynchus kisutch*	7,240	3
		Rainbow trout, *Oncorhynchus mykiss*	10,488	2
12	10,200	Brook trout *Salvelinus fontinalis*	10,200	1
11	9,708	Bonytail *Gilas elegans*	9,708	5
10	7,710	Worm, *Tubifex tubifex*	7,710	1
9	7,679	Razorback sucker, *Xyrauchen texanus*	7,679	6
8	6,500	Flagfish, *Jordanella floridae*	6,500	1
7	3,489	Amphipod, *Gammarus pseudolimnaeus*	3,489	5
6	2,209	Fathead minnow, *Pimephales promelas*	2,209	8
5	1,783	Striped bass, *Morone saxatilis*	1,783	2
4	1,700	Hydra, *Hydra sp.*	1,700	1
3	1,341	Cladoceran, *Daphnia magna*	905.3	11
		Cladoceran, *Daphnia pulex*	1,987	1
2	<515.3	Cladoceran, *Ceriodaphnia affinis*	<603.6	4
		Cladoceran, *Ceriodaphnia dubia*	440	1
1	461.4	Amphipod, *Hyalella azteca*	461.4	5

32 *March 2002 Draft*

Table 2a. Ranked Freshwater Genus Mean Acute Values (continued)

Rank[a]	Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
		Selenate		
18	442,000	Leech, *Nephelopsis obscura*	442,000	1
17	193,000	Snail, *Aplexa hypnorum*	193,000	1
16	66,000	Channel catfish, *Ictalurus punctatus*	66,000	1
15	63,000	Bluegill, *Lepomis macrochirus*	63,000	1
14	56,493	Chinook salmon, *Oncorhynchus tshawytscha*	112,918	5
		Coho salmon, *Oncorhynchus kisutch*	33,972	3
		Rainbow trout, *Oncorhynchus mykiss*	47,000	1
13	56,081	Arctic grayling, *Thymallus arcticus*	56,081	2
12	53,454	Colorado squawfish, *Ptychocheilus lucius*	53,454	6
11	37,586	Bonytail, *Gila elegans*	37,586	5
10	26,900	Flannelmouth sucker *Catostomus latipinnis*	26,900	1
9	23,700	Midge, *Chironomus decorus*	23,700	1
8	20,000	Midge, *Paratanytarsus parthenogeneticus*	20,000	1
7	13,211	Razorback sucker, *Xyrauchen texanus*	13,211	6
6	12,282	Fathead minnow, *Pimephales promelas*	12,282	5
5	7,300	Hydra, *Hydra sp.*	7,300	1
4	2,741	Amphipod, *Gammarus lacustris*	3,054	1

33 *March 2002 Draft*

Table 2a. Ranked Freshwater Genus Mean Acute Values (continued)

Rank[a]	Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
		Amphipod, *Gammarus pseudolimnaeus*	2,460	5
3	2,073	Amphipod, *Hyalella azteca*	2,073	4
2	926.8	Cladoceran, *Daphnia magna*	2,118	6
		Cladoceran, *Daphnia pulex*	1,528	1
		Cladoceran, *Daphnia pulicaria*	246	1
1	376	Cladoceran, *Ceriodaphnia dubia*	376	1

[a] Ranked from most resistant to most sensitive based on Genus Mean Acute Value. Inclusion of "greater than" and "less than" values does not necessarily imply a true ranking, but does allow use of all genera for which data are available so that the Final Acute Value is not unnecessarily lowered.
[b] From Table 1a.

Table 2b. Ranked Saltwater Genus Mean Acute Values

Rank[a]	Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
		SALTWATER SPECIES		
		Selenite		
17	17,350	Fourspine stickleback, *Apeltes quadracus*	17,350	1
16	14,649	Winter flounder, *Pseudopleuronectes americanus*	14,649	2
15	>10,000	Blue mussel, *Mytilus edulis*	>10,000	1
14	>10,000	Pacific oyster, *Crassostrea gigas*	>10,000	2
13	9,725	Atlantic silverside, *Menidia menidia*	9,725	1
12	7,400	Sheepshead minnow, *Cyprinodon variegatus*	7,400	1
11	4,600	Blue crab, *Callinectes sapidus*	4,600	1
10	4,400	Pinfish, *Lagodon rhomboides*	4,400	1
9	3,497	Summer flounder, *Paralichthys dentatus*	3,497	1
8	3,036	Striped bass, *Morone saxatilis*	3,036	5
7	1,900	Surf clam, *Spisula solidissima*	1,900	1
6	1,500	Mysid, *Americamysis bahia*	1,500	1
5	1,331	Copepod, *Acartia clausi*	2,110	1
		Copepod, *Acartia tonsa*	839	1
4	1,200	Brown shrimp, *Penaeus aztecus*	1,200	1
3	1,040	Dungeness crab, *Cancer magister*	1,040	1
2	599	Haddock, *Melanogrammus aeglefinus*	599	1

Table 2b. Ranked Saltwater Genus Mean Acute Values

Rank[a]	Genus Mean Acute Value (μg/L)	Species	Species Mean Acute Value (μg/L)[b]	Number of Acute Values used to Calculate Species Mean Value[b]
1	255	Bay scallop, *Argopecten irradians*	255	1
		Selenate		
1	9,790	Striped bass, *Morone saxatilis*	9,790	1

[a] Ranked from most resistant to most sensitive based on Genus Mean Acute Value. Inclusion of "greater than" and "less than" values does not necessarily imply a true ranking, but does allow use of all genera for which data are available so that the Final Acute Value is not unnecessarily lowered.
[b] From Table 1b.

Selenite

Fresh water

Final Acute Value = 514.9 μg/L

Criterion Maximum Concentration = (514.9 μg/L)/2 = 257.5 μg/L

Salt water

Final Acute Value = 253.4 μg/L

Criterion Maximum Concentration = (253.4 μg/L)/2 = 126.7 μg/L

Selenate

Fresh water

Final Acute Value = 369.6 μg/L

Criterion Maximum Concentration = (369.6 μg/L)/2 = 184.8 μg/L

Table 3a. Ratios of Freshwater Species Mean Acute Values for Selenite and Selenate.

Selenite Sensitivity Rank from Table 2a[a]	Species	Selenite Species Mean Acute Value (μg/L)[b]	Selenate Species Mean Acute Value (μg/L)[b]	Ratio
	FRESHWATER SPECIES			
28	Leech, *Nephelopsis obscura*	203,000	442,000	0.459
27	Midge, *Tanytarsus dissimilis*	42,500	NA[c]	NA
26	Midge, *Chironomus decorus*	48,200	23,700	2.033
	Midge, *Chironomus plumosus*	25,934	NA	NA
25	Common carp, *Cyprinus carpio*	35,000	NA	NA
24	Snail, *Aplexa hypnorum*	34,914	193,000	0.181
23	Bluegill, *Lepomis macrochirus*	28,500	63,000	0.452
22	Goldfish, *Carassius auratus*	26,100	NA	NA
21	Snail, *Physa sp.*	24,100	NA	NA
20	White sucker, *Catostomus commersoni*	30,176	NA	NA
	Flannelmouth sucker *Catostomus latipinnis*	19,100	26,900	0.710
19	Arctic grayling *Thymallus articus*	15,675	56,081	0.280
18	Channel catfish, *Ictalurus punctatus*	13,600	66,000	0.206
17	Colorado squawfish, *Ptychocheilus lucias*	12,801	53,454	0.239
16	Mosquitofish, *Gambusia affinis*	12,600	NA	NA
15	Yellow perch, *Perca flavescens*	11,700	NA	NA
14	Golden shiner, *Notoemigonus crysoleucas*	11,200	NA	NA
13	Chinook salmon, *Oncorhynchus tshawytscha*	15,596	112,948	0.138

Table 3a. Ratios of Freshwater Species Mean Acute Values for Selenite and Selenate (continued).

Selenite Sensitivity Rank from Table 2a[a]	Species	Selenite Species Mean Acute Value (µg/L)[b]	Selenate Species Mean Acute Value (µg/L)[b]	Ratio
	Coho salmon, *Oncorhynchus kisutch*	7,240	33,972	0.213
	Rainbow trout, *Oncorhynchus mykiss*	10,488	47,000	0.223
12	Brook trout *Salvelinus fontinalis*	10,200	NA	NA
11	Bonytail *Gilas elegans*	9,708	37,586	0.258
10	Worm, *Tubifex tubifex*	7,710	NA	NA
9	Razorback sucker, *Xyrauchen texanus*	7,679	13,211	0.581
8	Flagfish, *Jordanella floridae*	6,500	NA	NA
7	Amphipod, *Gammarus pseudolimnaeus*	3,489	2,460	1.418
6	Fathead minnow, *Pimephales promelas*	2,209	12,282	0.180
5	Striped bass, *Morone saxatilis*	1,783	NA	NA
4	Hydra, *Hydra sp.*	1,700	7,300	0.233
3	Cladoceran, *Daphnia magna*	905.3	2,118	0.427
	Cladoceran, *Daphnia pulex*	1,987	1,528	1.300
2	Cladoceran, *Ceriodaphnia affinis*	<603.6	NA	NA
	Cladoceran, *Ceriodaphnia dubia*	440	376	1.170
1	Amphipod, *Hyalella azteca*	461.4	2,073	0.223

[a] Ranked from most resistant to most sensitive based on selenite Genus Mean Acute Value (from Table 2a).
[b] From Table 1a.
[c] NA = Not Available

Table 3b. Ratios of Saltwater Species Mean Acute Values for Selenite and Selenate.

Sensitivity Rank from Table 2b[a]	Species	Selenite Species Mean Acute Value (µg/L)[b]	Selenate Species Mean Acute Value (µg/L)[b]	Ratio
	SALTWATER SPECIES			
8	Striped bass, *Morone saxatilis*	3,036	9,790	0.310

[a] Ranked from most resistant to most sensitive based on Genus Mean Acute Value (from Table 2b).
[b] From Table 1b.

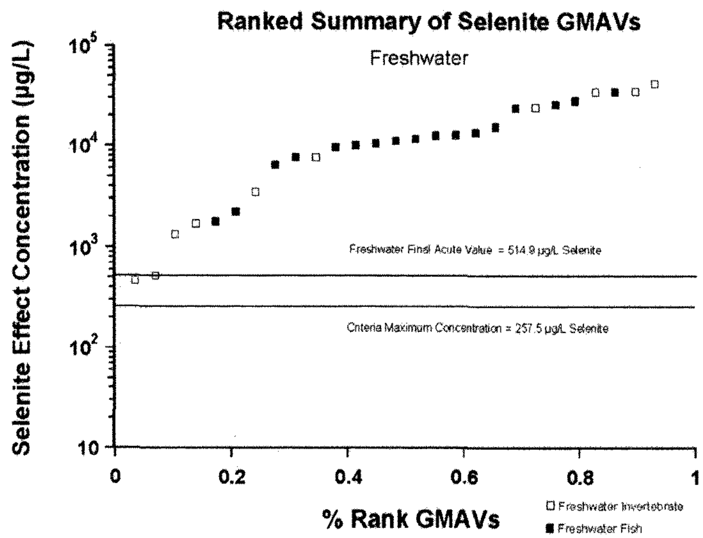


Figure 1. Ranked summary of selenite GMAVs (freshwater).

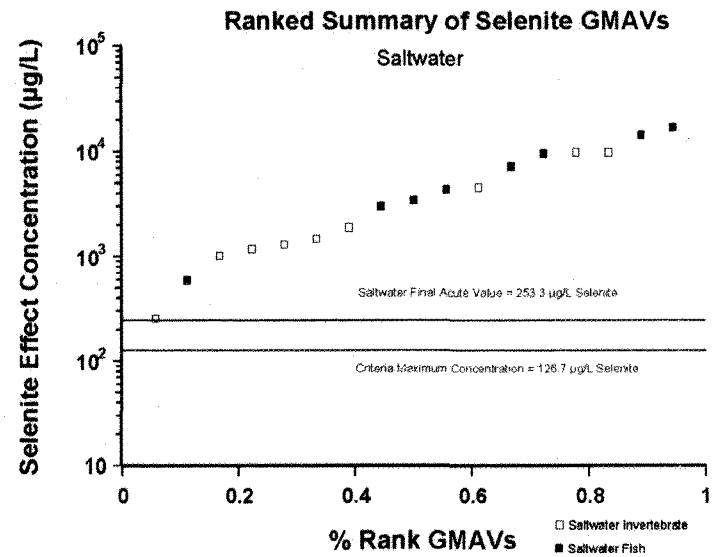


Figure 2. Ranked summary of selenate GMAVs (saltwater).

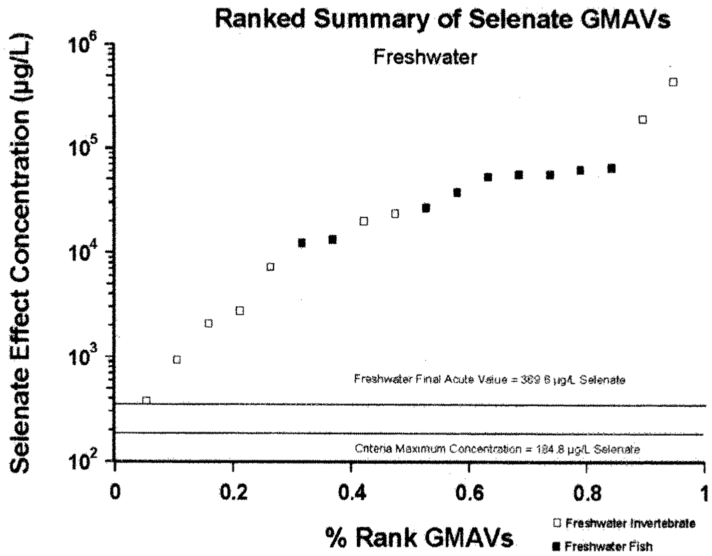


Figure 3. Ranked summary of selenate GMAVs (freshwater).

Review and Analysis of Chronic Data

Since the issuance of the 1987 chronic criterion of 5 µg/L, considerable information has come forth regarding the route of exposure of selenium to aquatic organisms. Studies have shown that diet is the primary route of exposure that controls chronic toxicity to fish, the group considered to be the most sensitive to selenium (Coyle et al. 1993; Hamilton et al. 1990; Hermanutz et al. 1996). Chronic tests in which test organisms were exposed to selenium only through water and which have measured selenium in the tissue of the test species have produced questionably low chronic values based on the tissue concentrations. Some of these water-only exposures have required aqueous concentrations of selenium of greater than 300 µg/L to attain body burdens sufficient to achieve a chronic response that would have been reached in the real world at aqueous concentrations approximately 30 times lower (Cleveland et al. 1993; Gissel-Nielsen and Gissel-Nielsen 1978).

Because diet controls selenium chronic toxicity in the environment and water-only exposures require unrealistic aqueous concentrations in order to elicit a chronic response, only studies in which test organisms were exposed to selenium in their diet alone or in their diet and water were considered in the derivation of a chronic value. To be able to use the chronic study results, the measurements had to include selenium in the test species tissue. Both laboratory and field studies were considered in the review process. Chronic studies reviewed were obtained through a literature search extending back to the last revision review, from information supplied to U.S. EPA through the Notice of Data Availability, and using the references cited in previous selenium criteria documents.

Selection of Medium for Expressing Chronic Criterion

Whole-body tissue concentration of selenium on a dry weight basis, for species eliciting the chronic response, was selected as the medium from which to base the chronic criterion value. As discussed above, a water-based criterion is not appropriate for selenium because diet being the most important route of exposure for chronic toxicity. The option of basing the chronic criterion on the concentration of selenium in prey species (that is, in the diet of the target species), was considered inappropriate for two reasons: 1) the concentration of selenium in the diet is an indirect measure of effects observed in the test species and is dependent on feeding behavior of the target species, and 2) selection of what organism to sample to assess attainment of a criterion based on diet is problematic in the implementation of such a criterion. Sediment has also been proposed as a medium upon which to base the selenium chronic criterion (Canton and Van Derveer 1997; Van Derveer and Canton 1997), but because of the patchiness of selenium in sediment and an insufficient amount of data to support a causal link between concentrations of selenium in sediment and chronic effects observed in fish (see Hamilton and Lemly 1999, for a review), a sediment-based criterion was not selected.

Besides being a direct link to chronic endpoints, a tissue-based criterion has the positive attributes of integrating many site-specific factors, such as chemical speciation and rates of transformation, large variations in temporal concentrations in water, types of organisms constituting the food chain, and rates of exchange between water, sediment, and organisms (Hamilton, in preparation; U.S. EPA 1998). Whole-body tissue was selected over specific tissue types, such as ovary, liver, kidney or muscle because of practical reasons of sampling and because a sufficient data base containing chronic effects based on whole-body tissue is present in the literature. Ovaries may be the best tissue to link selenium to chronic effects because of its role in the maternal transfer of selenium to eggs, and embryo-larval development being the most sensitive endpoint for chronic effects. However, ovarian tissue is also only available seasonally and sometimes difficult to extract in quantities sufficient for analysis, especially in smaller fish species. Whole-body larval tissue is also not practical due to sampling and seasonal constraints.

To increase the number of studies in which chronic effects could be compared with selenium concentrations in whole-body tissue, the relationship between selenium in whole-body was compared with ovary, liver and muscle tissues. Data from 12 studies that sampled whole-body as well as muscles, ovary, or liver allowed the projection of whole-body concentrations as a positive, linear function of concentrations in these individual tissues. It was not possible to estimate such relationship for kidneys and carcass because of insufficient data. Three species (rainbow trout, bluegill sunfish and largemouth bass) comprised over 95 percent of the data evaluated for these relationships.

Projections of whole-body concentrations of selenium as a linear function of concentrations of this element in muscles or ovaries appeared to be reliable (Figure 4; Appendix G; r^2 values of 0.92 and 0.84, respectively; $P < 0.01$ for both tests). Estimates from selenium concentrations in liver were not as precise ($r^2 = 0.61$), but the relationship was still highly significant ($P < 0.01$). Where appropriate, whole-body selenium concentrations were estimated from selenium concentrations in muscle, ovary and liver according to the following equations:

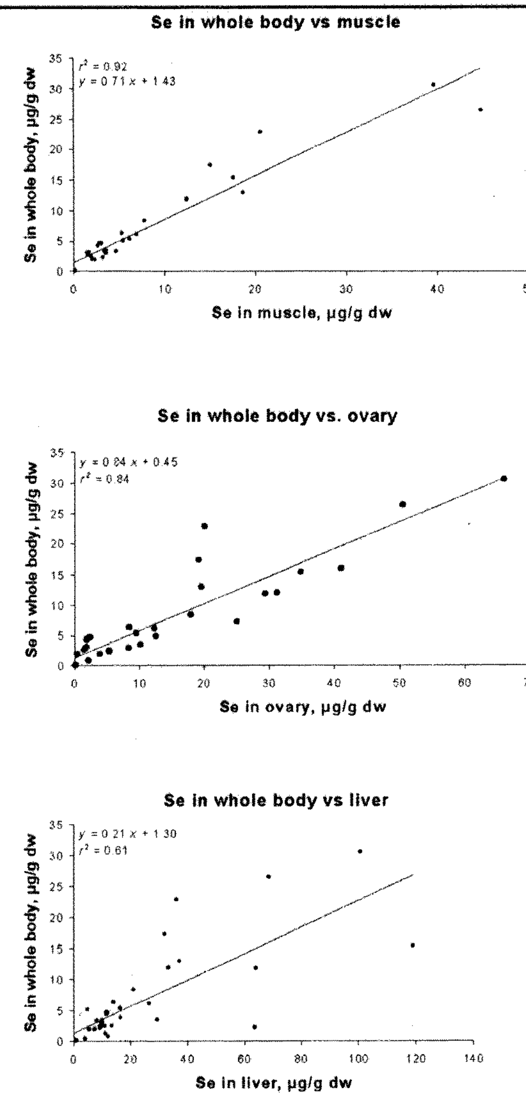


Figure 4. Linear regressions of selenium concentrations in all tissues (whole body) against concentrations in muscle, ovary and liver tissues. Data include multiple species of fish.

$$[Se_{whole\text{-}body}] = 0.71([Se_{muscle}]) + 1.43 \quad (I)$$

$$[Se_{whole\text{-}body}] = 0.84([Se_{ovary}]) + 0.45 \quad (II)$$

$$[Se_{whole\text{-}body}] = 0.21([Se_{liver}]) + 1.30 \quad (III)$$

Chronic studies that reported selenium concentrations in tissues based on wet weight were converted to dry weight using a moisture content of 0.80 (U.S. EPA 1985b).

Calculation of Chronic Values

In aquatic toxicity tests, chronic values are usually defined as the geometric mean of the highest concentration of a toxic substance at which no adverse effect is observed (highest no observed adverse effect concentration, NOAEC) and the lowest concentration of the toxic substance that causes an adverse effect (lowest observed adverse effect concentration, LOAEC). The significance of observed effects is determined by statistical tests comparing responses of organisms exposed to natural concentrations of the toxic substance (control) against responses of organisms exposed to elevated concentrations. Analysis of variance is the most common test employed for such comparisons. This approach however, has its limitations. Since neither NOAEC or LOAEC are known in advance and the number of concentrations that can be tested is constrained by logistic and financial resources, observed effects of elevated concentrations may not permit accurate estimates of chronic values. For instance, if all elevated concentrations had high adverse effects or if the difference in concentrations between two significantly different treatments was large, it would not be possible to define either the NOAEC or LOAEC with precision. Furthermore, as the concentration of some substances (e.g., selenium) naturally varies among ecosystems, a concentration that is above the normal range at one site, maybe within the normal range at a different location. In this approach to calculate chronic values, natural variation in concentrations of a substance implies that controls are site specific, and thus multiple tests are needed to define the chronic value at different locations.

An alternative approach to calculate chronic values focuses on the use of regression analysis to define the dose-response relationship. With a regression equation, which defines the level of adverse effects as a function of increasing concentrations of the toxic substance, it is possible to determine the concentration

that causes a relatively small effect, for example a 5 to 30 percent reduction in response. A reduction of 20 percent in the response observed at control (EC_{20}) was used as the chronic value because it represents a low level of effect that is generally significantly different from the control (U.S. EPA 1999). Smaller reductions in growth, survival, or other endpoints only rarely can be detected statistically. Effect concentrations associated with such small reductions have wide uncertainty bands, making them unreliable for criteria derivation. Adverse effects are generally modeled as a sigmoid function of increasing concentrations of the toxic substance (Figure 5).

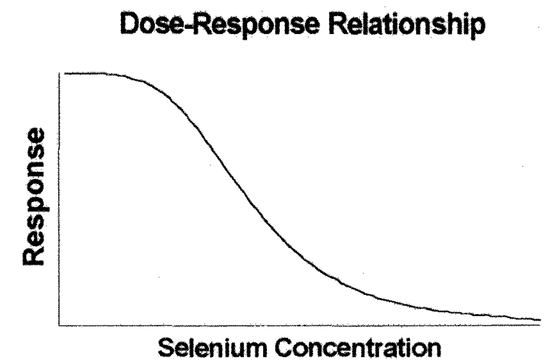


Figure 5. Reductions in survival, growth or other responses of organisms are often modeled as a sigmoid function of increasing concentrations of selenium, or any other toxic substance.

A logistic regression was used to model negative effects of increasing concentrations of selenium on growth, survival, or percent of normal individuals (without deformities) of several aquatic species. The equations that described such functions were then used to estimate the concentration that promoted a 20 percent reduction in response observed at control levels (EC_{20}). These analyses were performed using the Toxic Effects Analysis Model software (version 0.02; R. Erickson, U.S. EPA Duluth).

Only data sets that met the following conditions were included in the analysis: (1) the experiment had a control treatment, which made it possible to define response levels at natural concentrations of selenium, (2) and at least four concentrations of selenium. (3) The highest tested concentration of selenium caused >50 percent reduction relative to the control treatment, and (4) at least one tested concentration of selenium caused <20 percent reduction relative to the control treatment to ensure that the EC_{20} was bracketed by tested concentrations of selenium. When the response was expressed as percentages (e.g., percent survival), transformed values (arcsin of the square root) were used to homogenize the variance.

When the data from an acceptable chronic test met the conditions for the logistic regression analysis, the EC_{20} was the preferred chronic value. When data did not meet the conditions, best scientific judgment was used to determine the chronic value. In this case the chronic value is usually the geometric mean of the NOAEC and LOAEC. But when no treatment concentration was an NOAEC, the chronic value is less than the lowest tested concentration. And when no treatment concentration was a LOAEC, the chronic value is greater than the highest tested concentration.

Logistic regression assumes that a logistic model describes the log dose-response curve. For a visual display of such model, a logistic curve with three parameters was fitted to each data set using nonlinear least-squares regression analysis (Draper and Smith 1981). The logistic model was

$$y = \frac{y_0}{1 + ax^b}$$

where x symbolizes the selenium concentration in the organism's tissues, y is the response of interest (survival, growth, or reproduction), and y_0, a and b are model parameters estimated by the regression analysis. The y_0 parameter represents the response of interest at background levels of selenium. The graphs also include the 95 percent confidence interval for projections of the logistic model. These tasks were performed in S-Plus version 6.0 (Insightful 2001).

Evaluation of Freshwater Chronic Data for Each Species

Acceptable freshwater chronic toxicity data are currently available for an aquatic invertebrate (*Brachionus calyciflorous*), six different fish species, and a mix of fish species from the family Centrarchidae; total of 17 different studies (Table 4). Detailed summaries of each study are included in Appendix H. Collectively, only these data were considered for the derivation of a final tissue residue criterion for selenium. Below is a brief synopsis of the experimental design, test duration, relevant test endpoints, and other critical information regarding the derivation of each specific chronic value. The chronic toxicity values for other chronic selenium toxicity values and endpoints are included in Appendix H.

Brachionus calyciflorus (freshwater rotifer)

This study reported by Dobbs et al. (1996) is one of two laboratory-based experiments (also see Bennett et al. 1986) that involved exposing algae to selenium (in this case as sodium selenate) in water, and subsequently feeding the algae to rotifers which were in turn fed to fish (fathead minnows). In this particular study, the rotifers and fish were exposed to the same concentrations of sodium selenate in the water as the algae, but received additional selenium from their diet (i.e., the algae fed to rotifers and the rotifers fed to fish). The overall exposure lasted for 25 days. Rotifers did not grow well at concentrations exceeding 108.1 µg Se/L in water, and the population survived only 6 days at selenium concentrations equal to or greater than 202.4 µg Se/L in the water (40 µg/g dw in the algae). Regression analysis of untransformed growth data (dry weight) determined 4 day post-test initiation resulted in a calculated EC_{20} of 42.36 µg Se/g dw tissue (Table 4).

Oncorhynchus tshawytscha (chinook salmon)

Hamilton et al. (1990) conducted a 90-day growth and survival study with swim-up larvae fed one of two different diets. The first diet consisted of Oregon moist pellets where over half of the salmon meal was replaced with meal from selenium-laden mosquitofish (*Gambusia affinis*) collected from the San Luis Drain, CA (SLD diet). The second diet was prepared by replacing half the salmon meal in the Oregon moist pellets with meal from low-selenium mosquitofish (i.e., the same relatively uncontaminated mosquitofish that were used in the control diet) and spiked with seleno-DL-methionine (SeMe diet). Analysis of the trace element composition in the two different diets indicated that while selenium was the most toxic element in the SLD diet, concentrations of boron, chromium, iron and strontium in the high-selenium mosquitofish replacement diet (SLD diet type) were slightly elevated compared to the replacement diet composed of uncontaminated control mosquitofish that were spiked with organic selenium (SeMe diet type). These trace elements were, however, only 1.2 (e.g., iron) to 2.0 times (e.g., chromium) higher in the SLD diet than the SeMe diet, which contained the following measured concentrations (dry weight basis) in the food: boron- 10 µg/g; chromium- 2.8 µg/g, iron- 776 µg/g, and strontium- 48.9 µg/g.

During the test, the survival of control chinook salmon larvae and larvae fed the lowest dietary selenium concentrations in either dietary exposure type (SLD and SeMe, respectively, consuming food at approximately 3 µg Se/g dw) exceeded ≥97 percent up to 60 days post-test initiation. Between 60 and 90 days of exposure, however, the control survival declined significantly. Therefore, only data collected up to 60 days post-test initiation was considered for analysis. Regression analysis of untransformed growth data after 60 days of exposure resulted in a calculated EC_{20} of 15.74 µg Se/g dw tissue for fish fed the SLD diet type, and 10.47 µg Se/g dw tissue for fish fed the SeMe diet type (Table 4). Note: The mosquitofish from San Luis Drain were not tested for contaminants other than certain key elements suspected to be present in these fish. The San Luis Drain receives irrigation drainage from the greater San Joaquin Valley; and therefore, there is the possibility that the mosquitofish used in this study may have contained elevated levels of pesticides. The use of the SLD diet results assumes that selenium, and not these other possible contaminants, was the cause of any adverse chronic effects.

Oncorhynchus mykiss (rainbow trout)

Hilton and Hodson (1983) reared juvenile rainbow trout on either a high (25 percent) or low (1 percent) available carbohydrate diet supplemented with sodium selenite for 16 weeks. Body weights, feed:gain ratios, and total mortalities were followed throughout the exposure every 28 days. Tissues (livers and kidneys) were extracted for selenium analysis after 16 weeks. Fish fed the diets (low carbohydrate and high carbohydrate) with the highest selenium concentration (11.4 and 11.8 µg/g dw food, respectively) exhibited a 45 to 48 percent reduction in body weight (expressed as kg per 100 fish) compared to control fish by the end of the exposure, which the authors attributed to food avoidance. With only two dietary exposure concentrations and a control, these data were not amenable to regression analysis. The maximum acceptable toxicant concentration (MATC) for growth of juvenile rainbow trout relative to the final concentrations of selenium in liver tissue of trout reared on the high carbohydrate seleniferous dietary type is the geometric mean (GM) of 21.0 µg/g dw (NOAEC) and 71.7 µg/g dw (LOAEC), or 38.80 µg Se/g dw. Using the equation III to convert the selenium concentration in liver tissue to a concentration of selenium in the whole-body, the MATC becomes 9.659 µg/g dw (Table 4). The calculated MATC for the same group of experimental fish exposed to selenium in the low carbohydrate diet for an additional 4 weeks based on the occurrence of nephrocalcinosis in kidneys was estimated to be 10.42 µg Se/g dw tissue (see Hicks et al. 1984).

Hilton et al. (1980) employed a similar test design as Hilton and Hodson (1983) in a later experiment to examine the narrow window at which selenium changes from an essential nutrient to a toxicant affecting juvenile rainbow trout. The food consisted of a casein-torula yeast diet supplemented with selenium as sodium selenite. The experiment lasted for 20 weeks. During this time, the trout were fed to satiation 3 to 4 times per day, 6 days per week, with one feeding on the seventh day. Organs (liver and kidney) and carcasses were analyzed for selenium from fish sacrificed at 4 and 16 weeks. No gross histopathological or physiological effects were detected in the fish, although trout raised on the highest dietary level of

selenium (13.06 µg/g dw) had a significantly lower body weight (wet basis), a higher feed:gain ratio, and higher number of mortalities (10.7; expressed as number per 10,000 fish days). The MATC for growth and survival of juvenile rainbow trout relative to the final concentrations of selenium in whole-body tissue estimated from the selenium concentrations measured in the liver using the equation III is the GM of the NOAEC (9.710 µg/g dw tissue) and the LOAEC (22.31 µg/g dw tissue), or 14.72 µg/g dw tissue (Table 4).

Oncorhynchus clarki (cutthroat trout)

No significant effects of bioaccumulated selenium on mortalities and deformities in the eggs, larvae, and fry from wild-caught cutthroat trout from a reference and exposed site (Fording River, British Columbia, Canada) were observed by Kennedy et al. (2000). The observations were made on eggs reared in well water from spawning age females collected from the two locations (N = 17 and 20, respectively) and fertilized by one male collected at each site. The mean selenium content in muscle tissue from adult fish was 2.4 µg/g dw tissue for fish collected from the reference site, and 12.5 µg/g dw tissue for fish collected from the Fording River. Using Equation I to convert the selenium concentration in muscle tissue to a selenium concentration in the whole-body, the chronic value for this species was estimated to be >10.31 µg/g dw parental fish tissue (see Table 4).

Pimephales promelas (fathead minnows)

Chronic values for fathead minnows were derived from three laboratory-based studies and one mesocosm study (Table 4). Two of the laboratory studies (Bennett et al. 1986 and Dobbs et al. 1996) involved exposing algae to selenium (either as sodium selenite or sodium selenate) in water, and subsequently feeding the algae to rotifers which were in turn fed to fathead minnows. In the Bennett et al. (1986) study, larval fathead minnows were fed control (cultured in chambers without selenium containing algae) or selenium-contaminated rotifers (cultured in chambers with selenium containing algae previously exposed to sodium selenite in the water) in three separate experiments lasting 9 to 30 days. The different experiments were distinguished by: 1) the day selenium-laden rotifers were first fed, 2) the day selenium-laden rotifers were last fed, and 3) the age of larvae at experiment termination. The results from the three experiments reported by Bennett et al. (1986) were conflicting. Larval growth was significantly reduced at whole-body selenium concentrations ranging from 43.0 to 51.7 µg/g dw tissue in the first two experiments (see Appendix H for conditions), but growth was not significantly reduced in larvae that had accumulated 61.1 µg/g dw tissue in the third experiment (Table 4). The geometric mean of these three values, 51.40 µg/g dw, was considered the chronic value for selenium for this test.

A similar test system was used by Dobbs et al. (1996), in which larval fathead minnows were exposed to the same concentrations of sodium selenate in the water as their prey (rotifers), but also received additional selenium from the consumption of the selenium-contaminated rotifers, In this study, the fathead minnows did not grow well at concentrations exceeding 108.1 µg Se/L in water, and they survived only to 11 days at selenium concentrations equal to or greater than 393.0 µg/L in the water (75 µg Se/g dw in the diet, i.e., rotifers). The LOAEC for retarded growth (larval fish dry weight) in this study was <73 µg/g dw tissue (Table 4).

In contrast to the above laboratory-based food chain studies, Ogle and Knight (1989) examined the chronic effects of only elevated foodborne selenium on growth and reproduction of fathead minnows. Juvenile fathead minnows were fed a purified diet mix spiked with inorganic and organic selenium in the following percentages: 25 percent selenate, 50 percent selenite, and 25 percent seleno-L-methionine. The pre-spawning exposure lasted 105 days using progeny of adult fathead minnows originally obtained from the Columbia National Fishery Research Laboratory, and those obtained from a commercial fish supplier. After the 105 day exposure period, a single male and female pair from each of the respective treatment replicates were isolated and inspected for spawning activity for 30 days following the first spawning event of that pair. There was no effect from selenium on any of the reproductive parameters measured, including larval survival, at the dietary concentrations tested (5.2 to 29.5 µg/g dw food). Sub-samples of larvae from each brood were maintained for 14 days post-hatch and exhibited >87.4 percent survival. The pre-spawning adult fish fed a mean dietary level of 20.3 µg Se/g dw did exhibit a significant reduction in growth compared to controls (16 percent reduction), whereas no effect on growth occurred in the fish fed 15.2 µg/g dw. The whole-body chronic value, as determined by the GM of the NOAEC and the LOAEC measured at 98 days post-test initiation, was 5.961 µg/g dw tissue (Table 4).

The chronic value of 5.961 µg/g dw determined for growth after 98 days of exposure to pre-spawning fathead minnow adults (Ogle and Knight, 1989) was approximately an order of magnitude lower than the growth effects to fathead minnow observed in Bennett et al. (1986) and Dobbs et al (1996). The length of exposure in the Ogle and Knight test was more than twice as long as either Bennett et al. or Dobbs et al., suggesting a longer duration was needed in order to detect any growth effects from selenium. However, survival of larvae hatched from parents exposed to each of the five selenium treatments (including those in which growth was affected) was not affected.

Other studies (Bryson et al. 1984; Bryson et al. 1985a; Coyle et al. 1993; Hermanutz et al. 1996) have found larval deformities and larval survival to be the most sensitive endpoint to fish. This also appears true for fathead minnows. Schultz and Hermanutz (1990) examined the effects of selenium in fathead minnow larvae transferred from parental fish (females). The parental fathead minnows were originally exposed to selenite which was added to artificial streams in a mesocosm study. The selenite entered the food web which contributed to exposure from the diet. Spawning platforms were submerged into treated and control streams. The embryo samples that were collected from the streams were brought into the laboratory and reared in incubation cups which received stream water dosed with sodium selenite via a proportional diluter. Edema and lordosis were observed in approximately 25 percent of the larvae spawned and reared in natural water containing 10 µg Se/L. Selenium residues in the ovaries of females from the treated stream averaged 39.27 µg/g dw. Using equation II to convert the selenium concentration in the ovaries to a concentration of selenium in the whole-body, the chronic value for this species was estimated to be <18.99 µg/g dw (Table 4).

Since Ogle and Knight reported that food in the higher selenium concentrations remained uneaten and fish were observed to reject the food containing the higher selenium concentrations, the authors suggested that the decreased growth was caused by a reduced palatability of the seleniferous food items. This is a common observation also noted by Hilton and Hodson (1983) and Hilton et al. (1980) and apparent in Coughlan and Velte (1989). Given the no observed effect to larval survival and the apparent non-toxicological effect on growth in the Ogle and Knight study, the SMCV for fathead minnows does not include the 5.961 µg/g dw chronic value.

Lepomis macrochirus (bluegill sunfish)

Applicable chronic data for bluegill sunfish can be grouped according to field exposure versus laboratory exposure. In some field studies, chronic tolerance to selenium appears to be much higher than in laboratory studies (Bryson et al. 1985a; Lemly 1993b).

In the Bryson et al. (1984, 1985a) and Gillespie and Baumann (1986) studies, the progeny of females collected from a selenium contaminated reservoir, Hyco Reservoir, Person County, NC and artificially crossed did not survive to swim-up stage, irrespective of the origin of milt used for fertilization. Measured waterborne selenium concentrations prior to the experiments ranged from 35 to 80 µg/L. The whole-body tissue selenium concentration in the female parent associated with this high occurrence of mortality of hatched larvae was <43.32µg/g dw tissue, as reported by Bryson et al. (1985a), and <22.16

μg/g dw tissue, as reported by Gillespie and Baumann (1986) (Table 4). In the case of the latter, nearly all swim-up larvae from the Hyco Reservoir females were edematous, none of which survived to swim-up. These chronic effect tissue values are in line with the EC_{20} calculated for the occurrence of deformities among juvenile and adult fishes from the family Centrarchidae collected from Belews Lake, NC, i.e., 44.57 μg Se/g dw (see Lemly 1993b, Table 4).

In contrast, the chronic effects threshold for larval survival in a combination laboratory waterborne and dietary selenium exposure (Coyle et al. 1993), or even a long-term mesocosm exposure (Hermanutz et al. 1996), occurs at concentrations approximately 3 times lower than those recorded above (Table 4). In the Coyle et al. (1993) study, two-year old pond reared bluegill sunfish were exposed in the laboratory to a nominal 10 μg Se/L in water (measured concentrations in respective dietary treatments ranging from 8.4 to 11 μg/L) and fed (twice daily *ad libitum*) Oregon moist pellets containing increasing concentrations of seleno-L-methionine. The fish were grown under these test conditions for 140 days. Spawning frequency, fecundity, and percentage hatch were monitored after 60 days when spawning began to occur. There was no effect of the combination of the highest dietary selenium concentration (33.3 μg Se/g dw) in conjunction with waterborne selenium concentrations averaging 11 μg/L on adult growth, condition factor, gonadal somatic index, or the various reproductive endpoints (Appendix H). The survival of newly hatched larvae, however, was markedly reduced; only about 7 percent survived to 5 days post-hatch. Regression analysis on arcsin square root transformed fry survival data 5 days post-hatch resulted in a calculated EC_{20} of 8.95 μg Se/g dw tissue (Table 4).

Hermanutz et al. (1996), as corrected by Tao et al. (1999), exposed bluegill sunfish to sodium selenite spiked into artificial streams (nominal test concentrations: 0, 2.5, 10, and 30 μg Se/L) which entered the food web, thus providing a simulated field-type exposure (waterborne and dietary selenium exposure). A series of three studies were conducted over a 3 year period lasting anywhere from 8 to 11 months. Spawning activity was monitored in the stream, and embryo and larval observations were made *in situ* and from fertilized eggs taken from the streams and incubated in egg cups in the laboratory. None of the adult bluegill exposed to the highest concentration of selenium in the water (mean measured concentration equal to 29.4 μg/L) survived. Incidence of edema, hemorrhage, and lordosis in the larvae incubated in egg cups and spawned from fish exposed to 10 μg Se/L were 100, 45 and 15 percent, respectively (see Hermanutz 1996 in Appendix H). Such health problems were not observed in larvae from fish that were not exposed to elevated concentrations of selenium (control treatment). Rates of edema, hemorrhage, and lordosis occurrence in larvae (egg cup data) from fish exposed to 2.5 μg Se/L

The importance of diet in the bioaccumulation of selenium was demonstrated in one additional experiment. Study III consisted of the addition of new adult bluegill to the same streams that received the 2.5, 10 and 30 μg/L sodium selenite during previous studies, but with all dosing of selenite halted. The adult bluegills exposed only to dietary selenium present in the food web accumulated selenium to levels very near to the levels accumulated during Study II in which aqueous selenium was also present demonstrating the importance of diet on selenium accumulation. There were no effects (no effect on larval survival, 0 percent deformities, 0 percent hemorrhaging), on the bluegill progeny in Study III even from fish that accumulated 11.7 and 14.5 μg/g dw in the recovering 10 μg/L streams, and 17.3 μg/g dw in the recovering 30 μg/L stream. The lack of any effect on the Study III larvae suggests bluegill are more sensitive to a combined aqueous and dietary selenium exposure than they are to dietary only selenium.

Data from Lemly (1993a) indicate that over-wintering fish may be more susceptible to the effects of waterborne and dietary selenium due to increased sensitivity at low temperature. The authors exposed juvenile bluegill sunfish in the laboratory to waterborne (1:1 selenite:selenate; nominal 5 μg Se/L) and foodborne (seleno-L-methionine in TetraMin; nominal 5 μg Se/g dw food) selenium for 180 days. Tests with a control and treated fish were run at 4°C and 20°C with biological and selenium measurements made every 60 days. Survival, whole-body lipid content, and oxygen consumption were unaffected compared to control fish exposed at 20°C (whole-body selenium concentrations equal to 6 μg/g dw), whereas fish exposed to the combination low-level waterborne and dietary selenium at 4°C exhibited significantly elevated mortality (33.8 percent) relative to controls (2.7 percent), and exhibited significantly greater oxygen consumption and reduced lipid content, which are all indicative of an additional stress load. The chronic value for juvenile bluegill sunfish exposed to waterborne and dietary selenium at 4°C was <7.9 μg/g dw tissue.

Five of the studies discussed above evaluated the effects of selenium on fish larvae to which exposure was through the parents. Three of these studies collected adult fish from Hyco Reservoir to which the bluegill population had been exposed to elevated selenium concentrations for multiple generations (Bryson et al. 1984; Bryson et al. 1985a; Gillespie and Baumann 1986), whereas the other two studies exposed bluegill parents obtained from an uncontaminated source (Coyle et al. 1993; Hermanutz et al. 1996). The average of the chronic values reported for the Hyco studies were four times the values in the latter two studies. This difference may simply be the inability of the field tests to evaluate a lower effect concentration than that which occurs at the site. However, Bryson et al. (1985a) found no effects to larval survival from Hyco Reservoir females collected in an "unaffected area" containing 19.18 μg/g dw suggesting the possibility of tolerance through physiological or genetic adaptation of the previous exposed bluegill population at Hyco Reservoir.

Acquisition of tolerance to selenium has also been implied in the literature for other fish species. For example, Kennedy et al. (2000) suggested that the cutthroat trout collected from a stream containing 13.3 to 14.5 µg Se/L in the water column were tolerant at the cellular level explaining their ability to develop normally in the early life stages. Kennedy et al. reported the overall frequency of larval deformities in the exposed population was less than 1 percent, and in one fish containing eggs with 81.3 µg/g dw, there were 0.04 percent pre-ponding deformities and 3.3 percent larval mortalities. Other than the Kennedy et al. study, tolerance to selenium at the apparent most sensitive endpoint to fish, embryo-larval development, has not been reported in the literature and its reality is uncertain at this time. However, given the need to protect sensitive populations of species, the chronic values for the studies in which eggs and larvae were obtained from bluegill adults that were exposed to elevated selenium for multiple generations (i.e., Bryson et al. 1984; Bryson et al. 1985a; Gillespie and Baumann, 1986) were not included in the SMCV calculation.

Morone saxitilis (Striped bass)

The only remaining applicable chronic value for selenium was determined from a laboratory dietary exposure conducted using yearling striped bass (Coughlan and Velte 1989). During the experiment, the bass were fed contaminated red shiners (38.6 µg Se/g dw tissue) from Belews Lake, NC (treated fish) or golden shiners with low levels of selenium (1.3 µg/g dw tissue) purchased from a commercial supplier (control fish). The test was conducted in soft well water and lasted up to 80 days. During the experiment, all fish were fed to satiation 3 times per day. Control fish grew well and behaved normally. Treated fish behaved lethargically, grew poorly due to a significant reduction in appetite, and showed histological damage, all eventually leading to the death of the animal. The final selenium concentration in muscle of treated striped bass averaged from 17.50 to 20.00 µg/g dw tissue (assuming 80 percent moisture content), which was 3.2 to 3.6 times higher than the final selenium concentrations in control striped bass, which averaged 5.500 µg/g dw tissue. Using equation I to convert the selenium concentration in muscle tissue to a selenium concentration in the whole-body, the chronic value for this species was determined to be <17.50 µg/g dw (Table 4).

Formulation of the Final Chronic Value (FCV) for Selenium

The lowest GMCV in Table 4 is for bluegill, 9.5 µg/g dw whole body, which is the geometric mean of chronic values from the laboratory study of Coyle et al. (1993), the laboratory study of Lemly (1993a), and the macrocosm exposure study of Hermanutz et al. (1996). The "less than" values tabulated for Bryson et al. (1984) and Gillespie and Baumann (1986) for Hyco Reservoir bluegill did not contribute to this mean because they only indicate a chronic value in a range that includes 9.5 µg/g dw.

The Table 4 results for Bryson et al. (1985a) and Lemly (1993b) were also not used in calculating the bluegill GMCV. Bryson et al. (1985a) indicated a chronic value for Hyco Reservoir bluegill somewhere between 19.18 and 43.43 µg/g dw. Lemly (1993b), appearing in Table 4 under the category Centrarchidae, the family that includes bluegill, yielded a Belews Lake chronic EC20 of 44.57 µg/g dw, again substantially above the GMCV of 9.5 µg/g dw. It is not known whether historical exposure to elevated selenium concentrations, such as occurred at Belews Lake and Hyco Reservoir, will dependably lead to this magnitude of increase in the chronic tolerance of resident fish.

The Lemly (1993a) laboratory results, indicating a chronic value <7.9 µg/g dw, are not completely comparable to the other results used to calculate the bluegill GMCV. Lemly (1993a) involved an additional natural stress, exposure to a winter low temperature of 4°C. This appeared to reduce the tissue concentration associated with reduced survival. Because this stress occurs annually to one degree or another in nearly all the country, the FCV was lowered to 7.9 µg/g dw. Although the literature contains little information on the temperature-dependence of selenium toxicity, Lemly's study (further summarized in Appendix H) was judged to be sufficiently definitive to merit lowering the FCV.

The Guidelines indicate that the chronic criterion (in this case the FCV) is intended to be a good estimate of the threshold for unacceptable effect. The Guidelines point out that the threshold for unacceptable effect does not equate with a threshold for any adverse effect. Some adverse effects, possibly even a small reduction in survival, growth, or reproduction, may occur at this threshold. If bluegill is as sensitive as indicated by the Lemly (1993a) results, a minor reduction in survival (compared to populations accumulating lesser concentrations of selenium or exposed to less severe winter temperatures) would occur at the FCV. Nevertheless, other studies, those of Lemly (1993b) and Bryson et al. (1985a), suggest that historically exposed populations would not be as sensitive as the organisms studied by Lemly (1993a).

The FCV may not necessarily protect fish in artificial environments where they are exposed only via water and not via diet. If the organisms are provided with an uncontaminated diet, then exceedingly high water concentrations, possibly above the acute criterion, are needed to elicit effects, but such effects may occur at tissue concentrations below the FCV (Cleveland et al. 1993; Gissel-Nielsen and Gissel-Nielsen 1978). This is not a practical limitation, however, since water-only exposure of selenium is not representative of the actual exposure of selenium to aquatic organisms in the environment.

Although this aquatic life criterion was not developed with the intent of protecting terrestrial wildlife, the FCV is expected to be protective of birds dependent on an aquatic food chain. Adverse effects to waterfowl, shorebirds and piscivorus birds have been associated with elevated selenium concentrations at several western locations, notably at Kesterson Reservoir in the San Joaquin Valley, California (Burton et al. 1987b; Horne 1991; Ohlendorf 1986; Ohlendorf et al. 1986a,b; Saiki 1986a,b). An effect level was determined in the laboratory by Heinz et al. (1987) through feeding adult mallards and their ducklings food that contained selenite or selenomethionine. The number of 21-day old ducklings per hen was 9.7 for the controls and 2.0 for the animals that received food containing 10 µg/g selenomethionine. The treatments receiving 10 and 25 µg/g selenite produced 8.1 and 0.2 ducklings per hen, respectively. Food containing 10 µg/g selenomethionine resulted in nearly ten times as much selenium in eggs as did food containing 10 µg/g selenite. Selenomethionine resulted in more selenium in egg white than yolk, but the opposite was true for selenite. Adult mallards fed diets containing 10 µg/g seleno-DL-methionine for 76 days (Heinz and Hoffman 1998) displayed reduced hatching success, reduced survival of ducklings and produced a higher percentage of deformities when compared to the control group. Adults exposed under control conditions produced an average of 7.6 young per female, and 6.1 percent of the embryos had deformities. Females fed 10 µg/g selenomethionine produced an average of 2.8 young and 36.2 percent of the embryos had deformities.

A way to estimate risk to birds is to compare the FCV to effect levels derived for selenium in the diet of piscivorus birds. Opresko et al. (1995) derived chronic No Observed Adverse Effect Levels (NOAEL) and Lowest Observed Adverse Effect Levels (LOAEL) for three piscivorus birds: belted kingfisher, great blue heron and osprey, using the mallard data generated by Heinz et al. (1987). From the NOAELs and LOAELs, they calculated the dietary concentration in food of the contaminant that would result in a dose equivalent to the NOAEL and LOAEL (assuming no exposure through other environmental media). The chronic values for these birds, including the GM of the two dietary levels, are given in the following table:

Dietary Levels[a] for Selenite			
Species	dietary level that would result in a dose equivalent to the NOAEL, µg/g dw	dietary level that would result in a dose equivalent to the LOAEL, µg/g dw	dietary level that would result in a dose equivalent to the MATC, µg/g dw
belted kingfisher	9.5	18.5	13.26
great blue heron	10.5	21.5	15.02
osprey	11	22	15.56

Dietary Levels[a] for Selenomethionine			
Species	dietary level that would result in a dose equivalent to the NOAEL, µg/g dw	dietary level that would result in a dose equivalent to the LOAEL, µg/g dw	dietary level that would result in a dose equivalent to the MATC, µg/g dw
belted kingfisher	7.5	15	10.61
great blue heron	8.5	17	12.02
osprey	8.5	17.5	12.20

a Converted from wet weight to dry weight using a moisture content of 0.80 (U.S. EPA 1985b).

Comparing the FCV with the dietary levels that would result in a dose equivalent to the MATC indicates piscivorus birds would be protected from unacceptable effects if their diet (fish) is maintained or kept below the FCV. This assessment assumes that there is minimal exposure of selenium from other sources. Opresko et al. (1995) estimate the concentration of selenium in water needed to produce effects at the NOAEL and LOAEL for these birds ranges from 6,800 to 8,700 µg/L, which is approximately 1000 times the concentration of waters in which fish would be approaching the FCV level. Exposure of selenium to these birds through the intake of water at 1,000 times lower than the effect level would therefore be a minimal exposure.

FCV Relative to Natural Background Levels of Selenium in Fish

As an essential element, selenium naturally occurs in all living things. Since selenium is found in all fish, two questions arise. 1) How close is the FCV of 7.9 µg/g dw to natural background levels in fish, and 2) how frequently do natural selenium tissue concentrations exceed the FCV. The latter situation would pose problems in the implementation of the FCV as an ambient water quality criterion.

As part of the National Contaminant Biomonitoring Program, the U.S. Fish and Wildlife Service collected fish from 112 sites distributed evenly across the U.S. during 1979 through 1981 and measured several contaminants including selenium (Lowe et al. 1985). Selenium, measured in 591 fish representing 60 different species, ranged from 0.3 to 10.5 µg/g dw and had an overall average and standard deviation of 1.9 ± 1.4 µg/g dw.

A separate data set of selenium measured in macroinvertebrates and fish collected from 48 reference sites in USGS's National Water Quality Assessment (NAWQA) program. NAWQA is intended to measure water quality in a sampling of smaller watersheds having known land use. The categories of such land use span a wide range, and include residential, industrial, agricultural, and mixed, among others. The 48 sites evaluated for this comparison excluded watersheds with land use listed as anything other than "reference". Among these reference sites, whole body fish tissue concentrations ranged from 0.7 to 9.83 µg/g dw and had an overall average and standard deviation of 2.99 ± 1.96 µg/g dw. The distribution of both these data sets indicates that the FCV would not be in the range of natural background concentration for selenium in over 98 percent of fish collected across the United States (Figure 6; Appendix I). The FCV is therefore sufficiently greater than natural selenium levels that unavoidable exceedances of the criterion are unlikely.

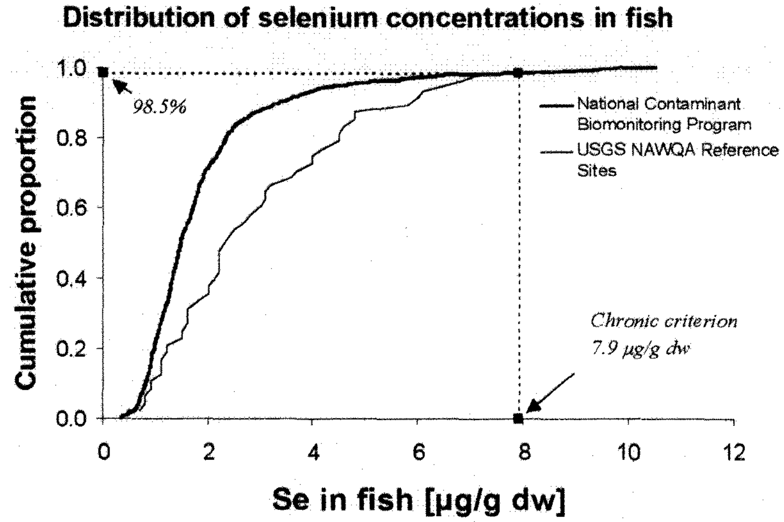


Figure 6. Cumulative distribution of selenium (whole-body, µg/g dw) in 591 fish samples from 112 sites across the United States. From Lowe et al. 1985.

Table 4. Freshwater Chronic Values from Acceptable Tests

Species	Reference	Exposure route	Selenium form	Toxicological endpoint	Chronic value, µg/g dw[a]	SMCV µg/g dw	GMCV µg/g dw
Brachionus calyciflorus rotifer	Dobbs et al. 1996	dietary and waterborne (lab)	algae exposed to SeVI in water, algae then fed to rotifers	EC_{20} for rotifer dry weight after 4 d	42.36	42.36	42.36
Oncorhynchus tshawytscha chinook salmon	Hamilton et al. 1990	dietary (lab)	Se-laden mosquitofish from San Luis Drain, CA	EC_{20} for juvenile growth	15.74 (juvenile tissue)		
Oncorhynchus tshawytscha chinook salmon	Hamilton et al. 1990	dietary (lab)	Mosquitofish spiked with seleno-DL-methionine	EC_{20} for juvenile growth	10.47 (juvenile tissue)	12.84	
Oncorhynchus mykiss rainbow trout	Hilton and Hodson 1983; Hicks et al. 1984	dietary (lab)	sodium selenite in food preparation	MATC for juvenile growth; nephrocalcinosis	9.659[b] (juvenile tissue)		>11.64
Oncorhynchus mykiss rainbow trout	Hilton et al. 1980	dietary (lab)	sodium selenite in food preparation	MATC for juvenile survival and growth	14.72[b] (juvenile tissue)	11.92	
Oncorhynchus clarki cutthroat trout	Kennedy et al. 2000	dietary and waterborne (field - Fording River, BC)	not determined	Chronic value for embryo/larval deformities and mortality	>10.31[c] (parent tissue)	>10.31	
Pimephales promelas fathead minnow	Bennett et al. 1986	dietary (lab)	algae exposed to selenite then fed to rotifers which were fed to fish	Chronic value for larval growth	51.40 (larval tissue)		
Pimephales promelas fathead minnow	Ogle and Knight 1989	dietary (lab)	mix of 25, 50, and 25 percent selenate, selenite, and seleno-L-methionine in food preparation	MATC for pre-spawning adult growth	5.951[d] (pre-spawning adult tissue)	41.46	41.46
Pimephales promelas fathead minnow	Dobbs et al. 1996	dietary and waterborne (lab)	algae exposed to selenate in water then fed to rotifers which were fed to fish	LOAEC for larval fish dry weight after 8 d	<73 (larval tissue)		
Pimephales promelas fathead minnow	Schultz and Hermanutz 1990	dietary and waterborne (mesocosm - Monticello)	selenite added to artificial streams which entered food web and provided dietary exposure	Chronic value for larval edema and lordosis	<18.99 (parent tissue)		
Lepomis macrochirus bluegill	Bryson et al. 1984	dietary and waterborne (field - Hyco Reservoir, NC)	not determined	Chronic value for larval mortality	<61.07[c,d] (parent tissue)		
Lepomis macrochirus bluegill	Bryson et al. 1985a	dietary and waterborne (field - Hyco Reservoir, NC)	not determined	Chronic value for swim-up larvae	<43.32[c,d] >19.18[c,d] (parent tissue)		
Lepomis macrochirus bluegill	Gillespie and Baumann 1986	dietary and waterborne (field - Hyco Reservoir, NC)	not determined	Chronic value for larval survival	<28.20[d] (larval tissue); or <22.16[d,e] (parent tissue)	9.500	9.500
Lepomis macrochirus bluegill	Coyle et al. 1993	dietary and waterborne (lab)	diet: seleno-L-methionine water: 6:1 selenate:selenite	EC_{20} for larval survival	8.954 (parent tissue - females only)		
Lepomis macrochirus bluegill	Lemly 1993a	dietary and waterborne (lab)	diet: seleno-L-methionine water: 1:1 selenate:selenite	Chronic value for juvenile mortality	<7.9 (juvenile tissue)		

Species	Reference	Exposure route	Selenium form	Toxicological endpoint	Chronic value, µg/g dw[a]	SMCV µg/g dw	GMCV µg/g dw
Lepomis macrochirus bluegill	Hermanutz et al. 1996	dietary and waterborne (mesocosm - Monticello)	selenite added to artificial streams which entered food web and provided dietary exposure	LOAEC for larval survival, edema, lordosis and hemorrhaging	12.12 (parent tissue)		
Centrarchidae (9 species)	Lemly 1993b	dietary and waterborne (field - Belews Lake, NC)	not determined	EC_{20} for deformities among juveniles and adults	44.57 (juvenile and adult tissue)	NA	NA
Morone saxitilis striped bass	Coughlan and Velte 1989	dietary (lab)	Se-laden shiners from Belews Lake, NC	Chronic value for survival of yearling bass	<17.50[c] (juvenile tissue)	<17.50	<17.50

[a] All chronic values reported in this table are based on the measured or estimated (see footnotes below) concentration of selenium in whole body tissue.
[b] Estimated using the equation III.
[c] Estimated using the equation I.
[d] Chronic value not used in SMCV calculation (see text).
[e] Estimated using the equation II.

National Criteria

The available data for selenium, evaluated using the procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (Stephan et al. 1985) indicate that, except possibly where an unusually sensitive species is important at a site, freshwater aquatic life should be protected if the concentration of selenium in whole-body fish tissue does not exceed 7.9 µg/g dry weight, and if the short-term average concentration of selenium dissolved in the water seldom exceeds 185 µg/L.

The available data for selenium, evaluated as above, indicate that saltwater aquatic life should likewise be protected if the short-term average concentration of dissolved selenium seldom exceeds 127 µg/L. If selenium is as chronically toxic to saltwater fishes as it is to freshwater fishes, the status of the fish community should be monitored if selenium exceeds 7.9 µg/g dw in the whole-body tissue of salt water fishes.

Implementation

As discussed in the Water Quality Standards Regulation (U.S. EPA 1983b), a water quality criterion for aquatic life has regulatory force only after it as been adopted in a state or tribal water quality standard. Such a standard specifies a criterion for a pollutant that is consistent with a particular designated use. With the concurrence of the U.S. EPA, states and tribes designate one or more uses for each body of water or segment thereof and adopt criteria that are consistent with the uses (U.S. EPA 1983c, 1987b). In each standard, a state or tribe may adopt the national criterion (if one exists), or an adequately justified state-specific or site-specific criterion.

State-specific or site-specific criteria may include not only criterion concentrations (U.S. EPA 1983c), but also state-specific or site-specific, and possibly pollutant-specific, durations of averaging periods and frequencies of allowed excursions (U.S. EPA 1985c). Because the chronic criterion is tissue-based for selenium, the averaging period only applies to the acute criterion, which is defined as a short-term average, based on the nature of the toxicity tests used for its derivation, and the speed at which effects may occur in such tests. Implementation guidance on using criteria to derive water quality-based effluent limits is available in U.S. EPA (1985c and 1987b).

United States Environmental Protection Agency | Office of Water 4304 | EPA-822-R-98-007 September 1998

EPA

Report on the Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation

September 1998

REPORT ON THE PEER CONSULTATION WORKSHOP ON SELENIUM AQUATIC TOXICITY AND BIOACCUMULATION

September 1998

Office of Water
U.S. Environmental Protection Agency
Washington, DC

NOTE

This report was prepared by Eastern Research Group, Inc., a contractor to the U.S. Environmental Protection Agency (EPA), as a general record of discussion during the peer consultation workshop. As requested by EPA, this report captures the main points of scheduled presentations and discussions, and a summary of comments offered by observers attending the workshop; the report is not a complete record of all details discussed, nor does it embellish, interpret, or enlarge upon matters that were incomplete or unclear. This report will be used by EPA as an early scientific assessment of technical issues associated with selenium aquatic toxicology and bioaccumulation and will serve as a technical resource during EPA's review of freshwater selenium aquatic life criteria. The information in this document does not necessarily reflect the policy of the U.S. Environmental Protection Agency and no official endorsement should be inferred. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

ACKNOWLEDGMENTS

This document summarizes the proceedings and presentations made at a 2-day workshop sponsored by the U.S. Environmental Protection Agency (EPA) to discuss selenium aquatic toxicology and bioaccumulation. The meeting was chaired by Anne Fairbrother of ecological planning and toxicity, inc., who wrote the overall meeting summary section and led one of the discussion sessions. Other discussion leaders included William Adams (Kennecott Utah Copper Corporation), Steven Hamilton (U.S. Geological Survey) and William Van Derveer (Colorado Springs Utilities). Technical presentations were made by A. Dennis Lemly (Virginia Tech University) and George Bowie (Tetra Tech, Inc.). Keith Sappington of EPA's Office of Water served as the Work Assignment Manager for this task. Kate Schalk, Rebekah Lacey, Lauren Lariviere, and Beth O'Connor of Eastern Research Group provided support services to plan and coordinate the workshop and prepare a summary report for task 98-09 under EPA Contract No. 68-D5-0028.

OBTAINING COPIES OF THIS DOCUMENT

Copies of this document may be obtained by contacting the U.S. EPA, National Center for Environmental Publications and Information (NCEPI), 11029 Kenwood Road, Cincinnati, Ohio, 45242, phone (513) 489-8190. In addition, the document will soon be published on the world wide web at http://www.epa.gov/ost/selenium.

CONTENTS

PREFACE

Under section 304(a) of the Clean Water Act, the U.S. Environmental Protection Agency (EPA) publishes ambient water quality criteria which serve as guidance to States and Tribes for setting enforceable water quality standards. Water quality standards form the basis for establishing pollutant discharge limits under the National Pollutant Discharge Elimination System (NPDES) and for setting Total Maximum Daily Loads (TMDLs). Given the importance of 304(a) criteria to the regulation of pollutant discharges to the Nation's waters, these criteria must be reviewed and revised periodically to reflect the latest scientific information.

Selenium is one chemical for which 304(a) aquatic life criteria have been derived, but which is currently undergoing review by EPA. Selenium exhibits a number of chemical and toxicological properties that complicate the derivation of numeric aquatic life criteria. Among these are: (1) its existence in at least four different oxidation states in the aquatic environment, (2) its propensity to bioaccumulate in aquatic food webs, and (3) its ability to convert between different chemical forms.

On May 27 and 28, 1998, EPA sponsored a workshop entitled: *Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation.* The goal of this peer consultation was to obtain early assessment of the state of the science on various technical issues associated with deriving aquatic life criteria for selenium. This document presents the proceedings from this workshop and is considered by EPA to be a valuable technical resource for future refinement of EPA's aquatic life criteria for selenium.

I. INTRODUCTION

Background

Selenium, a metalloid that is released to water from both natural and anthropogenic sources, can be highly toxic to aquatic life at relatively low concentrations. Selenium is also an essential trace nutrient for many aquatic and terrestrial species. Derivation of aquatic life criteria for selenium is complicated by its complex biogeochemistry in the aquatic environment. Specifically, selenium can exist in several different oxidation states in water, each with varying toxicities, and can undergo biotransformations between inorganic and organic forms. The biotransformation of selenium can significantly alter its bioavailability and toxicity to aquatic organisms. Selenium also has been shown to bioaccumulate in aquatic food webs, which makes dietary exposures to selenium a significant exposure pathway for aquatic organisms.

The most recent aquatic criteria for selenium were derived by the U.S. Environmental Protection Agency (EPA) in 1987. At the time of their publication, these criteria could not be conveniently adjusted to account for the combined toxicities of different selenium forms. Since then, a substantial body of literature has accumulated on the aquatic toxicity of different selenium forms (in combination and in isolation). In response to this and other new information, EPA has initiated an effort to evaluate and revise acute and chronic aquatic life criteria and site-specific criteria guidelines for selenium.

As part of this effort, EPA sponsored a Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation on May 27-28, 1998. This workshop brought together nine experts on the aquatic chemistry and biology of selenium to discuss technical issues underlying the freshwater aquatic life chronic criterion. The discussion among the experts was guided by questions posed in a technical charge written by EPA. While focusing on issues related to the chronic criterion, the charge also touched on technical questions pertinent to acute criteria, wildlife criteria, and site-specific criteria guidelines. The output from this meeting (recommendations in response to the technical charge) will be considered by an EPA-established work group that will be responsible for revising freshwater selenium criteria and for developing guidance for site-specific criteria.

Before the workshop, the experts submitted individual responses to the questions in the technical charge. At the workshop, the experts heard presentations by two leading selenium researchers; they then collectively discussed the questions in the technical charge and related issues. This report presents the results of this peer consultation. Section II of this report presents the chair's summary of the overarching themes and recommendations that emerged from the workshop. Section III summarizes the discussions and specific conclusions concerning each question in the technical charge. Section IV summarizes comments presented by observers at the meeting. Section V lists the references cited in the report.

Workshop materials, including the agenda and lists of experts, presenters, and observers, are provided in Appendix A. Appendix B includes the technical charge to the experts and background materials. Appendix C presents the experts' premeeting comments. Additional references provided by experts, presentation materials, and observer presentations are included in Appendices D, E, and F respectively.

Summary of Opening Remarks

Dr. Jeanette Wiltse, director of the Health and Ecological Criteria Division of EPA's Office of Water, opened the meeting and welcomed participants. She said that the peer consultation process allows EPA to benefit from the knowledge and experience of experts in the field, obtaining better understanding of the problem and new perspectives. She thanked the experts for their time and effort.

Dr. Wiltse commented that metals present a technically complex problem when developing water criteria. One key issue is the balance between sufficiency and toxicity: Many metals (including selenium) are required by organisms in small amounts, but are toxic in larger amounts. She predicted that the experts would find the selenium discussion challenging and thanked them again for participating in the consultation.

Keith Sappington, also of the Health and Ecological Criteria Division, then presented an overview and background of the revision of EPA's freshwater aquatic life criteria for selenium. He said that the purpose of the consultation was to provide an early assessment of the science on a number of the technical issues associated with the criteria, and that EPA would use this information as a basis for moving forward through the criteria revision process. He explained that the impetus for EPA's review of the selenium criteria included:

- New data and concern over the level of protection (too high or too low?).
- Ecological importance (as selenium is both an essential trace nutrient and a toxicant).
- The need to address the toxicity and bioavailability of different selenium forms.
- The need for site-specific criteria modification procedures (taking into account bioaccumulation and food-web exposure).

He added that some fundamental issues EPA is facing in the development of the new criteria include determining in which environmental compartment to express the criteria, establishing the duration of the averaging period, and identifying the key factors affecting the toxicity and bioaccumulation of selenium.

Mr. Sappington emphasized that the focus of the peer consultation would be on technical issues underlying the freshwater aquatic life chronic criterion. He reminded the experts that discussion of risk management or policy decisions would not be appropriate to this forum. He discussed the key steps that EPA would undertake in its criteria review process and concluded by presenting a rough timeline for the development of the revised criteria. (See Appendices B and E for more detail.)

Dr. Anne Fairbrother, the workshop chair, then discussed the workshop structure and objectives, reminding experts again to focus only on reviewing the state of the science; she added that waterbirds would not be considered in the discussion. (See Appendix E for presentation materials.)

Opening Presentations

Belews Lake: Lessons Learned

Dr. A. Dennis Lemly of the Department of Fisheries and Wildlife at Virginia Tech University gave a presentation entitled "Belews Lake: Lessons Learned." (See Appendix E for presentation materials.) Belews Lake is a reservoir in the northwestern Piedmont area of North Carolina. The reservoir is hydrologically divided by a highway crossing into a main lake and the "158-Arm." The main lake received selenium input from disposal of waste ash from a coal-fired power plant. Inputs occurred over a 10-year

period, stopping in 1985. The combination of a period of ongoing inputs and a period of declining selenium concentrations has allowed researchers to obtain a great deal of information on tissue residue levels and effects. Dr. Lemly's summary of the key information gained from research at Belews Lake is as follows:

Main Lake Studies:

A concentration of ~10 µg/L dissolved selenium (about 80-90% selenite as it entered the lake) can bioaccumulate in aquatic food chains and cause massive reproductive failure in warm-water fish. Centrarchids (e.g., largemouth bass, bluegill, crappie, sunfish) are among the most sensitive to elevated selenium; forage species such as red shiners, fathead minnows, and mosquitofish are relatively tolerant (Cumbie and Van Horn, 1978; Lemly, 1985).

Once ecosystem equilibration to ~10 µg/L has occurred in this type of a reservoir setting, natural removal/cleansing processes operate very slowly. Elevated residues and toxic (teratogenic) effects in fish were evident 10 years after selenium inputs stopped and waterborne concentrations dropped below 1 µg/L (Lemly, 1997); consumption advisories are still in effect because of public health concerns. Complete recovery can be on the order of decades.

Dietary selenium was the most important source leading to effects in fish. Across years, the sediment/detrital route of exposure delivered the most consistent dose to fish (i.e., residues in benthos were consistently high). However, within a given year, residues in the waterborne/planktonic route of exposure were occasionally as high as in the benthic pathway (70-90 µg/g dry weight, especially in summer). Thus, each route of exposure delivered a toxic dose to fish. Planktivores, omnivores, insectivores, and piscivores were all similarly affected.

158-Arm Studies:

Concentrations of 0.2-4 µg/L dissolved selenium in the 158-Arm bioaccumulated to levels that caused teratogenic deformities and chronic selenosis (pathological lesions) in sensitive fish species (e.g., bluegill and green sunfish) (Sorensen et al., 1984; Lemly, 1993a, 1997).

Concentrations of 0.2-4 µg/L dissolved selenium bioaccumulated to >25 µg/g dry weight in aquatic food-chain organisms. This concentration is over five times the chronic dietary toxicity threshold for freshwater fish and aquatic birds, as determined in laboratory studies (i.e., 3-5 µg/g; Lemly 1993b).

Selenium concentrations in fish (especially bluegill) reached levels equal to or greater than those that caused reproductive failure in artificial crosses of bluegill from a sister lake (Hyco Reservoir; 38-54 µg/g dry weight whole body concentrations in fish; Cumbie and Van Horn, 1978; Holland, 1979; Gillespie and Baumann, 1986), and reproductive failure in laboratory feeding experiments with bluegill (13 and 33 µg/g dry weight in fish diets; Woock et al., 1987; Coyle et al., 1993).

Related Laboratory Studies:

Exposure to waterborne (only) selenium (selenite) at concentrations of 10 µg/L does not affect survival of juvenile bluegill. Although some bioconcentration occurs, residues in tissues do not reach the toxic threshold (Lemly, 1982).

Conditions mimicking those in the Belews 158-Arm (4-5 µg/L dissolved selenium; 5 µg/g dry weight dietary selenium) can induce physiological and metabolic stress in young centrarchids, resulting in significant mortality during cold weather due to Winter Stress Syndrome (Lemly, 1993c, 1996). Thus, time of year may be an important factor in the toxicity process when concentrations are near the current EPA criterion for chronic exposure (5 µg/L).

Conclusions:

Because of the extensive and rapid collapse of fish populations, the main body of Belews Lake has received most of the research focus and notoriety. However, the 158-Arm provides valuable information on selenium bioaccumulation and effects when waterborne concentrations are below the EPA national criterion for chronic exposure (5 µg/L).

Historic and current reference to the 158-Arm as "unaffected" (e.g., EPA 1998 Draft Field Study Summary) are incorrect. Multiple lines of evidence from this field site, (diagnostic residues, tissue pathology, teratogenic deformities) as well as associated laboratory studies (simultaneous water/diet exposures), indicate that selenium can become toxic to fish when waterborne concentrations are 4 µg/L or less. The affected taxa include widely distributed, economically and recreationally important species such as largemouth bass and bluegill. In this type of field setting, the threshold for detrimental impacts is well below 5 µg/L.

The most sensitive biological endpoint for detecting toxicity in fish (that has demonstrated impacts at a population and community level) is reproductive failure (i.e., teratogenic deformities and associated embryomortality that occur shortly after hatching). Winter Stress Syndrome may be a more sensitive indicator but it has not been confirmed in field studies.

From a toxicity perspective, the point of effect is the fish's reproductive tissue (i.e., eggs). The toxic threshold for selenium in eggs (10 µg/g dry weight) is consistent regardless of the source or chemical form of selenium in an aquatic system. Pairing water and egg concentrations gives a direct source-fate, cause-effect linkage that integrates all aspects of the selenium cycle. The existing national field database suggests that a single water-tissue method for setting criteria can be applied equally to both selenate and selenite dominated systems.

The practice of allowing exceedances in meeting water quality criteria is not supported by field evidence of effects. For example, current EPA guidelines allow up to 20 µg/L as an ambient (lake-wide) concentration once every 3 years. The concentration of waterborne selenium in Belews Lake reached this level only once in 10 years, yet 17 species of fish were eliminated.

In response to a question on the origin of the 4 µg/L of selenium in the uplake arm, Dr. Lemly replied that it must have come from backflow from the main lake, because he doubted that there was significant contribution from atmospheric deposition. Dr. Teresa Fan asked whether it had actually been determined that selenium was incorporated into proteins in the species with which Dr. Lemly was working. Dr. Lemly said there had been some speciation work done, but that he did not know if there were differences between mosquitofish and bluegill in terms of selenium incorporation into protein. He said that this was one possible explanation for why mosquitofish accumulate higher tissue levels of selenium than bluegills yet show fewer effects. Dr. Steven Hamilton asked about Dr. Lemly's statement that 10 µg/g of selenium in fish eggs is correlated with 5 µg/g in the food chain and 2 µg/L in the water column. Dr. Lemly replied that this statement was based on both data from the Belews recovery period and data from other lakes.

Modeling Selenium in Aquatic Ecosystems

4

Dr. George Bowie of TetraTech gave a presentation entitled "Modeling Selenium in Aquatic Ecosystems," and referred to the paper "Assessing Selenium Cycling and Accumulation in Aquatic Ecosystems" (Bowie et al., 1996). (See Appendix E for presentation materials.) The model was sponsored by the Electric Power Research Institute (EPRI) and was developed in conjunction with a major research program. The research had two major components: toxicology and biogeochemical processes. Dr. Bowie's presentation focused on three of the five major components of the model: cycling processes in the water column and in the sediments, and accumulation in tissues of organisms.

For each of these areas, Dr. Bowie described the processes in the model, discussed areas of uncertainty or limitations in our understanding of these processes, and showed the results for an example application to Hyco Lake to illustrate which processes are most important. He used these results plus some of his experimental results to discuss the response times of aquatic organisms to changes in selenium exposure and the effects of water quality variables on selenium uptake. Since the model description, Hyco application, and conclusions are covered in the paper, Dr. Bowie listed the main points concerning uncertainty, pharmacokinetics, and water quality effects on uptake that are not included in the paper.

Water-Column Uncertainty:

Organic selenides represent a lumped selenium pool that includes many different selenium compounds which are poorly understood and most of which cannot be measured with current analytical techniques. Some, such as selenomethionine, may be very biologically reactive while others may be much more refractory. Most of the organic selenide pool is not selenomethionine since the high uptake rates measured in the lab are not consistent with accumulation levels and organic selenide turnover times observed in the field.

Sediment Uncertainty:

Sediment selenium accumulation depends on settling of particulate selenium (plankton, suspended organic detritus, elemental selenium, selenite adsorbed on clays), diffusion of water column inorganic selenium into sediment porewaters followed by rapid reduction to elemental selenium in anaerobic sediments, and decomposition of organic detrital selenium in the sediments. In lakes where sediments are usually anaerobic below a thin oxidized microzone, diffusion of inorganic selenium and subsequent reduction to elemental selenium is one of the most important processes. However, in other types of systems where the sediments are aerobic or anaerobic at much greater depths, other accumulation processes would be more important. Selenium speciation data in other types of systems are currently lacking, which limits an assessment of accumulation mechanisms in these systems. Sediment selenium concentrations depend not only on the selenium fluxes into the sediments, but also on the sediment deposition rates (and sediment transport rates in flowing systems). This makes sediment selenium concentrations very dependent on site-specific conditions.

Food Web Accumulation Uncertainty:

Most research on selenium accumulation in aquatic organisms has focused on planktonic food webs. Benthic invertebrates can be an important source of selenium accumulation in fish, and since the sediments contain most of the historical selenium loadings in aquatic ecosystems, detrital and sediment pathways to benthic organisms could be extremely important. Bacteria accumulate selenium to levels several times higher than algae, so sediment bacteria associated with organic detritus could be an important source of selenium accumulation in benthos. Much of the sediment selenium in lakes is elemental selenium, which was recently shown to be bioavailable to benthos (though organic selenium assimilation efficiencies are several times higher). The selenium

5

concentrations in organic detrital particles, associated bacteria, and the amount of elemental selenium ingested during feeding are what determine selenium accumulation in benthos, not the selenium concentrations in the bulk sediments. Systems with high sediment deposition rates or high sediment transport rates could dilute selenium concentrations in bulk sediments, even though the selenium content of the organic food particles remained the same.

Response Rates of Organism Tissue Concentrations to Changes in Exposure:

Uptake and depuration experiments, as well as other studies in the literature, indicate that the time it takes to reach equilibrium starting from no previous selenium exposure is on the order of a few days to a week for algae and bacteria, 1 week for microzooplankton, 1 to 2 weeks for zooplankton and benthic invertebrates, and 3 to 10 months for fish. Since most fish experiments are conducted with small fish in the laboratory, larger fish in the field could respond more slowly. Food is generally the primary route of selenium accumulation in consumer organisms, and since the sediments respond much more slowly to changes in selenium loadings than the water column, the benthic food web can continue to provide exposure to fish long after the planktonic food web levels drop.

Water Quality Effects on Selenium Accumulation:

Since most selenium accumulation occurs at the bottom of the food web and then moves to higher trophic components through food exposure, water quality factors that influence accumulation in primary producers can be very important. In experimental research with phytoplankton, three water quality variables had a significant effect on selenium uptake rates (Riedel and Sanders, 1996). Low pH and low phosphate increased selenite uptake by a factor of about 4 or 5, and low sulphate increased selenate uptake by a factor of 2.

Dr. Fan asked Dr. Bowie if the elemental selenium data he was using for sediments involved analytical confirmation. Dr. Fan cautioned that her group could not confirm using extraction methods that the red amorphous material secreted from algae was elemental selenium; this material contained <10% Se and >90% carbonaceous material, possibly polysaccharides. She suggested a particular analytical technique that should be used for elemental selenium. Dr. Bowie replied that he was using results from Dr. Greg Cutter's work (Cutter, 1991), but that Dr. Terry Layton's work (not yet published) at the University of California at Berkeley used the analytical technique referred to by Dr. Fan and found that a significant portion of the sediment selenium was elemental selenium.

Chair's Charge to the Experts and Highlights of Premeeting Comments

Dr. Fairbrother summarized the technical charge given to the experts by EPA, and the experts' premeeting responses to the questions in the charge. (See Appendix E for presentation materials.) She noted that the leaders of each discussion session would present the premeeting comments in more detail.

Dr. Fairbrother repeated that the charge to the experts was to address and comment on technical issues. She asked the experts to identify the rationale behind their comments and conclusions, assess the level of confidence in data cited, and discuss data quality.

Dr. Fairbrother first addressed the question "What do we know about the relationship between water-column measurements of selenium and biological effects?" She said that the experts generally agreed that

looking at this relationship alone is not a good approach for a bioaccumulative compound like selenium. Many of the experts noted that the most sensitive fully aquatic species are fish species and that diet is the primary exposure route. Also, there seemed to be a need to discuss selenium chemistry.

Next, Dr. Fairbrother discussed the experts' comments on the relationship between tissue concentrations and either sediment or water concentrations. She said that there had been mixed responses on this issue. There was disagreement on the state of the science; some of the experts said that the science base was good, while others said that there was too little data. The experts also disagreed somewhat in what form of selenium to measure in which tissue. There was some agreement that water-tissue correlations are poor, and that diet-tissue-effects correlations are better.

Concerning the link between sediment concentrations and both water concentrations and effects, Dr. Fairbrother said that there had been disagreement on several aspects of this question. Experts disagreed about the ability to relate sediment concentrations to either water-column concentrations or effects in fish. Finally, Dr. Fairbrother said that some of the cross-cutting issues brought up included selenium geochemistry, selenium kinetics within and between ecosystem compartments, and the differences between lotic and lentic systems.

II. CHAIR'S SUMMARY OF WORKSHOP DISCUSSIONS

The following summary was written by the Workshop Chair, Anne Fairbrother, based on the experts' discussion and premeeting comments. Details of the experts' discussions are provided in Section III.

The technical sessions initiated discussions among the experts by first reviewing the questions provided in the premeeting comments and then allowing conversation to develop around a general theme. General themes were: relationship of effects to water, sediment, or tissue concentrations and a session on cross-cutting issues to capture ideas on chemistry, system variability, and other topics brought forward by individual experts.

Water-Effects Relationships

This session began with a discussion of the scientific validity of predicting chronic effects of selenium from water concentrations. The experts quickly agreed that waterborne exposure to selenium in all its various forms is less important than dietary exposure in determining the potential for chronic effects. Therefore, predictions of ecological effects cannot be based on studies that use water-only exposures. Factors that modify the relationship between water concentration and effects include the types of organisms constituting the food web, speciation and rates of transformation of selenium, and rates of exchange of selenium between water, sediment, and organisms. It was noted that selenium speciation may be sensitive to salinity, thus altering bioaccumulation potential, but this has not yet been proven.

There were differences of opinion about what to measure in the water column for assessing the level of selenium contamination of an aquatic system. However, it was agreed that, at a minimum, dissolved (i.e., in the water phase) versus particulate (i.e., attached to particles of inorganic substances or to bacteria or phytoplankton) selenium be differentiated and that selenate and selenite (two oxidation states of selenium) be determined in both fractions. Peptide- and protein-bound forms of selenium are critically related to the potential for occurrence of chronic effects. The protein-bound forms should be specifically included in the analysis of selenium in the particulate fraction, as this is the primary step for the major route of bioaccumulation. The current definition of the dissolved fraction is the portion of the sample that passes freely through a 0.4 μm filter. One expert suggested that an 0.2 μm filter might be more appropriate in order to catch the smaller phytoplankton and bacteria in the particulate fraction, as these organisms are very important in the first step of bioaccumulation of selenium.

Experts concluded that insufficient information exists to quantitatively correlate water quality characteristics (such as sulfate, pH, and TOC) with chronic toxicity. Finally, the experts emphatically agreed that toxicity relationships derived from acute toxicity studies cannot be used to predict chronic toxicity, as the dietary route of concentration and exposure is so important for selenium. This also implies that bioconcentration factors (i.e., concentration in tissues divided by concentration in water) are not appropriate for use with this compound. In summary, water concentrations are related to effects, but it is a nonlinear (and site-specific) relationship.

Tissue – Effects Relationships

Discussion then turned to technical issues associated with a tissue-based criterion. The experts agreed that tissue integrates all exposures, whether from food or water. The best tissue in which to measure selenium is fish ovaries or eggs as concentrations have been linked to reproductive effects in some species. There

was some discussion, however, that pointed out the need to develop a larger data set encompassing interspecies variability in the ovary concentration – reproductive effects relationship. If fish ovaries are not available (i.e., sampling needs to be done during the wrong time of year), then larval stages are the next-best tissue to measure as older life-stages are less sensitive to selenium effects. Liver tissue was mentioned as a third tissue for possible monitoring of residue concentrations. Muscle-plug biopsy techniques have been suggested for use with endangered species, but do not seem to correlate well with effects.

It was also pointed out that concentrations of selenium in benthic invertebrates could be measured in order to determine the potential for effects to the lower order organisms as well as to establish potential dietary exposure values for fish. Discussion highlighted the need to standardize this method, in order to be sure that sediment is removed from the organisms guts prior to measurement. A discussion ensued about the ability of selenium to alter community relationships of phytoplankton with ramifications throughout the entire food web. However, it was agreed that fish are the most sensitive to the chronic effects of selenium and therefore fish tissue continues to be the choice for a tissue-based toxicological threshold.

Further discussion centered on the form of selenium that is most appropriate to measure in tissue. To date, nearly all of the studies have measured total selenium, but it was agreed that a more accurate representation of selenium-effect relationships could be obtained through measuring protein- or peptide-bound forms of organoselenium. The incorporation of selenium into protein is the trigger for biological effects.

Finally, it may be difficult to correlate water column concentrations with tissue concentrations. There are many examples of sites where water levels are low and tissue levels are high, as a result of previous sediment loading with current reductions in water-column selenium. Sediment (and subsequent dietary) concentrations will decline over time if water levels are kept low, but there is a considerable lag from the time when water concentrations are reduced to the time when sediment concentrations reach low levels. Therefore, if the history of a site is not known, a single measurement of water and tissue (or sediment) concentrations may provide a misleading picture and inconclusive relationships.

Sediment – Effects Relationships

Sediment is the dominant sink for selenium, and sedimentary organic materials (detritus) are an important dietary resource for aquatic invertebrates. The literature relating sediment-based criteria is sparse; most participants relied on three key references in their comments. A positive relationship between sedimentary selenium concentrations and effects in fish or bioaccumulation in invertebrate larvae has been shown in a few studies. However, one expert cautioned that a no-effects determination in field studies must always be tempered with an assertion that the test was powerful enough to have detected effects if they were there, albeit at low levels.

An analysis of data focusing only on fish indicates that toxic effects may occur when total sedimentary selenium concentrations exceed 4 μg/g (dry weight). Elemental and organic selenium forms predominate in sediments. The process is affected by redox conditions, and selenium tends to associate with the organic detritus. In streams, total sedimentary selenium is related to water-column concentrations through normalization to total organic carbon. It was suggested that sedimentary aluminum concentrations might be useful as a marker for inorganic sediment composition, in an effort to further separate the detrital-bound selenium from inorganic-bound forms. For accumulation in sediments of lentic systems (i.e., lakes and slow moving water), consideration of residence time and use of a mass balance approach could relate sediment selenium to waterborne selenium.

Because waterborne selenium concentrations tend to exhibit large temporal variations, the strength of the water-to-sediment correlation is affected by the averaging period selected. The issue of spatial heterogeneity of benthic invertebrates as well as selenium deposition and speciation is very important. Other parameters that might affect the relationship of sediment concentrations and ecological effects include water retention time, volatilization rates, the type of benthic phytoplankton community, and whether or not the system is at equilibrium. Habitat selection by different types of aquatic biota and preferential feeding habits of higher organisms also modifies selenium exposure. Various experts made the points that redox potential (i.e., amount of oxygen in the system) affects selenium speciation and that improved analytical methods for sediments are needed. Two experts advocated the expansion of the use of liquid chromatography for sediment selenium analysis.

Cross-Cutting Issues

The cross-cutting session captured issues that did not fit neatly into one of the above themes, as well as other comments or ideas. Spatio-temporal variability was addressed again, as it applies to water column, sediments, and tissues, although in different scales for each. Water concentrations may change rapidly (within days), whereas fish-tissue residue and sediment concentrations take months or years to change. The rate-limiting step may be the rate of conversion of the inorganic form of selenium to the organic form, which is a function of the species of selenium in the water column and the types of microorganisms present in the sediment.

There was agreement that the type of ecosystem has a large effect on selenium cycling in the system. Lentic and lotic (fast-flowing) systems, ephemeral or perennial waterbodies, saline systems, and northern (cold) streams, may differ in response to selenium input. Retention time of carbon, rate of sediment accumulation, rates of conversion of inorganic to organic forms of selenium, and tolerances of local species all differ among these types of systems. Bacteria and phytoplankton species differ between the two ecosystem types, which may cause differences in bioaccumulation rates. Also, lentic systems have higher primary productivity. Open (rather than closed) fish populations in lotic systems make changes in recruitment more difficult to document. While there was argument about the relative importance of considering one or both of these types of systems, there was agreement that their interconnections are important.

Two methods using existing field data were suggested for differentiating non-affected sites, areas with definite effects, and sites requiring a site-specific determination of effects. The apparent effects threshold (AET) method categorizes previously studied areas based on sediment or water concentrations. The sediment/water concentration above which effects always occurred would be identified, as would the concentration below which effects never occurred. New sites with sediment/water concentrations that fall between these two values (where effects sometimes occurred or sometimes did not) would require a site-specific assessment; otherwise, the site would be categorized as affected or not. A second method is based on fish tissue concentrations as a function of water concentrations. The empirical data from field studies that exist in the literature would be used to develop the bioaccumulation correlation on a global basis. Sites where measured fish tissue concentrations were statistically significantly different from what would be predicted based on water concentrations and the global bioaccumulation factor, would require a site-specific assessment of potential effects.

It was suggested that the Aquatic Toxicity Model presented by George Bowie could be used to make *a priori* predictions of whether a concentration of selenium in water would result in effects to the fish. Site-specific input parameters include selenium input (amount, rate, and species), flow rates, water depth, and a

few other hydrological parameters as well as food-web species. The more site-specific data that are used in the model, the more likely it is to accurately predict effects.

Selenium has the potential to interact with other metals, causing either greater or lesser responses than predicted from selenium alone. Furthermore, exposure to selenium may reduce an organism's ability to respond to other environmental stresses, such as has been shown for fish similar to those found in Belews Lake that were exposed to cold temperatures during laboratory studies. These types of interactions might confound the global empirical data set relating effects to selenium concentrations in water, sediment, or food.

Selenium is a required micronutrient for both plants and animals. Therefore, there is an exposure concentration below which insufficiency effects are seen and a different concentration above which toxicity occurs. The area in between is the Optimal Effects Concentration. In general, there is at least a 10-fold difference between insufficient and toxic concentrations and, on a practical basis, it does not appear to be of particular concern in field situations. However, this issue may be important in laboratory studies where appropriate minimum concentrations of selenium must be provided to maintain colonies of test species.

Analytic methods for detection of selenium in water, sediment, or tissue are technically complex. However, due to their importance in carefully and critically describing the systems at risk, a significant amount of time was devoted to discussion of this issue. Desired minimum detection limits, sample preparation requirements, cost, and laboratory capability all affect the selection of which method to use. A detailed summary of available methods, as well as sample collection and retention procedures, is included in the report.

One expert stated that at the national level, median background concentrations of selenium in aquatic systems do not vary greatly, being at about 0.1 μg/L. However, there was disagreement on this value and particularly on the variability in background, which is dependent upon the spatial scale of the analysis as well as on site-specific geology. Methods are being developed for differentiating between natural and anthropogenic inputs of selenium into aquatic systems, but there remains a great deal of uncertainty.

Observer comments reinforced the recommendation to develop methods for setting site-specific criteria, as a universal numeric chronic criterion for selenium is highly unlikely to be predictive of effects for any particular site.

III. TECHNICAL DISCUSSION SESSIONS

Generally, discussion leaders organized the discussions according to the questions provided in the technical charge. Each leader opened the discussion on each question by presenting an overhead summarizing the relevant premeeting comments. The following discussion session summaries include the presentation of the premeeting comments, followed by an account of the discussion for each question of the technical charge. Overall conclusions, which were written by the discussion leaders and reviewed by the other experts, are presented at the end of the discussion summary for each session.

DISCUSSION SESSION 1:
Technical Issues Associated With a Water-Column-Based Criterion

Question 1: Besides selenite and selenate, which other forms of selenium in water are toxicologically important with respect to causing adverse effects on freshwater aquatic organisms under environmentally realistic conditions?

Discussion leader's summary of premeeting comments:

Dr. William Adams presented his summary of the experts' premeeting comments concerning this question as follows: Selenate, selenite, seleno-cyanate, and organo-forms (seleno-methionine) are the key forms of interest. Selenate and selenite are the predominant forms derived from mining, agricultural practices, fly ash, and natural shales. Organo-selenium compounds produced from these inorganic forms are of most ecological relevance on a chronic basis; seleno-methionine is thought to be a key chemical form. Little is known, however, about environmental exposures of organo-forms, especially seleno-methionine; there is a general lack of analytical procedures for measuring organo-forms. Dr. Adams then asked the experts for any comments concerning his summary or question 1.

Discussion:

Dr. Gregory Cutter, disagreeing with the statements concerning seleno-methionine, said that free seleno-methionine is not important in water and is easy to measure. Dr. Fan expressed skepticism about the measurement of seleno-methionine, because most methods do not involve structure confirmation. She also pointed out that seleno-methionine is abundant in macromolecules and emphasized that macromolecular seleno-methionine may be important, although this hypothesis has been neither disputed nor confirmed by the literature. Dr. Cutter agreed and also stated that, based on his analysis using acid hydrolysis and ligand-exchange chromatography, the vast majority of organic selenium in unpolluted waters is peptide-bound.

Dr. Fan mentioned the possibility of the selenonium form, a cation, being present, as shown by Cooke and Bruland (1987). She added that, based on her work, salinity can drive speciation; she has found that one phytoplankton accumulates dimethyl selenonium propionate in a euryhaline environment. Dr. Cutter agreed that selenonium can be present in highly contaminated systems.

Returning to the discussion of seleno-methionine, Dr. Chapman asked whether laboratory tests using seleno-methionine are irrelevant to environmental exposures, given the small amounts of free seleno-methionine found in water. Other experts agreed that water-only exposures to seleno-methionine are of questionable relevance, but seleno-methionine may be important in food-chain transfer of selenium.

12

Question 2: Which form (or combination of forms) of selenium in water are most closely correlated with chronic effects on aquatic life in the field? (In other words, given current or emerging analytical techniques, which forms of selenium in water would you measure for correlating exposure with adverse effects in the field?) Note: Your response should include consideration of operationally defined measurements of selenium (e.g., dissolved and total recoverable selenium), in addition to individual selenium species.

Discussion leader's summary of premeeting comments:

Dr. Adams summarized the experts' premeeting comments for this question as follows: Total recoverable selenium is a useful form to measure. This would include all forms of selenium in the water except a limited amount of non-bioavailable selenium that might be tied up in the crystalline structure of suspended solids. There are no identified actual correlations between selenium forms and chronic effects. Future efforts should focus on proteinaceous forms (especially seleno-methionine). Dr. Adams then asked for the other experts' reactions to this question.

Discussion:

Dr. Fan asked for the other experts' opinions on making correlations between waterborne particulate selenium and accumulation of selenium in the food chain. She said that she had seen a couple of papers that indicated that there was a correlation (e.g., Saiki et al., 1993). Dr. Gerhardt Riedel replied that he thought that gathering data from multiple lakes would result in a correlation that was positive but would have large confidence limits.

Dr. Cutter advocated separating total recoverable selenium into the dissolved and particulate fractions, because those pools are available to different organisms. He said that this should be done by filtration using as small a pore size as possible, preferably 0.2 microns. Dr. Riedel and Dr. Adams agreed that separating the dissolved and particulate fractions is useful.

Dr. Gary Chapman raised the issue of the operational definition of dissolved selenium, which Dr. Cutter had mentioned in his premeeting comments. He asked Dr. Cutter to discuss this issue. Dr. Cutter replied that there is some work on colloidal selenium in estuaries, including a paper by Takayanagi and Wong (1984). He thinks that, based on these papers and his work, in most systems colloidal selenium represents a small fraction of "dissolved" ($\leq 0.4 \mu m$) selenium. Thus, in his opinion, 0.4 microns is not a bad filter pore size for most systems, but he advocates 0.2 microns to ensure that the smaller phytoplankton and bacteria are included in the particulate fraction. Although Dr. Riedel suggested that cross-flow filtration could be used to get down to very small size ranges, Dr. Cutter replied that this technique is laborious. Dr. Cutter and Dr. Riedel agreed that the very small size range is not that important for selenium, although it is important for some other metals. Dr. Adams concluded this discussion by pointing out that the operational definition of "dissolved" is a topic currently under debate, particularly in respect to data collection by the United States Geological Survey (USGS).

Dr. Adams asked whether the experts thought it accurate to state that no forms of selenium in water have been correlated with chronic effects; he added that the science is uncertain, but it is probably a polypeptide/protein-bound form of selenium.

Dr. Chapman asked how much of particulate selenium is actually organic and how much is bound up in a

13

mineral matrix. Dr. Fan agreed that this was an important question for thinking about bioavailability. Dr. Cutter agreed and listed the possible forms of particulate selenium: adsorbed selenate or selenite (probably on clays), elemental selenium, and organic forms. He said that Luoma et al. (1992) have looked at the speciation of selenium on particles. Dr. Fairbrother responded that the separation of organic from mineralized selenium needs further research. Dr. Fan suggested that standard biochemical procedures could be used to determine what fraction of particulate selenium is bound to proteins. Dr. Adams observed that most of the previous discussion related to possible areas of future research, rather than currently practical techniques.

Dr. Joseph Skorupa asked the biochemists present if they felt that any form of selenium was toxicologically unimportant. Dr. Fan and Dr. Cutter responded that they did not, because all forms of selenium may eventually interconvert.

Question 3A: In priority order, which water quality characteristics (e.g., pH, TOC, sulfate, interactions with other metals such as mercury) are most important in affecting the chronic toxicity and bioaccumulation of selenium to freshwater aquatic life under environmentally realistic exposure conditions?

Discussion leader's summary of premeeting comments:

Dr. Adams summarized the experts' premeeting comments for this question as follows: It is not possible to rank these water quality characteristics with reasonable certainty due to insufficient information on their effects on expression of chronic toxicity. Overall, the Eh (oxidative/reductive) state of an ecosystem is most important in determining the potential for chronic toxicity to occur, because it significantly influences the formation of organo-forms of selenium. One could predict that, at the extremes and as a function of Eh, pH would be important due to speciation changes, but chronic data are not available to assess this. pH would be expected to have the most impact on selenite across typical environmental pH values. Sulfate appears unimportant in terms of the expression of chronic toxicity except potentially for primary producers. Arsenic and molybdenum are also mobilized under similar conditions as selenium and appear to be additive with selenate.

Discussion:

Dr. Cutter agreed that redox state is important for precipitating elemental selenium and removing dissolved selenium. He argued, however, that photosynthesis has more influence on the formation of organo-selenium. Dr. Adams and Dr. Fan pointed out that non-photosynthetic microbial processes are also important, particularly in sediments; these processes are somewhat coupled to redox state.

Dr. Fan added that the presence of sulfate or nitrate in a reducing environment encourages a certain type of microbial community (sulfate or nitrate reducers), which would have a major impact on selenium speciation. She cited evidence of hydrogen selenide and methaneselenol release into the marine atmosphere via phytoplankton activities (Amoroux and Donard, 1996). Dr. Cutter expressed skepticism about this possibility. Dr. Fan, Dr. Cutter, and Dr. Adams did agree, however, that the microbial loop is very important and that the presence of sulfate and nitrate reducers would affect selenium speciation, resulting primarily in the reduction of selenium to the elemental form.

Dr. Cutter commented that arsenic and molybdenum behave differently from selenium; in a reducing

environment, arsenic is mobilized while selenium is immobilized.

Question 3B: Of these, which have been (or can be) quantitatively related to selenium chronic toxicity or bioaccumulation in aquatic organisms? How strong and robust are these relationships?

Discussion leader's summary of premeeting comments:

Dr. Adams summarized the experts' premeeting comments for this question as follows: Insufficient information exists to quantitatively correlate water quality characteristics with chronic toxicity across multiple species and trophic levels. Sulfate, phosphate, and temperature have been shown to correlate with selenate for some species (i.e., primary producers).

Discussion:

Dr. Riedel amended Dr. Adams's comment by saying that, for primary producers, phosphate does not affect selenate uptake, but rather high phosphate concentrations appear to suppress selenite uptake.

Question 3C: How certain are applications of toxicity relationships derived from acute toxicity and water quality characteristics to chronic toxicity situations in the field?

Discussion leader's summary of premeeting comments:

Dr. Adams summarized the experts' premeeting comments for this question as follows: The applications of relationships derived from acute toxicity and water quality characteristics do not apply to chronic toxicity for most aquatic life (an exception to this might be the relationship between selenate and sulfate for algae). The primary reason for this is that acute toxicity is most often the result of water exposures, whereas chronic effects are the result of selenium being incorporated into the diet where the predominant form of selenium is no longer an inorganic form.

Discussion:

None of the experts had any objections to this summation.

General Comments:

Discussion leader's summary of premeeting comments:

Dr. Adams offered for discussion the following statements taken from various premeeting comments: 1) Laboratory studies provide reasonable estimates of acute toxicity. 2) It seems imperative that chronic criteria include consideration of tissue residue and dietary route of uptake. 3) Fish eggs may represent a reasonably sensitive tissue to use as an endpoint for assessing the potential for species-level risk. 4) A useful approach might be to develop a generic criterion which also allows for site-specific approaches. Toxicity and bioconcentration factors (BCFs) are a function of time and exposure level. 5) Organic forms are thought to be produced in response to inorganic selenium enrichment and probably represent a net reduction in potential for toxicity.

Discussion:

Dr.
s
yed
s
ng data
an
ment he
med
rning
ty as a
on of
with
ow trout
lings
fathead
ws
es 1-3).
se the
changed
time in
experim
(i.e.,

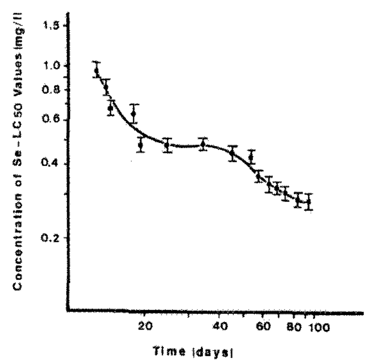


Figure 2. The effect of time on the toxicity of sodium selenite to fingerling rainbow trout. The line was fitted by eye. (Adams, 1976.)

Adam
displa
graph
showi
from
experi
perfor
conce
toxici
functi
time
rainb
finger
and
minno
(Figur
Becau
LC_{50}
over
this
ent
uptak

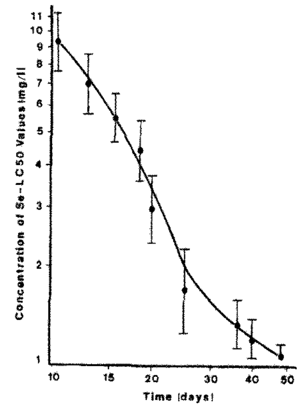


Figure 3. The effect of time on the toxicity of sodium selenite to juvenile fathead minnows. The line was fitted by eye. (Adams, 1976.)

e rates are slow), he postulated that the 96-hour assay may not be the right test for acute toxicity. Dr. Cutter questioned the relevance of a water-only exposure. Dr. Skorupa pointed out that a short-term spike in selenium may have long-lasting food-chain implications, as shown by a paper by Maier et al. (1998). In this paper, a short-term 10 µg/L spike in a Sierra Nevada stream resulted in a concentration of 4 µg/g in the food chain for over a year. Dr. Chapman replied that a tissue-based criterion would require modeling with rate and fate functions and that in such a situation there would be no reason to draw an arbitrary timeline to separate acute dosings from chronic effects. Dr. Fairbrother said that that issue would be addressed in the discussion of averaging times during the cross-cutting session.

16

Dr. Adams then initiated
point, concerning organic
pointed out that
toxic and can volatilize out
they can also
Cutter stated that a paper
showed that dissolved
less bioavailable to primary
forms, such as selenite.
distinction between
essentially nontoxic to
selenate, which is
agreed that concentrations
real waters are probably
selenate. Dr. Fan pointed
organic forms may be
organisms such as small

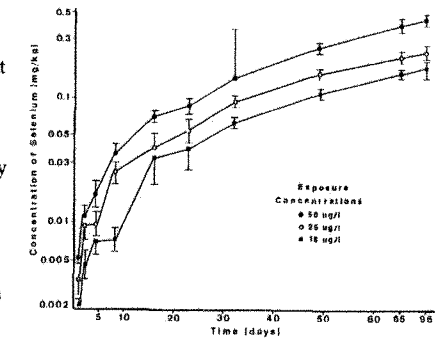


Figure 4. The accumulation of selenium in the muscle of adult fathead minnows. (Adams, 1976.)

discussion on the last
selenium forms. Dr. Fan
methylated forms are less
of the system, but that
bioaccumulate. Dr.
by Gobler et al. (1997)
organic selenium was
producers than inorganic
Dr. Riedel made the
selenite, which is
phytoplankton, and
moderately toxic. He
of organic selenium in
less toxic to algae than
out that particulate
more bioavailable to
protozoans, which can

ingest them; Dr. Cutter agreed. Overall, however, Dr. Riedel and Dr. Cutter both stated that dissolved (not particulate) organic selenium in most waters is probably fairly persistent and refractory, and not very bioavailable. (It is taken up poorly and broken down slowly.) Dr. Cutter referred to a paper his group has published, which looks at the lifetime of dissolved organic selenium in the North Atlantic (Cutter and

17

Cutter, 1998).

Dr. Adams directed the experts' attention to the comment concerning bioconcentration factors, which he defined as not including diet. (Bioaccumulation factors would include diet.) He showed a graph of bioconcentration factors observed at various intervals for fathead minnows exposed to four concentrations of selenium (Figure 4). Dr. Adams argued that, because there is a body of literature showing (as did his data) that BCF is inversely related to water concentration for selenium and many other metals, reporting a BCF for a given species at a given site is of questionable value. Dr. Chapman replied that he thought the experts could agree that BCFs were not relevant for selenium, as food chain is the key; Dr. Cutter agreed and said that this point should be emphasized.

Dr. Fan remarked that the emphasis on water-column concentration has led mitigators to focus on driving down those concentrations, which is not in fact the aspect of the system that is directly correlated with ecosystem effects. Dr. Fairbrother replied that EPA is struggling with this issue, because water quality criteria have been set using water column numbers. Dr. Adams postulated that the mass of selenium in the sediments may be more important than the concentration of selenium in the water. Dr. Cutter replied that water concentrations are related to effects but that it is a nonlinear relationship. Dr. Fan gave an example of two agricultural drainage ponds she has studied. Water concentrations of selenium differ by an order of magnitude between the two ponds, but sediment concentrations are similar. Dr. Adams speculated that one site might have more volatilization, and Dr. Fan agreed. Some of the experts discussed volatilization. Dr. Adams said he had seen papers that found that volatilization increases in reservoirs which have alternating drawd own and refill cycles (Hansen et al., 1998; Franke nberger and Karlson, 1994). The experts discus sed the residence time of volatilized selenium in the atmosphere; Dr. Cutter said that it lasts a day or two at most, although Dr. Fan said it could be longer if the selenium attaches to particles and/or aerosols.

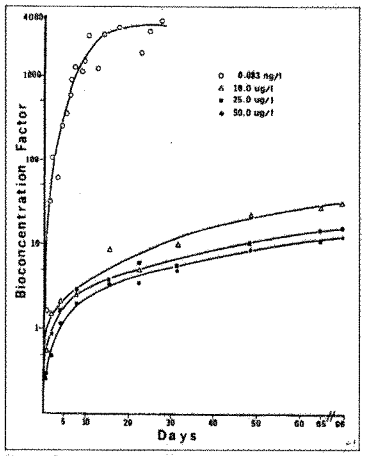


Figure 5. A comparison of the bioconcentration factors observed at various intervals for fathead minnows exposed to four concentrations of selenium. (Adams, 1976.)

Dr. Skorupa asked if the apparent lack of correlation betwe en water and sediment selenium concentrations in Dr. Fan's evaporation ponds could be due to sediment hetero geneity and small sampling size. Dr. Fairbrother replied that this question could be discussed during the sedime nt session.

Wra p-Up

Dr. Adams summarized the discussion session as follow s: Dietary uptake is critical to determining chronic effects . The incorporation of waterborne selenium into the diet is key; factors that should be taken into accou nt include transformations, rates of transf ormation, chemical species, and types of organi sms (e.g., microbes, invertebrates). Peptide/protein-bound forms are important. Free seleno-methionine is typically nonexistent or at low levels.

18

Dr. Adams asked what form(s) of selenium in water should be measured relative to assessing chronic toxicity and water quality standard compliance. Dr. Cutter said that, at a minimum, selenite, selenate, and total dissolved selenium should be measured. Another expert added that particulate should be measured as well. The experts discussed this question but did not come to agreement. Experts with opinions on this topic were asked to write summaries of their opinions.

Dr. Fan gave the following summary of her opinion regarding the significance of differentiating the protein-bound fraction of particulate selenium in the water column:

> Particulate selenium can originate from live planktonic organisms, organismal debris/waste, and soil/sediment particles. The bioavailability of selenium associated with these different sources can vary. Presumably, selenium associated with organisms and biodebris represents a dietary route of exposure for aquatic consumers, and this fraction of selenium may be more concentrated and bioavailable. Since selenium bioaccumulation and toxic effects are mainly expressed through dietary exposure, it is important to distinguish the fraction of particulate selenium that is more representative of the consumers' diets. However, it would be a difficult task to speciate all of the selenium in particulate matter that is of biological origin. The fraction of biogenic selenium associated with soluble proteins may be convenient, because it may also be the most significant selenium sink in planktonic organisms exposed to environmentally relevant waterborne selenium concentrations. Major incorporations of selenium into bulk algal proteins have been documented for several categories of algae (Wrench,1978; Fan et al., in press; Fan et al., 1998). Based on known selenium biochemistry (e.g., the propensity of selenium to substitute in sulfur amino acids), similar incorporations may well be applicable to other planktonic organisms. Therefore, monitoring protein-bound selenium in particulate matter may provide a more representative linkage from water to aquatic consumers in terms of selenium exposure.

Dr. Adams gave the following summary of his opinion regarding total recoverable selenium measurements:

> Total recoverable selenium is recommended as one of several measurements that could be made to correlate with adverse effects in the field. This measurement includes all of the forms of selenium present in a water sample (both dissolved and particulate) except those tied-up in the crystalline structure of suspended solids. This recommendation is based on the need to identify a measurement that can be performed routinely and reliably across multiple laboratories. Additionally, many of the existing relationships between water, sediment and tissue have been developed around either total recoverable selenium or dissolved selenium. Ultimately, what form(s) of selenium should be measured depends upon the use of the data.

Dr. Cutter gave the following summary of his opinion regarding selenium measurements:

> Additional measurements that are recommended for water include dissolved (defined as $\leq 0.4\ \mu m$) and particulate selenium. Dissolved measurements would be measured as total dissolved selenium, selenate, and selenite. Se^{-2} (selenides) would be determined by subtracting Se^{+4} + Se^{+6} from total dissolved selenium (Cutter 1982). Particulate selenium (defined as selenium associated with particles $>0.4\ \mu m$) could be measured as total selenium as well as Se^{+4} and Se^{+6}. Elemental selenium would be determined separately by direct analysis for Se^{0} (Velinsky and Cutter 1990). Se^{-2} would be determined by difference (i.e., subtracting [elemental + Se^{+4} + Se^{+6}] from total particulate selenium). As an approach to reduce costs one could consider speciating samples, especially the particulate

19

fraction, only on a periodic basis.

Conclusions: The following summary of the entire discussion session was written by the discussion leader and reviewed by the other experts.

1. Waterborne exposure to selenium in all its various forms is much less important than dietary exposure in determining the potential for chronic effects in aquatic organisms in general and for fish in particular.

2. The relationship between selenium in water and sediment relative to the aquatic organisms that live in these compartments and constitute the diet of fishes is key to understanding the food chain transfer of selenium. Factors that are important in understanding these relationships include rates of transformation and speciation of selenium, rates of exchange of selenium between sediment and water and organism tissues, and types of organisms constituting the food web.

3. Peptide- and protein-bound forms of selenium in the diet of aquatic organisms are emerging as critical factors in assessing the potential for chronic effects in aquatic organisms. Free seleno-methionine appears to exist only at very low levels in tissues and in water.

4. Bioconcentration and bioaccumulation factors are inversely related to water exposure levels, which complicates their use in developing water quality criteria.

5. To evaluate selenium in the water compartment of aquatic ecosystems it is recommended that at a minimum dissolved versus particulate selenium be differentiated and that selenate and selenite be determined in the dissolved fraction. Additionally, it appears useful to determine selenite, selenate, and protein-bound and total selenium in the particulate fraction of natural surface waters. The latter may be of less importance for industrial discharges.

DISCUSSION SESSION 2:
Technical Issues Associated With a Tissue-Based Chronic Criterion

Dr. Hamilton opened the session by remarking that tissues integrate all exposures an organism experiences and represent the biological effects that water quality criteria are intended to prevent.

Question 4: Which forms of selenium in tissues are toxicologically important with respect to causing adverse effects on freshwater aquatic organisms under environmentally realistic conditions and why?

Discussion leader's summary of premeeting comments:

Dr. Hamilton presented a brief summary of each individual's comments on this question. He said there was general agreement that the form of selenium of concern in tissues was an organic, or protein-bound, form. He asked for any comments or concerns.

Dr. Chapman asked whether this question included organisms fed on by fish, pointing out that, if so, it would be important to think about the issue of gut contents and to specify whether organisms should be

depurated. Dr. Fairbrother asked the other experts to clarify whether fish were the only organisms in which effects were to be discussed, or whether anyone would say that selenium affects other organisms. Dr. Fan replied that, based on her review of the literature, there are not mortality or direct toxic effects on phytoplankton or invertebrates, but there may be community change. Dr. Riedel agreed. Dr. Fan and Dr. Riedel submitted additional comments on this point.

Dr. Fan submitted the following comments on the potential effect of selenium on community structure:

> It is clear that selenium, regardless of the form, is less toxic to lower trophic organisms including primary and secondary producers, zooplankton, and benthic invertebrates. Selenium contamination, however, can have an effect on the competitiveness of different components of a given community, leading to an alteration of the community structure. For example, in San Francisco Bay in the 1980s, a shift from a diatom-dominated to a green algal community occurred. This shift preceded an explosive growth of the Asian clam, *Potamocorbula amurensis*, which is an extremely efficient accumulator of selenium (Brown and Luoma, 1995). It is unclear whether selenium contamination contributed to the change in the algal community, nor can we draw conclusions about the role of selenium in the abundance of the Asian clam. However, selenium is interacting with this new trophic system, and a selenium bioaccumulation factor of over 100,000 from water to the clam has been observed. In addition, the Asian clam is an important food source for the indigenous sturgeon. There is some evidence that the sturgeon population in the Bay is not actively reproducing and that field-collected sturgeon eggs exhibit high parts per million (ppm) selenium concentrations, particularly in certain protein fractions (Kroll and Doroshov, 1991). Unfortunately, the relationship between high selenium egg content and sturgeon reproduction problems has not been clearly established. It remains a real possibility, however, that selenium plays an important role in the impact of altered lower trophic community structure on fish reproduction.

Dr. Riedel submitted the following comments on selenium toxicity and algal communities:

> Although most of the discussion of selenium toxicity has focused on fish reproductive effects, selenium toxicity can exert other effects on aquatic ecosystems. In some cases, environmental concentrations of selenium can also exceed the acute toxicity thresholds for a variety of algal species. The toxicity of selenium to algae is dependent both on the species of algae and the form of selenium. Of the two predominant forms of inorganic selenium in water, selenate has been generally observed to be more toxic to algae than selenite. For example, selenate concentrations from 50 to greater than >10,000 µg Se/L have been observed to inhibit growth of three species of phytoplankton from three different taxa. A diatom, *Cyclotella meneghiania*, was observed to be the most sensitive ($EC_{50} \approx 200$ µg/L). A green alga, *Chlamydomonas reinhardtii*, was the next most sensitive ($EC_{50} \approx 2{,}000$ µg/L), while the cyanophyte *Anabaena flos-aquae* was the least sensitive, with an EC_{50} of >10,000 µg/L. None of these species were inhibited by concentrations of selenite up to 10,000 µg/L (Sanders et al., 1989). Similar toxicity results have been reported by Wheeler et al. (1982). Other authors, notably Kumar and Prakash (1971) and Moede et al. (1980), have observed that selenate and selenite have similar effects on several algal species. At least one green algae, *Ankistrodesmus falcatus*, may be unusually sensitive to selenite; Dr. Riedel has observed near complete growth inhibition in cultures spiked with 10 µg/L selenite, but not selenate (Riedel, unpublished observation).

> Dr. Riedel has observed at least one "field" case of selenium toxicity at concentrations representative

of mildly contaminated sites. Riedel et al. (1996) made 10 µg/L additions of both selenate and selenite to natural phytoplankton cultures collected from Hyco Lake, as part of a biotransformation experiment. The selenate cultures showed a mild reduction in growth rate and maximum yield (~10%) compared to the control and selenite cultures. To verify the study, a series of selenate and selenite additions were made to another natural collection from the same site one month later; in this case, 10 µg/L selenate showed no inhibition, 20 µg/L decreased growth more than 10%, and inhibition was complete at 200 µg/L. Selenite did not show inhibition in these experiments either.

If selenium toxicity to a particular species or group of species were to occur in the field, it would be very difficult to observe from the existing community; the absence of some subset of possible species would not readily be detected (unlike the situation of fish in Belews where some 13 of 17 possible fish species were eliminated, there are hundreds of possible phytoplankton species, and rapid changes in species composition is the norm). Even a relatively small decrease in growth rate by an individual species could lead to a very rapid decline in its abundance relative to unaffected species. Nevertheless, the lack of these species could be significant in the food web, or as links in the chain of selenium bioaccumulation and biotransformation. If the sensitive species are truly randomly distributed among taxa, size classes, edibility to higher trophic levels, etc., differential selenium toxicity to phytoplankton is probably not a significant influence on aquatic ecosystems. It is unlikely, however, that the effects are truly random, and the net effect of selenium toxicity to phytoplankton may be to inhibit large cells to a greater extent than small cells (e.g., Munwar et al. 1987), diatoms to a greater extent than blue-greens (e.g., Sanders et al., 1989), and so on.

To return to the original question about toxicologically important selenium forms in tissue, Dr. Fan said that she did not believe that all selenium in tissue is in the protein-bound form. She cited a study of her group's, currently in press, which found that the percent allocation of selenium into protein in algae varies with varying selenium concentration (Fan et al., in press). Dr. Cutter, referencing his dissertation work (Cutter, 1982), said that the remaining selenium could be going into selenium esters, found in membranes. Dr. Hamilton asked the experts whether the bottom line of the discussion was still that incorporation of selenium into protein was the trigger for biological effects. The other experts agreed that this is at least "a" bottom line.

Question 5: Which form (or combination of forms) of selenium in tissues are most closely correlated with chronic effects on aquatic life in the field? (In other words, given current or emerging analytical techniques, which forms of selenium in tissues would you measure for correlating exposure with adverse effects in the field?)

Discussion leader's summary of premeeting comments:

Dr. Hamilton summarized the experts' premeeting comments for this question as follows: There were a variety of answers and agreement on some points. The experts agreed that there has been little speciation work in fish tissue. The forms suggested for measurement were largely total selenium or protein-bound selenium. William Van Derveer said that he would measure total selenium only if the exposure was a field exposure.

Discussion:

Dr. Hamilton asked Mr. Van Derveer to elaborate on his premeeting comments. Mr. Van Derveer replied that his concern is that, in laboratory studies, when diets are dosed with a specific selenium form, the residues that accumulate in the tissues may differ from the full biogeochemical spectrum that is found in the field. Dr. Hamilton replied that he had done a study in which fish were fed diets either spiked with seleno-methionine or made up of selenium-contaminated organisms from the field. He found mirror-image effects between the two diets (Hamilton et al., 1990). He added that there has been at least one other study that indicated that seleno-methionine is a good model for selenium present in the food chain (Bryson et al., 1985). Dr. Skorupa said that there is fairly strong consensus in the scientific literature that food-chain selenium, even though it is derived from different forms in water, exerts the same toxicity on a gram per gram basis. Besser et al. (1993) showed that seleno-methionine, selenate, and selenite bioaccumulate to different levels, but exert the same toxicity at the same levels. However, the various forms will move differently from water into the food chain; for example, compare Chevron Marsh to Kesterson (Skorupa, 1998). Dr. Cutter pointed out that the Bryson et al. study related to water exposure, not selenium added to the diet.

Dr. Hamilton summarized that the form of selenium in the tissue most closely associated with biological effects is an organic form. Dr. Fairbrother reminded the other experts that the original question was what to measure in tissues. She added that, historically, total selenium is what has been measured in tissues to relate to effects, but that in the future more measurement of protein-bound selenium should be done. Dr. Hamilton agreed, but Dr. Riedel said that, from a monitoring perspective, total selenium is adequate for tissues. Dr. Fairbrother pointed out that the morning's discussion indicated that there is not always a good correlation between total concentrations and effects. She speculated that these differences could be related to different amounts, or different types, of protein-bound selenium. The experts discussed the implications of the variation in the correlation between tissue levels of selenium and effects. Some argued that this variation mostly results from individual and interspecies variation in metabolism and fitness, whereas others said it may result from different forms of selenium in the tissues. The latter group thus argued for improved speciation of selenium forms in tissue.

Question 6: Which tissues (and in which species of aquatic organisms) are best correlated with overall chronic toxicological effect thresholds for selenium?

Discussion leader's summary of premeeting comments:

Dr. Hamilton summarized the experts' premeeting comments as follows: Almost all of the experts said that reproductive tissue is best correlated with effect thresholds. Some suggested that whole-body residue measurements would also be acceptable; whole fish are easier to obtain and much of the data in the literature is on whole-body residues. Dr. Fairbrother and Dr. Chapman suggested sampling benthic invertebrates; Dr. Cutter recommended the cytosol fraction of prey organisms.

Discussion:

Dr. Hamilton asked the experts whether they could recommend the ovaries as the tissue of choice, even though ovaries are not available all year. After a brief discussion, the experts agreed that fish ovaries are the tissue of choice in which to measure selenium levels. This agreement, however, was followed by further discussion.

Dr. Adams said that there needs to be a great deal more data on the variability of thresholds of effect among various species, habitat types, and environments. Dr. Hamilton agreed. Dr. Adams said that it would be important to characterize the distribution of sensitivity among organisms of interest, as is currently done for the water-column criteria. Dr. Fairbrother asked whether the variability is based mostly on species sensitivity, or whether the type of selenium measured and the problem of gut contents contribute to the variability. Dr. Hamilton said that a lot of the variability in the current data set is due to life stage, as older organisms are more resistant. He said that, if whole-body residues are used, larval fish should be sampled.

Dr. Fairbrother asked Dr. Skorupa to comment based on his experience with the agricultural drainwater study. He replied that that type of dataset would be useful for taking a probabilistic approach to the criterion. The National Irrigation Water Quality Program (NIWQP) dataset (Seiler, 1996) has a large amount of data relating water concentrations to fish tissue levels (almost exclusively whole-body). Dr. Skorupa said that this data could be used, along with good measures of tissue effect levels, to develop a water column number that was associated with a certain probability of exceedance of effect thresholds. He agreed that more work would need to be done on effect-level variability among species. Dr. Fairbrother said that, if this type of analysis were done, it would be important to look at all the relevant parameters, such as what type of selenium is measured, whether the gut content is included, etc.

Dr. Fan asked how endangered species could be sampled for regulatory purposes. Dr. Hamilton replied that a muscle-plug technique has been developed, in which a biopsy is analyzed by neutron activation. Unfortunately, muscle tissue does not seem to correlate well with effects, based on his research (Hamilton, unpublished). Dr. Fan asked if blood sampling is an option; Dr. Riedel replied that it is, although it is hard to get blood from the smaller fish. Dr. Hamilton said that he has seen sampling of gills, blood, heart, and liver, but that are few data on these tissues. Dr. Riedel responded that his group had sampled various tissues in fathead minnows. They found that selenium concentrations increased more slowly in muscle tissues than in other tissues. Selenium concentrations in livers, however, mirrored concentrations in ovaries (Dr. Denise Breitburg, unpublished research for the EPRI project). Dr. Riedel noted that, unlike ovaries, livers are available all year.

Dr. Adams said that he thinks gonadal tissue is by far the first choice, because it is where the most sensitive effect is expressed; it is worth waiting to sample this tissue when it is available. Other experts agreed, although it was pointed out that there are additional sampling difficulties; some fish bear their young live, and sometimes it is difficult to get gonadal tissue even during the reproductive season. Dr. Lemly said a good approach would be to target a sensitive species that is widespread, such as a salmonid or a centrarchid, depending on the water body. Other experts reiterated that assessing data sensitivity across species would be crucial to the establishment of a tissue-based criterion.

Question 7: How certain are we in relating water-column concentrations of selenium to tissue-residue concentrations in top trophic-level organisms such as fish? What are the primary sources of uncertainty in this extrapolation?

Discussion leader's summary of premeeting comments:

Dr. Hamilton summarized the experts' premeeting comments as follows: Experts expressed that they were "not very certain" about making these correlations.

Discussion:

Dr. Hamilton made the point that there are many situations in which the water-column concentration of selenium is low but tissue levels are high (Hamilton et al., 1990; Schroeder et al., 1988; Skorupa and Ohlendorf, 1991; Zhang and Moore, 1996). Loading to tissue can come from the sediments and biota as well as from the water. Dr. Hamilton also asked whether it is possible that seleno-methionine is found in such low concentrations in the water column because it is highly bioavailable and taken up immediately when cells lyse. Dr. Cutter said that his group is working on this question.

The experts discussed using the NIWQP dataset to develop an empirical probabilistic approach to correlating water-column to tissue concentrations of selenium. Dr. Adams did not have great success in an initial attempt to make these correlations (Adams, unpublished), but he plans to redo his analysis. Dr. Hamilton said that better correlations could probably be achieved by taking site-specific factors into account. Dr. Adams agreed; he said that some of the published studies say that selenium transfer from the water to the food chain can be predicted well within a small site, but attempts to extrapolate to a regional or national scale fall apart.

Dr. Cutter raised the issue of detection limits, which he said are often not low enough for researchers to adequately make the correlations that are attempted. He recommends 0.01 ppb, because most uncontaminated waters are below 0.1 ppb total selenium. He and Dr. Skorupa discussed this issue. Dr. Skorupa questioned whether such a low detection limit is necessary if the effects threshold is much higher. Dr. Cutter responded that the lower the detection limit, the more useful the data will be for future uses and for looking at sublethal effects. Dr. Fairbrother agreed that a low detection limit was a good idea when trying to establish water-tissue correlations. Some experts objected to the characterization of the natural background concentration of selenium as 0.1 ppb, but this discussion was tabled until the cross-cutting session.

Dr. Hamilton then asked whether the other experts thought there would be more certainty in relating dietary concentrations to tissue residue in fish, and then in the two-step process of relating water to food organisms to fish. The experts agreed that there would be more certainty in these relationships, but that they still would be difficult to quantify. Many of the experts mentioned the difficulty caused by spatial and temporal variability in water-column selenium concentrations. Dr. Fan also questioned how to define diet. She mentioned Saiki's work in the San Joaquin River and San Luis drain (Saiki and Lowe, 1987; Saiki et al., 1993), which showed a good correlation between benthic invertebrates and detrital selenium. She emphasized, however, that it is crucial to determine what organisms are actually eating when trying to model food-chain transfer. Dr. Hamilton added that this point brought up the issue of sediments, which can be a source of loading to the food chain, and thus should potentially be included in correlation models. Dr. Fan said that migration of organisms in and out of the system poses another problem for correlations.

Wrap-Up:

Dr. Hamilton summarized the discussion from this session. He said that he thought the experts had come to agreement that tissue integrates all exposures, whether different food types or water. Issues that had been raised included community change and variability in the sensitivity of the reproduction endpoint across fish species, and sometimes within species; there are limited data on both of these topics. He said that the group had not thoroughly discussed which endpoint was appropriate to examine (e.g., mortality, growth, deformities). Dr. Fan responded that this is why she thought the blood idea would be interesting. Selenium may reduce blood's oxygen-carrying capacity, and this endpoint would respond fairly quickly to ingestion of selenium. Dr. Hamilton replied that an important question to ask in considering an endpoint is whether the effect is reversible. If so, the effect may not be truly adverse; it may not have effects at the population level.

Dr. Hamilton said that the experts had largely agreed that the ovary is the best tissue in which to measure residues; larval fish are a second choice if ovaries are not available. He reiterated that the issue of sensitive species is key. He said that information on linking sediments or water back to tissue is a data gap; too few data exist to build a good model. Dr. Adams said that he thinks the data exist, but that gathering sufficient data to encompass variability within and across sites would be a large task. He added that EPA should make a broad effort to compile these data sets. Dr. Fairbrother put in a cautionary note that the empirical approach of using large data sets to look at correlations is a useful starting point, but the real goal should be to understand mechanistically how selenium moves through the different compartments in different systems. Dr. Hamilton agreed, and said the data set should be built around reproductive studies in a series of fish species.

Dr. Hamilton said that some of the experts had suggested sampling benthic invertebrates because they are a key component of the food chain. He agreed that this is a good idea, and added that tissue concentrations in these organisms will be less variable than other components of the ecosystem. Dr. Riedel pointed out that selenium concentrations in benthic invertebrates are highly affected by gut contents, but other experts replied that this problem can be solved by depurating the organisms. Dr. Adams said that which compartment is most variable can be site-specific; sediments can be very heterogeneous and may therefore be highly variable. Other experts responded that this problem could be addressed by sampling in multiple locations.

Dr. Adams made the final point that, when looking at sensitive species, it is important to look at species that actually occur in the region under study. Dr. Hamilton agreed and added that, in the west, one may want to differentiate between native and introduced species.

Conclusions: The following summary of the entire discussion session was written by the discussion leader and reviewed by the other experts.

There was an unexpected, readily reached agreement on the four issues concerning the possibility of a tissue-based chronic criterion. The experts agreed that the selenium form in tissue that is toxicologically important with respect to causing effects on freshwater aquatic organisms under environmentally realistic conditions is protein-bound selenium. By "protein-bound," experts meant all organic selenium forms as a group. It was acknowledged that different forms of selenium can exist in tissue, but analysis of tissue selenium is typically as total selenium and not by speciated forms. In general, the organisms of concern were fish, which is the group usually emphasized in consideration of adverse effects on aquatic life. However, aquatic invertebrates were mentioned as another tissue of concern, because they represent an important link in food-chain transfer of selenium in the aquatic environment.

Protein-bound selenium, measured as total selenium, is the selenium form related to chronic toxicity. The major concern was organo-selenium forms bound by proteins rather than free organo-selenium or inorganic forms. One concern raised was that the form of selenium to which organisms are exposed might influence the resulting tissue residue; thus, emphasis should be on use of data from environmental field studies rather than laboratory studies in establishing a tissue-based criterion. The key tissues identified by experts were fish gonads, ovaries, or eggs. Due to the limited availability of ripe gonads/eggs, however, newly hatched larvae analyzed for whole-body residues were recognized as a possible alternative. Most data are on

whole-body fish, but for a variety of life stages rather than the preferred, sensitive larval life stage. The dataset for gonads, ovaries, and eggs are more limited. Liver tissue was mentioned as a third tissue for possible monitoring of residue concentrations.

Referring back to the dietary route for selenium, benthic invertebrates were recognized as a possible group of organisms to monitor in assessing adverse effects on aquatic environments, especially from the standpoint of shifts in the composition of a community and the resultant effects on higher trophic levels which might also shift in composition. One concern with benthic invertebrates was possible errors in residue concentrations due to gut contents.

Even though tissues were readily embraced as a possible component for establishing a criterion for selenium, the relation to water concentrations was questionable. Experts readily acknowledged that there was a lot of uncertainty in modeling the relation between concentrations in fish tissue and water. However, the level of uncertainty was less for the relation of selenium in water to that in aquatic invertebrates, and concomitantly, from selenium in dietary organisms to fish tissue.

Data gaps were identified including the limited number of fish reproductive studies where exposures included water and dietary routes using realistic water characteristics and food organisms and where meaningful endpoints were measured such as egg and larvae residues along with biological effects on offspring. These reproductive fish studies should include several representative families of fish.

DISCUSSION SESSION 3:
Technical Issues Associated With a Sediment-Based Chronic Criterion

Mr. Van Derveer opened the session by making some general observations based on the premeeting comments. First, sediment is the dominant sink for selenium. Second, sedimentary organic materials (detritus) are an important dietary resource for aquatic invertebrates, and selenium tends to accumulate in detritus. He added that the literature applicable to sediment-based criteria is sparse; most participants relied on two to three references in their comments. Finally, he said that there was a range of opinions expressed in the comments regarding the potential merit of a sediment-based criterion.

Question 8: Which forms of selenium in sediments are toxicologically important with respect to causing adverse effects on freshwater aquatic organisms under environmentally realistic conditions?

Discussion leader's summary of premeeting comments:

Mr. Van Derveer presented a brief summary of each individual's comments on this question. Experts expressed a range of different opinions. Forms suggested included total selenium, elemental and organic selenium, and detrital selenium. Various experts made the points that redox affects speciation and that improved analytical methods are needed.

Discussion:

The issue of sediment heterogeneity was raised and discussed by some of the experts. They agreed that selenium can be distributed very heterogeneically in sediments, and that this should be considered in sampling and modeling. Dr. Skorupa added that the spatial heterogeneity of benthic invertebrate distribution should also be noted. He said that this distribution often maps onto the spatial heterogeneity of selenium; both are found in areas of fine organic matter. In his opinion, sampling that does not concentrate on these areas misrepresents the toxicological risk. Dr. Riedel agreed and said that normalization to total organic carbon (TOC) is one way to solve this problem. Mr. Van Derveer said that he would later present some data showing that depositional zone selenium concentrations can fairly well predict concentrations in riffle-dwelling midges.

Mr. Van Derveer asked Dr. Adams to elaborate on his call for improved analytical methods for sedimentary selenium. Dr. Adams replied that he sees variability among analytical laboratories in determining sediment selenium speciation. Dr. Cutter responded that the techniques are established, but that better training may be needed. Dr. Skorupa said that he agreed with Dr. Adams, and added that it is important that all analytical data be evaluated. Dr. Riedel agreed that there is a problem with analysis for selenate. He and Dr. Fan advocated the expansion of the use of liquid chromatography for selenium analysis.

Mr. Van Derveer asked if there were any other issues related to question 8, recognizing that the literature relating sediment concentrations to toxicity is sparse. Dr. Cutter replied that, because of the lack of literature, the conclusion should be that the experts had low confidence in answering the question; Dr. Riedel agreed.

Mr. Van Derveer presented a graph using data from a publication of his (Van Derveer and Canton, 1997) (Figure 5). The graph showed the relationship between sedimentary selenium concentration and effects in fish, using data from a variety of sources, including NIWQP, Belews Lake, Hyco, and others. Mr. Van Derveer said that there appears to be a clear concentration-response ratio, but that more data are needed. Dr. Skorupa cautioned that the power of the study should be kept in mind when there is a finding of "no effect," as many studies lack the necessary power to detect effects.

Quest ion 9: Which form (or combi nation of forms) in sediment are most closely correlated with chronic effects on aquatic life in the field? (In other words, given current or emerg ing analytical techniques, which forms of selenium in sediments would you measure for correlating expos ure with adverse effects in the field?)

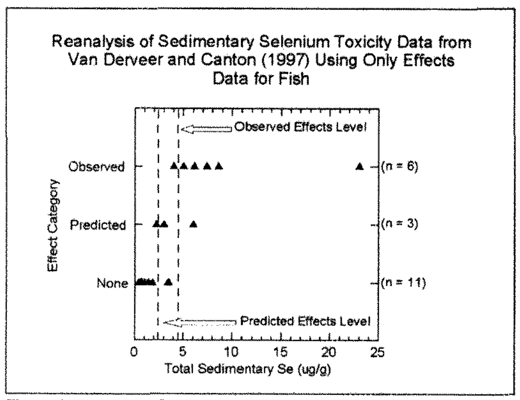


Figure 6. Reanalysis of sedimentary selenium toxicity data using only effects data for fish. (Van Derveer and Canton, 1997.)

Discus sion leader's summary of preme eting comments:

Mr. Van Derveer presented a brief summ ary of each individual's comments on this question as follows: He himself said to measure total selenium and mentioned his unpublished data indicating high sediment-to-benthos correlation in lotic (flowing-water) systems. Dr. Fairbrother said to measure total selenium and to consider lotic vs. lentic (standing water) differences. Dr. Adams said to measure total selenium, because individual species have not been correlated

with benthos. Dr. Fan said to measure proteinaceous selenium and seleno-methionine in benthos and detritus. Dr. Riedel said that better analytical methods are needed, and Dr. Skorupa said that a matched sediment and benthos study is needed.

Discussion:

Dr. Adams clarified that the lack of correlation between selenium species and benthos results from the lack of data on the subject. Dr. Fan said that her recommendation to measure proteinaceous selenium was based on an educated guess that detrital selenium is probably concentrated in peptides or proteins. Dr. Cutter agreed that this is a reasonable assumption. Dr. Fan added that her group performed an experiment in which they compared detrital material captured in a sediment trap to cored sediments. The material that settled in the trap (rich in detritus) contained an order of magnitude more selenium than did the cored sediments (Fan, unpublished).

Mr. Van Derveer presented his unpublished data from a study in the Middle Arkansas River Basin in Colorado (Figure 6). The graph was a log-log plot relating sedimentary selenium to selenium concentrations in chironomids. He pointed out that there seemed to be a positive relationship. The experts discussed the possibility of relating this information to the effects information in the previous graph to estimate a threshold of dietary selenium associated with effects in fish. Mr. Van Derveer agreed that this was a useful direction for research, but he stressed that far more data would be needed. Dr. Skorupa added that, to perform such an analysis, it would be important to know what the fish were actually eating. The experts discussed the possibility of using assimilation efficiencies and protein-normalized selenium values in food-chain modeling. The variety of food chains present in different habitats was also discussed; not only do lotic and lentic systems differ, but lotic systems have high- and low-energy areas.

Quest ion 10: In priority order, which sedim ent quality characteristics (e.g., TOC, etc.) are most important in affecti ng the chronic toxicity and bioacc umulation of selenium to fresh water aquatic life under enviro nmentally realistic conditions? Of these, which have been (or can be) quantitatively related to seleni um chronic toxicity or bioacc umulation in aquatic organ isms?

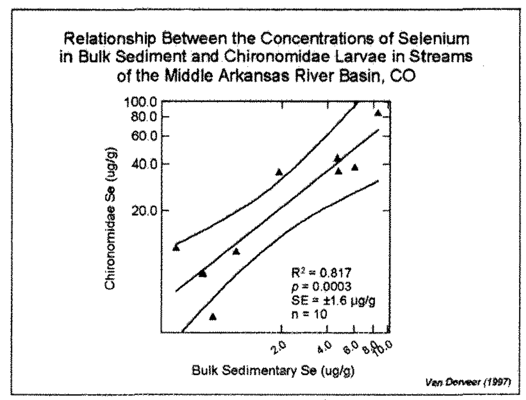


Figure 7. The relationship between the concentrations of selenium in bulk sediment and chironomidae larvae in streams of the Middle Arkansas River Basin, CO. (Van Derveer, unpublished.)

Discus sion leader's summary of preme eting comments:

Mr. Van Derveer gave a brief summary of each individual's comments on this questi on. He said there was a reasonable level of agreement among those who respon ded. Everyone who responded mentioned TOC may be important, although Mr. Van Derveer pointed out that they all cited the same systems, using 204 water-sediment pairs from 15 water bodies (Adams, unpublished). The correlation coefficient was 0.66 overall. Correlating water with the fine-grained fraction of sediments yielded a coefficient of 0.68; with the coarse-grained fraction the coefficient was 0.73. Dr. Riedel pointed out that, as with fish, temporal variability affects correlation; because water is highly temporally variable and sediments are well buffered, it is not surprising that the correlation is poor.

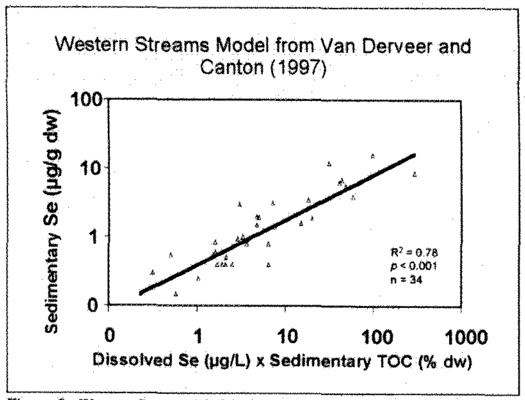


Figure 8. Western Streams Model. (Van Derveer and Canton, 1997.)

Mr. Van Derveer showed another graph from his work to stimulate more conversation (Figure 7). This graph showed the product of dissolved selenium and sedimentary TOC on the x-axis and sedimentary selenium on the y-axis. He noted that, at least in streams of the western United States, there is a fairly predictable relationship. Dr. Cutter suggested revisiting the data with a normalization to aluminum in the low-TOC range (i.e., normalize to "TOC *or* aluminum"). Other experts said that it is important to consider whether systems are at equilibrium or not. (For example, is there an ongoing input?)

Research Needs

Dr. Fairbrother moved the conversation to the issue of research needs. Dr. Fan said there is a need to test the relationship among waterborne selenium, TOC, detrital selenium, total sediment selenium, and biota selenium for all abundant sediment species. Dr. Riedel said that it would be important to obtain the

assimilation coefficients for different benthic organisms and to examine how the different types of selenium in the food affect these coefficients. Mr. Van Derveer said that the issue of whether or not organisms are depurated should be addressed. Dr. Cutter said that a coupled examination of the ecosystem and the biogeochemical cycle should be performed at a site. Mr. Van Derveer said that he would like to see a more mechanistic understanding of what affects selenium accumulation in the sediments. Dr. Skorupa said he would like to see more data linking the biology of the most sensitive species to the heterogeneity of the sediments; some species may feed preferentially in high-selenium areas (because of other characteristics of these areas). Dr. Fan agreed that she would like to see if selenium accumulation by benthos can be correlated with selenium levels in organic-rich sediments. Dr. Hamilton mentioned the issue of differential accumulation of selenium by closely related species (e.g., flannelmouth vs. razorback suckers). Mr. Van Derveer said that it would be useful to do some controlled laboratory studies using field-collected sediments, perhaps running EPA's *Lumbriculus* bioaccumulation test. Dr. Adams said he would like to see examination of the sites that have relatively high levels of selenium but no effects seen; he said that these sites should help shed light on mechanistic understanding of processes. Dr. Fan said it is important to understand the mechanism of toxicity; she cited a review article from the biomedical field (Spallholz, 1994), which she urged the other experts to read.

Wrap-Up

Mr. Van Derveer summarized the preceding discussion. After some further discussion, the experts agreed that the following was an accurate summary:

Elemental and organic selenium predominate in sediments. The process is somewhat redox driven, depending on the system type and the characteristics of the sediments. Selenium tends to be located in detritus. Total selenium may predict toxicity; there are some questions about relating selenium concentrations to TOC, the possibility of carbon-to-nitrogen (C:N) ratio normalization, normalization to proteins, and direct measurements of detritus vs. whole sediment. Spatial heterogeneity is an issue, as is preferential feeding (some species feeding in certain areas with high selenium concentrations). In addition, there are some issues with the power of biological assessments to detect effects. Concerning the question of what should be measured, there is some argument that total selenium in surficial sediments should be measured and it was also pointed out that multiple dietary pathways should be considered when they exist. Direct correlations of specific selenium forms to effects are lacking, but an overall causal relationship tends to exist, where high selenium in sediments tends to co-occur with effects at the population and community level. Some examples might be (1) effects seen in Belews Lake after the cessation of selenium input and (2) microbial community changes.

Which sediment characteristics appear to be most important? TOC seems to be important, but may be inappropriate for anoxic sediments where redox conditions are driving selenium accumulation; there may be some pseudocorrelation or a simple biogeochemical process moving selenium and sequestering it in sediment. Quantity of detritus may be important, and it may be important to measure that directly. In lentic systems, the residence time appears to be important; selenium accumulation can be calculated based on residence time and some other factors. Aluminum should be considered as a marker for inorganic sediment composition, to help differentiate detrital matter from inorganic material. Efflux from sediment to the water column is important. Sulfate may be important to sedimentary microbial communities, affecting selenium speciation. (Dr. Fairbrother noted that most items on this list reflect, not results reported in the literature, but things some or all of the experts think should be important, based on their understandings of the relevant processes.)

Finally, relating sediment to water, a TOC model exists for western streams. Residence time is important for both lentic and lotic systems. Whether the system is at equilibrium or not should be considered. Uncertainty is moderate overall for relating sediment to water, based on the small number of publications specifically addressing this relationship.

Conclusions: The following summary of the entire discussion session was written by the discussion leader and reviewed by the other experts.

Sediment is the dominant sink for selenium in aquatic ecosystems. Elemental and organic selenium tend to predominate in sediment, with elemental selenium dominating under reducing conditions. Organic selenium is believed to be markedly more bioavailable than elemental selenium. Sedimentary organic materials (detritus) are an important dietary resource for aquatic invertebrates. Selenium tends to accumulate in detritus, thereby entering the benthic-detrital food web.

The literature regarding the toxicological effects of sedimentary selenium is sparse, and most workshop participants relied upon two to three publications for preparing their premeeting comments. Several participants cited a paper by Van Derveer and Canton (1997), which concluded that the total sedimentary selenium concentration is a reliable predictor of chronic toxicity in fish and birds. A reanalysis of those data (Van Derveer, premeeting comments), focusing only on fish, indicated that toxic effects may occur when total sedimentary selenium concentrations exceed 4 μg/g (dry weight). The field data that were collected from Belews Lake after curtailment of fly ash input demonstrate the importance of sedimentary selenium in bioaccumulation and toxic effects on fish. Although waterborne selenium concentrations declined rapidly, Se concentrations in sediment and biota declined very slowly and teratogenic effects in fish populations persisted even 10 years later. Effects data for particular selenium forms in sediment are lacking in the literature; thus, preventing interpretation of sedimentary selenium speciation data.

The relationship between sedimentary selenium and toxicological effects may be affected by factors such as spatial heterogeneity in sedimentary selenium concentrations, habitat selection by different types of aquatic biota, and preferential feeding habits of aquatic biota. Moreover, efforts to relate toxicological effects to sedimentary selenium concentrations, or selenium concentrations in any environmental compartment, should consider the statistical power of the effects assessment. It was hypothesized that prediction of food web bioaccumulation and subsequent chronic effects on higher trophic levels might be improved by measuring detrital selenium, proteinaceous selenium in sediment, or seleno-methionine in sediment.

Unpublished data (Van Derveer, premeeting comments) were presented which indicate that a significant positive relationship exists between total selenium in surficial sediment (ca. 0-3 cm) and selenium accumulation in depurated Chironomidae larvae from streams of the middle Arkansas River basin, Colorado. These data suggest that, at least for some systems, total sedimentary selenium is well correlated with bioaccumulation in benthic organisms.

The following sediment quality characteristics were identified as potentially relevant to chronic selenium toxicity:

- Sedimentary TOC (possibly inappropriate for anoxic sediments where redox processes predominate);
- Quantity of sedimentary detritus present;
- Water residence time (longer residence time promotes greater sedimentary selenium accumulation);
- Normalization of sedimentary selenium to sedimentary carbon:nitrogen ratio;

- Normalization of sedimentary selenium to sedimentary protein content;
- Efflux of selenium from sediment to water; and
- Sulfate concentrations (may affect the composition of sedimentary microbial communities and thus the speciation of sedimentary selenium).

Sedimentary selenium can be related to waterborne selenium using two approaches, with a moderate degree of uncertainty. For streams of the western United States, a TOC-based model can be applied (Van Derveer and Canton, 1997). Sedimentary selenium accumulation in lentic and lotic systems can be calculated by considering residence time and applying a mass balance approach (Cutter, 1991). Because waterborne selenium concentrations tend to exhibit large temporal variations, the strength of the water-to-sediment correlation is affected by the averaging period selected. It is also important to consider whether the regime of waterborne selenium input to a system is relatively consistent over time (e.g., a stream receiving selenium from surrounding geological sources) or recently altered (e.g., Belews Lake after curtailment of fly ash input).

The following research issues were identified as being relevant to developing a more complete understanding of the role of sediment in chronic selenium toxicity:

- Assessing the relationship between detrital selenium and food web bioaccumulation;
- Understanding factors that may cause variability in selenium accumulation in benthic invertebrates, such as interspecific differences, assimilation rates, and effect of sedimentary selenium speciation;
- Evaluating the potential merit of depurating specimens prior to correlation with sediment, or any other environmental compartment;
- Correlating sedimentary selenium concentrations at preferred feeding sites with particular species of interest (e.g., endangered fish);
- Defining the mechanisms of selenium accumulation in sediment; and
- Performing laboratory studies of sedimentary selenium accumulation by invertebrates.

DISCUSSION SESSION 4:
Cross-Cutting Issues Associated With a Chronic Criterion

Dr. Fairbrother explained that the cross-cutting session was intended to capture issues that did not fit neatly in one compartment, as well as any other comments or ideas that any of the experts had not yet had a chance to raise. She listed the following issues to be discussed during the session: spatio-temporal variability and averaging times; ecosystem type (including lentic vs. lotic); site-specific approaches; analytical methods; sufficiency vs. toxicity; natural background; and interactions with other stressors.

Question 12: How does time variability in ambient concentrations affect the bioaccumulation of selenium in aquatic food webs and, in particular, how rapidly do residues in fish respond to increases and decreases in water concentrations?

Discussion leader's summary of premeeting comments:

Dr. Fairbrother summarized the experts' premeeting comments on this question as follows: Water concentrations can change by ten-fold in 1 month. Bioaccumulation in fish tissues changes over months. Phytoplankton and bacteria accumulate selenium rapidly (5-6 days), with turnover in 2 weeks. The rate-

- Normalization of sedimentary selenium to sedimentary protein content;
- Efflux of selenium from sediment to water; and
- Sulfate concentrations (may affect the composition of sedimentary microbial communities and thus the speciation of sedimentary selenium).

Sedimentary selenium can be related to waterborne selenium using two approaches, with a moderate degree of uncertainty. For streams of the western United States, a TOC-based model can be applied (Van Derveer and Canton, 1997). Sedimentary selenium accumulation in lentic and lotic systems can be calculated by considering residence time and applying a mass balance approach (Cutter, 1991). Because waterborne selenium concentrations tend to exhibit large temporal variations, the strength of the water-to-sediment correlation is affected by the averaging period selected. It is also important to consider whether the regime of waterborne selenium input to a system is relatively consistent over time (e.g., a stream receiving selenium from surrounding geological sources) or recently altered (e.g., Belews Lake after curtailment of fly ash input).

The following research issues were identified as being relevant to developing a more complete understanding of the role of sediment in chronic selenium toxicity:

- Assessing the relationship between detrital selenium and food web bioaccumulation;
- Understanding factors that may cause variability in selenium accumulation in benthic invertebrates, such as interspecific differences, assimilation rates, and effect of sedimentary selenium speciation;
- Evaluating the potential merit of depurating specimens prior to correlation with sediment, or any other environmental compartment;
- Correlating sedimentary selenium concentrations at preferred feeding sites with particular species of interest (e.g., endangered fish);
- Defining the mechanisms of selenium accumulation in sediment; and
- Performing laboratory studies of sedimentary selenium accumulation by invertebrates.

DISCUSSION SESSION 4:
Cross-Cutting Issues Associated With a Chronic Criterion

Dr. Fairbrother explained that the cross-cutting session was intended to capture issues that did not fit neatly in one compartment, as well as any other comments or ideas that any of the experts had not yet had a chance to raise. She listed the following issues to be discussed during the session: spatio-temporal variability and averaging times; ecosystem type (including lentic vs. lotic); site-specific approaches; analytical methods; sufficiency vs. toxicity; natural background; and interactions with other stressors.

Question 12: How does time variability in ambient concentrations affect the bioaccumulation of selenium in aquatic food webs and, in particular, how rapidly do residues in fish respond to increases and decreases in water concentrations?

Discussion leader's summary of premeeting comments:

Dr. Fairbrother summarized the experts' premeeting comments on this question as follows: Water concentrations can change by ten-fold in 1 month. Bioaccumulation in fish tissues changes over months. Phytoplankton and bacteria accumulate selenium rapidly (5-6 days), with turnover in 2 weeks. The rate-

limiting step is the conversion of the inorganic form to the organic form. The $t_{1/2}$ for sediments depends on the form of selenium.

Discussion:

Dr. Cutter suggested that averaging time should be a function of retention time (the physics of the system), which varies greatly between lentic and lotic systems. Dr. Fan said that the biological component of a system can also have an effect on averaging time. Dr. Skorupa again raised the issue that a short-term spike can have long-term food-chain implications, based on the Maier et al. (1998) study. Dr. Fairbrother summarized that, in addition to the physics of the system, the biology of the system has to be considered, because organisms will have different effects on the residence time of selenium in the various compartments. Both physics and biology should be looked at when examining the relationship of water fluxes to responses or to fish tissue changes.

Question 13: To what extent would the type of ecosystem (e.g., lentic, lotic) affect the chronic toxicity of selenium?

Discussion leader's summary of premeeting comments:

Dr. Fairbrother summarized the experts' premeeting comments on this question as follows: There was general agreement that the type of ecosystem has a large effect on selenium cycling in the system. Lotic systems have a slower rate of conversion of inorganic to organic selenium, shorter retention time of carbon and decreased storage potential, and less accumulation of selenium in sediments. The modeling approach differs between lotic and lentic systems. Bacteria and phytoplankton species differ between the two ecosystem types, which may cause differences in bioaccumulation factors. Also, lentic systems have higher primary productivity. Open (rather than closed) fish populations make changes in recruitment more difficult to document.

Discussion:

Dr. Riedel added that lotic systems have a larger contribution of terrigenous detritus, which tends to dilute the selenium concentration. Dr. Fan replied that if the allochthonous input is through seleniferous soils, the reverse could be true. Dr. Skorupa said that another way in which lotic and lentic systems differ is that lotic systems are more likely to provide the source water for lentic rather than vice versa. Dr. Fairbrother replied that the reverse could also be true. Dr. Riedel said that the key point is not to consider parts of systems in isolation. Dr. Hamilton agreed that the interconnection of lentic and lotic systems is important. He cited a study by Radtke et al. (1988) on the Lower Colorado River, which showed that selenium in the backwaters was coming from the river's main stem. Conversely, a study by Engberg (currently in review) showed that only 18 percent of the selenium entering Lake Powell stays in the lake.

Dr. Adams said that there are other ecosystem types that should be considered, such as the Great Salt Lake, saline streams, ephemeral streams, and cold northern streams. He added that indigenous biology in each of the different environments should be taken into account.

Dr. Fairbrother questioned the statement that modeling approaches vary for different systems. She said that, in her opinion, the major components of the model are conceptually the same for different systems and that what varies are the rate processes. She asked for comments from the other experts. Dr. Fan replied that components other than rates vary (e.g., food-web composition). Dr. Cutter replied that food-web composition is taken into account by Dr. Bowie's model. Dr. Bowie agreed.

Dr. Fan asked Dr. Bowie what was the minimum amount of information required to use his model for a site. Dr. Bowie said that one can use very little information and make guesses, but that the more actual data that are included, the better the model is. He said that the hydrology of the system and the selenium loadings would be the most important information, followed by the food web structure and some information on sediments. Dr. Fan replied that it is difficult to get a good mass balance for a dynamic system. She mentioned volatilization as an important component that is difficult to measure. Dr. Bowie replied that he didn't think volatilization was a major factor in most systems; further, the model takes into account factors which affect volatilization, such as the volatile fractions of bacterial and algal excretions. During the discussion, it was also clarified that the main purpose of the model is to be able to tie biological effects to water concentrations resulting from loadings, and possibly predict outcomes in hypothetical future situations.

Site-Specific Approaches:

Dr. Fairbrother summarized suggestions Dr. Adams made about different approaches for doing site-specific assessments. These were: (1) Empirical database of fish tissue concentration as a function of water concentrations (develop for a variety of species and couple with reproductive effect concentrations); (2) Apparent Effects Threshold (AET -- use it to identify areas where site-specific effects measurements should be done); and (3) Modeling approach (parameterize for the ecosystem of concern).

Discussion:

Dr. Adams elaborated further on the AET approach. He explained that it is the approach shown in the graph Mr. Van Derveer presented earlier (Figure 5). For multiple sites, concentrations of selenium in various compartments are coupled with information on the presence or absence of biological effects at the site. This approach identifies three ranges of concentrations: a range in which effects were never seen, one in which effects were sometimes seen, and one in which effects were always seen. This approach helps to establish rough effect thresholds and to identify sites for which more site-specific data are needed (i.e., those in the middle range). The AET approach has been articulated for marine sediments (Barrick et al., 1989). Dr. Bowie said that, for such an approach, using total selenium measurements might not be desirable for sediments, because detrital selenium is what gets into the food web. Dr. Fairbrother agreed that, in the sediments discussion session, there had been suggestions to normalize to TOC or protein. Dr. Fairbrother emphasized that, for the AET approach, it would be crucial to consider whether the studies used had adequate power to detect effects.

Dr. Fairbrother then asked Dr. Adams to discuss the idea of an empirical database. Dr. Adams said that this idea was based on various papers (e.g., Skorupa and Ohlendorf, 1991; Ohlendorf and Santolo, 1994). He said that, basically, this approach would again use information from multiple sites. Relationships between, for example, water concentrations and levels in fish reproductive tissue could be graphed and used to create a regression line. The strength of the regression's predictive power could be evaluated; in addition, as with the AET approach, sites with strong site-specific influences could be identified.

Dr. Riedel asked Dr. Adams how he would modify the water-to-fish regression if it did not fit well. Dr. Adams replied that his first step would be to remove sites like Belews Lake, in which there is not an

36

ongoing selenium discharge. Dr. Skorupa said that it should not be too hard to separate out the sites causing the "noise" in the data, based on knowledge of site-specific factors. He expressed optimism that it would be possible to create a good global relationship between water-column and fish-tissue selenium. Dr. Cutter added that another factor to consider would be the amount each site is elevated above background for its region.

Dr. Fairbrother said that the experts seemed to be contradicting their conclusions from the previous day, in which most of them had said that water concentrations could not be used to predict fish tissue concentrations. Dr. Adams said that part of the reason for that conclusion was that, to date, efforts to build global models had not been very successful. Dr. Skorupa said that two different scales of analysis were being discussed. During the water session, the experts addressed the question of what confidence they would have in predicting fish-tissue selenium concentrations from water selenium concentrations. He said that that was a different question from the current issue, which was looking globally at relationships between water and fish and trying to identify sites that are over or under the regression line. Dr. Cutter agreed. Dr. Adams said that, even if tissue levels are considered to have the best predictive power of effects, they still must be related back to water concentrations, or the tissue-based approach leads only to site-specific assessments for every site. Dr. Fan added that picking apart the variables that make some sites deviate from the global relationship would lead to a better understanding of the relationship between tissue concentrations and water concentrations.

Dr. Fairbrother commented that what the two approaches under discussion would mainly show is which sites need site-specific studies. Dr. Riedel asked whether a "site-specific study" means anything beyond analyzing selenium in the discharge and the receiving body. Dr. Skorupa replied that, in his opinion, site-specific analysis usually boils down to developing rigorous effects data to assess whether effects are occurring at a particular site.

Analytical Methods:

Dr. Cutter presented the following remarks:

The Chemical Forms of Selenium in Natural Waters

DISSOLVED

Se(VI)	Selenate (SeO_4^{2-})
Se(IV)	Selenite ($HSeO_3^- + SeO_3^{2-}$)
Se(0)	Elemental selenium (insoluble, but may be colloidal and pass through a 0.4 μm filter)
Se(-II)	Selenide, primarily in the form of organic selenides such as seleno- amino acids (e.g., seleno-methionine, $CH_3Se(CH_2)_2CH(NH_3)CO_2H$) in dissolved peptides, and dimethyl selenide ($(CH_3)_2Se$))

PARTICULATE

Se (IV+VI)	Adsorbed to mineral or biogenic phases
Se(VI)	Selenate esters in membranes
Se(0)	Elemental Se precipitated from water column or produced in sediments

37

Se(0/-II)	Metal selenides (pyrite-like compounds)
Se(-II)	Organic selenides (primarily seleno- amino acids in proteins)

Factors to Consider for Selecting Appropriate Analytical Methods for Determining Selenium in Natural Waters

1. Accuracy. For obvious reasons, systematic errors must be eliminated. Standard additions method of calibration should be used and appropriate (i.e., same matrix type) standard reference materials should be analyzed (although only limited speciation data for these are available).

2. Precision. The analytical precision must be much less than the environmental variability in order to discern it.

3. Low detection limits. Natural concentrations of dissolved selenium can be as low as 2 ng Se/L, necessitating low detection limits. In this respect, for determining loadings, etc. a lack of data (i.e., below detection limits) should be avoided. Moreover, low detection limits allow potential interferences to be minimized via dilution. As a general rule, the detection limits should be approximately 10x lower than the expected concentrations.

4. Ability to determine dissolved and particulate speciation. The speciation of selenium in both the dissolved and particulate phases has been shown to affect its bioavailability and/or toxicity.

Analytical Techniques for Selenium Determinations in Natural Waters

Method	Speciation		Interferences	Detection Limit	Relative Cost
	Dissolved	Particulate			
SHG AAS	yes	yes	few	2 pptr	$
SHG ICP-MS	yes	yes	few	<2 pptr	$$$$
Deriv.-fluorimetry	yes	no	many	5 pptr	$
Deriv.-GC	yes	no	few	5 pptr	$$
IC	yes	no	many	1 ppb	$
IC-ICP-MS	yes	no	many	<2 pptr	$$$$

SHG = selective hydride generation
AAS = atomic absorption spectrometry
ICP = inductively coupled plasma

What can we do now?

38

Dissolved: IV, IV + VI, total, selected or operationally defined organics
VI = (IV + VI) - IV
organic Se (-II) = Total - (IV + VI)

Particulate: IV, IV + VI, total, Se(0), pyrite-Se
organic Se (-II) = Total - (IV + VI) - Se(0) - pyrite-Se

Organic Se: The big problem. HPLC, etc. require knowledge about specific compounds. Can get at specific compounds or compound classes. For example: Copper-chelex gets primary amine Se; cation resin gets the selenonium cation.

Dr. Fan pointed out that the cost of disposal has to be factored into the cost of analysis using selective hydride generation, because a very acidic waste is generated for which disposal can be expensive. She added that her laboratory has had problems with their nebulizer becoming clogged. Dr. Cutter replied that a nebulizer is not necessary for his AA-hydride method.

Dr. Fan noted that selenonium can be analyzed for by spiking whole water with base and analyzing the resulting head space. She asked Dr. Cutter if he had tried using the copper chelex method to analyze for seleno-methionine in sediments, and he replied that he had not. Dr. Riedel said that his group, after dosing algae with selenium-75, had detected small amounts of free seleno-methionine in water (in the parts per trillion range) using copper chelex. Dr. Skorupa asked Dr. Cutter to comment on neutron activation. Dr. Cutter replied that this method does not do speciation and that special attention must be paid to sample preparation.

Dr. Cutter presented further remarks:

Water-Column Sampling

Sample
--> 0.4 um filter (immediate)
--> "dissolved" (pH <2 with HCl, borosilicate glass)
--> suspended particles (freeze; dry at low temp)

Why? Dissolved and particulate represent different "pools" available to different parts of food web.

Sediment Sampling

Box core (or equivalent)
--> "squeeze" and filter
--> dissolved
--> particulate (dry at low temp)

Why? Dissolved and particulate availability; fluxes; selenium changes with depth; preserve flocculent matter at surface.

References for sediment sampling: Bender et al., 1987; Blomqvist, 1985; Blomqvist, 1991; Jahnke, 1988; Zhang et al., 1998.

39

For determination of selenium in sediments, Dr. Fan brought up benchtop x-ray fluorescence spectrometry. She said that it has the advantage of not requiring digestion, which minimizes sample handling and thus the potential for technician error. Dr. Cutter replied that the detection limits for this method are very high. Dr. Fan agreed, saying they are currently around 2 ppm, but she said the method could be useful for more highly contaminated sediments. She added that this technique determines other metals at the same time, which can be useful for looking at interactions. Dr. Cutter replied that it is an expensive instrument. Dr. Fan responded that it is not more expensive than other instruments he had referred to and that it results in large savings in labor costs.

Dr. Adams commented that Dr. Cutter's chart of analytical methods was a summary of the state of the art, rather than the methods commonly used. He said he thought a detection limit of 2 pptr was a stretch for some of the methods and was certainly a stretch for contract laboratories. Most contract laboratories, he added, are struggling to do a good quantitative analysis at the 2 ppb level. Dr. Riedel replied that EPA is currently publishing and validating a method for arsenic and that the selenium method will come in time. Dr. Cutter replied that, in his opinion, it is crucial that detection limits be ten times below the concentrations being analyzed. He added, however, that he understands the situation faced by a contract or utility lab analyzing large quantities of samples in short time periods. He said that, with EPRI funding, he had developed a methods "cookbook" currently used by many utility labs. He said that the approach he recommends for these labs is to analyze for total selenium, making sure that their method is accurate and precise, and to speciate a subset of samples.

Sufficiency vs. Toxicity:

Dr. Fairbrother introduced this topic by saying that selenium is a required micronutrient; the question, then, is whether the range between sufficiency and toxicity levels is large enough that we need not worry about sufficiency. Dr. Riedel responded that there are regions, such as places on the Canadian Shield, in which selenium concentrations are so low (in the low pptr in the water column) that algae respond to selenium administration. Dr. Fan added that she found that she needed to add selenium to an algal culture in her laboratory that she had isolated from an evaporation pond. Algal growth had been diminished, but was ameliorated when she added 10 ppb of selenium to the culture. Dr. Fairbrother pointed out that these algae were adapted to a high-selenium environment. She reiterated the question of how wide the zone between sufficiency and toxicity is, and Dr. Riedel replied that for plants and algae it is quite wide.

For fish, Dr. Hamilton cited a study in which a selenite-spiked diet was fed to rainbow trout (Hilton et al., 1980). The researchers determined that between 0.15 and 0.38 µg/g dry weight selenium in the diet was the sufficiency level; they estimated that the toxicity level was about 3 µg/g. Dr. Hamilton pointed out that this was only a ten-fold difference, which is fairly narrow. Mr. Van Derveer said that spiking with selenite did not realistically mirror an environmental exposure.

Dr. Cutter said that, in his opinion, one would not have to worry about making a system too clean. He pointed out that low-selenium environments would have an assemblage of species that were adapted to the lack of selenium. Dr. Skorupa agreed; he said that, in 10 years of research, he has never found selenium levels in a waterbird egg in the wild that were below the level of selenium sufficiency determined for chickens.

Dr. Adams said that published papers have established a selenium requirement for daphnids in the range of 0.5 to 1 µg/L added to the algal culture that is fed to the daphnids. He also commented that European

researchers have started to develop sufficiency-toxicity curves for metals and said that this is interesting because it allows one to look at the gradations of effect. He added that, in the Netherlands, water criteria for metals are adjusted for natural background concentrations. Dr. Fairbrother then turned the discussion to the topic of natural background.

Natural Background:

Dr. Fairbrother asked Dr. Cutter to elaborate on his assertion that 0.1 ppb is the natural background for selenium in U.S. freshwaters. He replied that the data he based this on were presented in a chapter he wrote on selenium in freshwater systems, which he had provided to the group (Cutter, 1989). He said that he only included data he considered to have been produced using sound analytical methods; he acknowledged that the western United States was not adequately represented. He also cited another reference he provided (Cutter and San Diego-McGlone, 1990), detailing variability in selenium concentrations over 2 years in the Sacramento and San Joaquim rivers. He added, however, that concentrations in the San Joaquim are affected by agricultural input, and that headwater data would be necessary to estimate natural background. Dr. Riedel said that using headwater data ignores the natural selenium inputs that occur as one moves downstream. Dr. Fan said that researchers had addressed this issue in the San Joaquim by looking at tracers; they determined that approximately 90% of the selenium inputs were agricultural. Dr. Fairbrother asked if this method could be used to determine natural background in systems with anthropogenic inputs. Dr. Fan replied that some researchers are trying to do this, but it is not yet a proven method. Dr. Adams questioned how one defines a number for "background," since there is a range of values; he cited some examples of water bodies with natural selenium levels much higher than 0.1 ppb.

Dr. Cutter turned the discussion to the natural background selenium level for U.S. freshwater sediments, which he said is about 1 ppm. Dr. Adams agreed. Dr. Cutter said there is not much regional variation. Dr. Skorupa said that the USGS study of surficial soils in the United States found little regional variation in selenium soil levels. Dr. Fairbrother questioned how numbers were averaged in this study, agreeing with Dr. Adams's comment that one must look at the distribution as well as the median. She summarized the discussion by saying that there is still debate about natural background and that more work must done to allow good determinations to be made of whether sites' selenium concentrations are at natural background or elevated.

Interactions with Other Stressors:

Dr. Fairbrother raised the issue of the interaction of selenium with other stressors, asking the experts whether they had confidence that effects seen in the empirical data set are due just to selenium. Dr. Cutter said that he did not have confidence that this was the case, because when there is an excess of selenium, there is often an excess of something else. Dr. Hamilton said that the literature is fairly limited on many other elements. He cited an example from his research; in a study he did on the Green River, vanadium was somewhat elevated and may have been a confounding factor, but he could only find one relevant study about vanadium. Dr. Fairbrother and other experts pointed out the additional problem of extrapolating from the laboratory to the field. Dr. Fan said that, as broad element scans are becoming easier to do, she is hopeful that more field data will soon be available. Dr. Skorupa said that he feels there are sufficient data establishing that effects attributed to selenium are actually caused by selenium alone. His group has done studies in reservoirs that have a suite of pollutants excluding selenium, and they have not seen the effects typically associated with selenium.

Clarification Requested by EPA:

At this point, Mr. Sappington asked the experts to clarify a couple of issues. First, he pointed out that, during the cross-cutting session, experts had discussed possible global approaches in relating tissue concentrations to water concentrations; however, during the water-column issues session the day before, experts had expressed skepticism about performing water-to-tissue correlations. He asked them to clarify this, and also to state some of the factors that they think might make the correlation poor. He asked whether the experts considered loading from sediments and spatio-temporal variability in the water column to be important factors.

Dr. Fan replied that the problem might be more complex than that and cited an example of an irrigation pond in California in which large changes in selenium load in bird eggs were observed with only a minor dilution of waterborne selenium concentrations, for unknown reasons. Dr. Fairbrother asked the experts to also clarify whether the form of selenium that is discharged to receiving waters changes the temporal or magnitudinal dynamics of what happens in the food chain. Dr. Cutter replied that it does; for example, the uptake rate of selenate is slow compared to selenite. Dr. Fairbrother said that part of the problem in trying to establish relationships is that the systems under study are generally non-equilibrium, dynamic systems.

Dr. Adams responded to Mr. Sappington's original question by agreeing that both mass in the sediments and spatio-temporal variability in the water column are important. He added that fish behavior is also important, including what fish feed on and where they forage.

Mr. Sappington asked whether the experts would expect tissue residue effect levels to differ between the laboratory and the field, or whether laboratory data are in fact useful for generating effect-level information. Dr. Hamilton replied that when he did laboratory studies, with both water-only and dietary exposure to selenium, he found the residue effect level to be very similar between the two; in other words, how the selenium got into the tissue did not affect the effect level. Dr. Riedel agreed that this is probably generally true, but that there are exceptions. He pointed out that there are many unknowns in the field, while organisms in the laboratory are kept under optimal conditions. Dr. Hamilton agreed.

Conclusions: The following summary of the entire discussion session was written by the discussion leader and reviewed by the other experts.

1. Spatio-temporal variability

There is a large amount of variability in selenium concentrations within compartments of an ecosystem (e.g., water, sediment, biota) across both time and space. The relationships between the compartments are not linear, however. Water concentrations may change rapidly (within days) whereas sediment concentrations take months or years to change, particularly in lentic systems. Fish tissue residues integrate all compartments and theoretically may change in response to alterations in any of them although food-chain exposures tend to dominate. Therefore, fish tissue residues also change over a period of months, and do not reflect the faster fluctuations of water.

The major factors influencing spatio-temporal variability are water residence time and biological processing (i.e., the type of organisms in the food web). The rate-limiting step may be the rate of conversion of inorganic form to organic form, which is a function of the form of selenium and species of microorganisms in the sediment.

2. Ecosystem type

Ecosystems can be divided into lentic or lotic systems. Further subdivisions include ephemeral or perennial, highly saline, and northern (cold) streams. Differences in these systems that may lead to different responses to similar selenium input include retention time of carbon, rate of sediment accumulation, rates of conversion of inorganic to organic forms of selenium, and tolerance of local species. In addition, rates of allochthonous inputs (i.e., input of selenium materials from outside the aquatic system) versus autochthonous inputs (i.e., from within the system) differ. Most lotic systems are biologically open systems which makes it more difficult to measure ecologically-relevant effects on fish species that may move through the system, rather than being resident.

3. Site-specific approaches

Three approaches to site-specific assessments were proposed:

- Apparent effects threshold: This method would use existing field data to categorize systems as affected or not affected relative to selenium concentrations in sediment or water. The sediment/water concentration above which effects always occurred would be identified, as would the concentration below which effects never occurred. The concentrations in-between (where effects sometimes occurred or sometimes did not) would identify sites where a site-specific assessment would be needed.
- Fish tissue concentrations as a function of water concentrations: The empirical data from field studies that exist in the literature would be used to develop this bioaccumulation correlation on a global basis. Sites where measured fish tissue concentrations were different from the predicted concentrations, based on the amount of selenium in the water, would require a site-specific approach. If fish tissue – effects relationships are known for the species of concern, then sites could be further characterized as those with potentially higher than predicted effects or those with potentially lower effects.
- Modeling approach: The Aquatic Toxicity Model presented by George Bowie could be used to make *a priori* predictions of whether a concentration of selenium in water would result in effects to the fish. Site-specific input parameters include selenium input (amount, rate, and species), flow rates, water depth, and a few other hydrological parameters as well as food web species. The more site-specific data that are used in the model, the more likely is it to accurately predict effects.

4. Analytical methods

There are several methods for analyzing selenium in water, sediment, or tissue. No one method is the best for all media. Important considerations are desired minimum detection limits (ideally, should be ten-fold lower than the concentrations of interest), sample preparation requirements, and laboratory capabilities. Cost may be a factor as well. While methods are available that can achieve very low detection limits, many (if not most) contract laboratories are not set up to conduct these methods with appropriate accuracy or precision.

In addition to analytical methodology, appropriate sample collection and storage are required. Water samples should be acidified (with HCl) and kept cool; solid matrices should be kept frozen. Selenium may volatilize when a sample is heated and provide an incorrectly low value. Box core samplers are preferred for sediment sampling as they preserve the depth structure of the sediment, allowing measurements to be made on the upper flocculent (organic) material versus the lower inorganic portions.

5. Sufficiency versus toxicity

Since selenium is a required micronutrient for both plants and animals, there is an exposure concentration below which insufficiency effects are seen and a different concentration above which toxicity occurs. The area in-between is the Optimal Effects Concentration. For algae, there is a wide sufficiency zone and the required amount may differ depending on the amount of selenium in the system from which the test colony was derived (due to adaptation to a higher selenium environment). Fish have at least a ten-fold difference between required and toxic amounts. In general, there does not appear to be any naturally deficient systems, with the exception of some lakes in the Laurentian Shield area in Canada that may be deficient for algae. Furthermore, on a practical basis, it does not appear that source reduction of site remediation would result in systems with insufficient selenium concentrations. However, this issue may be important in laboratory studies where appropriate minimum concentrations of selenium must be provided to maintain colonies of test species.

6. Natural background

On the national level, the median background concentration of selenium in aquatic systems is about 0.1 µg/L. However, there is disagreement about this value and about the variability and range of natural background concentrations. Areas of highly seleniferous soils in the western U.S. may have naturally higher background concentrations either through movement of soils into waterbodies or into groundwater. Methods are being developed for differentiating between natural and anthropogenic inputs of selenium into an aquatic system, but there remains a great deal of uncertainty in the follow-on calculation of what a resulting natural background concentration would be.

7. Interactions with other stressors

Selenium has the potential to interact with other metals, causing either greater or lesser responses than predicted from selenium alone. Furthermore, exposure to selenium may reduce an organisms' ability to respond to other environmental stresses, such as has been shown for fish similar to those found in Belews Lake that were exposed to cold temperatures during laboratory studies (Lemly, 1993c, 1996). These types of interactions might confound the global empirical dataset relating effects to selenium concentrations in water, sediment, or food. Examples where this may have occurred include interactions between vanadium and selenium in a field study of fish reproduction. On the other hand, another study showed that effects were correlated only with the selenium concentration in the food, and that additional elements had no discernible effects. The endpoint of interest also may affect the potential for interactive effects to occur.

44

IV. OBSERVER COMMENTS

At the end of each day of the meeting, Dr. Fairbrother opened the floor to comments from observers. These comments are summarized below. In addition, observer presentation materials may be found in Appendix F.

Peter Chapman, EVS Consultants

This observer (speaking on the first day of the meeting) noted that discussions to date had mostly focused on standing-water systems. In contrast, his interest is flowing cold-water streams, particularly in Alaska and southeast British Columbia, with inputs of selenium from hard-rock mining and coal mining. He pointed out that these systems are quite different in many aspects from the systems under discussion by the experts. To date, his group's studies have found no adverse effects in streams in British Columbia with concentrations of selenium as high as 65 µg/L. He urged the experts and EPA to consider three key points:

- Flowing-water systems are very different from standing-water systems; much higher concentrations can be tolerated without adverse effects.
- Site-specific factors are incredibly important.
- Not all waters or biota require the same level of protection.

Philip Dorn, Shell Development Company

This observer questioned the need for a revision of the national freshwater chronic water quality criterion for selenium. He argued that no compelling field effects have been demonstrated in waters with selenium levels below the existing 5 µg/L chronic criterion. In addition, analytical methods for compliance testing are limited below 10 µg/L. Finally, there is large uncertainty in making correlations at the national scale between water-column selenium concentrations, selenium concentrations in the food chain, and selenium concentrations in bird eggs. He urged EPA to move toward developing site-specific residue- or effects-based criteria. He also noted that the cost per pound to remove selenium from discharge is quite high and that the removal process generates a large volume of sludge which must be disposed of. He asked EPA to ensure that future regulations are developed upon fact-based science.

Rob Reash, American Electric Power

This observer made comments on behalf of the Utility Water Act Group (UWAG), an association of electric utility companies and trade associations. UWAG is interested in EPA's reevaluation of the freshwater chronic aquatic life criterion for selenium because selenium is a natural trace element in coal and

45

many of UWAG's members use coal as the primary fuel for electrical generation. The observer said that UWAG views a universal numeric chronic criterion for selenium as inappropriate. He urged EPA to consider the following issues:

- Stratification by waterbody type;
- Accurate accounting of site-specific factors affecting selenium toxicity; and
- Development of site-specific criteria technical guidance.

In addition, he offered the opinion that fish liver is a good tissue in which to measure residues if ovaries are unavailable; in his work, he has found that fish liver tissue mirrors water-column selenium concentrations.

Walter Kuit, Cominco, Ltd.

Speaking on behalf of Cominco Alaska, this observer said that selenium is a key issue at his company's Red Dog Mine in northern Alaska. An impending NPDES permit will lower the mine's selenium discharge limit to a level that the company cannot meet. He said that flowing streams should be considered separately from standing water and urged EPA to move quickly in developing site-specific guidance. He also asked EPA to provide preliminary guidance on possible changes in sampling procedures (e.g., implementation of fish ovary sampling), so that affected parties can start gathering relevant data as soon as possible.

William Wright, Montgomery Watson

This observer, an ecologist, is managing the Southeast Idaho Phosphate Resource Area Selenium Project. This project involves the evaluation of a 1,200-square-mile area containing 14 mines, where selenium is leaching from interburden waste shales. Receiving waters are typically intermittent tributaries of montane trout streams and are generally sulfate rich. Sampling to date has found water-column concentrations of selenium ranging from below detection limits to 2,000 ppb. Ninety percent of the selenium is in the selenate form. His group does not have definitive results yet, but has seen no adverse effects so far. Healthy populations have been found in areas with high concentrations of selenium. He echoed Peter Chapman's comments, saying that site-specificity is important, and beneficial use should be taken into account.

Chris Stanford, JD Consulting

This observer expressed the opinion that we have a long way to go in regard to quantifying the behavior and effects of selenium in the environment. He added that although revising the chronic criterion is a good goal, we do not yet have enough information to be able to develop a new nationwide criterion that is a definite improvement over the existing one. The solution to this in the short term, he said, is to develop site-specific standards, including guidance on sampling and data analysis and interpretations. In addition, he asked EPA to establish standards that can serve as guidance to contract laboratories.

John Goodrich-Mahoney, EPRI Environment Division

This observer said that EPRI will be coming out with their Selenium Aquatic Toxicity Model this fall. He invited experts and observers to be beta testers for the model. He can be contacted at <jmahoney@epri.com>. He added that EPRI encourages EPA to develop site-specific guidance and is willing to offer any assistance it can.

Judith Schofield, DynCorp

This observer stated that DynCorp has been providing support to EPA in the development of 1600-series analytical methods; she updated the attendees on the status of the two methods that apply to selenium. EPA Draft Method 1638 is an ICP-MS method with an estimated detection limit of 0.45 µg/L. EPA Draft Method 1639 is a gas furnace-AA method with an estimated detection limit of 0.3 µg/L. The methods and their detection limits will be tested in upcoming interlaboratory validation studies. Formal proposal of the methods will probably occur in early 1999. She added that EPA is also working on a streamlining rule, which is a performance-based measurement system approach to analytical methods.

V. REFERENCES

Adams, W.J. 1976. The toxicity and residue dynamics of selenium in fish and aquatic invertebrates. Ph.D. Dissertation, Michigan State University, E. Lansing, MI.

Amouroux, D. and O.F.X. Donard. 1996. *Geophys. Res. Lett.* 23:1777-1780.

Barrick, R.C., H. Beller, D.S. Becker, and T.C. Ginn. 1989. Use of the Apparent Effects Threshold (AET) in classifying contaminated sediments. In *Contaminated Marine Sediments -- Assessment and Remediation.* National Academy Press, Washington, DC.

Bender, M., W. Martin, J. Hess, F. Sayles, and L. Ball. 1987. A whole-core squeezer for interfacial pore-water sampling. *Limnol. Oceanogr.* 32:1214-1225.

Besser, J.M., T. Canfield, and T. LaPoint. 1993. Bioaccumulation of organic and inorganic selenium in a laboratory food chain. *Environ. Toxicol. Chem.* 12:57-72.

Birkner, J.H. 1978. Selenium in aquatic organisms from seleniferous habitats. Ph.D. thesis. Colorado State University, Fort Collins, CO. Available from: University Microfilms, Ann Arbor, MI. Order No. 78-20841.

Blomqvist, S. 1985. Reliability of core sampling of soft bottom sediment -- an *in situ* study. *Sedimentology* 32:605-612.

Blomqvist, S. 1991. Quantitative sampling of soft-bottom sediments: Problems and solutions. *Mar. Ecol. Progr. Ser.* 72:295-304.

Bowie, G.L., J.G. Sanders, G.F. Riedel, C.C. Gilmour, D.L. Breitburg, G.A. Cutter, and D.B. Porcella. 1996. Assessing selenium cycling and accumulation in aquatic ecosystems. *Water, Air, Soil Pollut.* 90:93-104.

Brown, C.L. and S.N. Luoma. 1995. Energy-related selenium and vanadium contamination in San Francisco Bay, California: Effects on biological resources? *In* L.M.H. Carter, ed., *Energy and the Environment: Application of Geosciences to Decision-Making.* Tenth V.E. McKelvey Forum on Mineral and Envergy Resources, U.S. Geological Survey Circular 1108.

Bryson, W.T., K.A. MacPherson, A. Mallin, W.E. Partin, and S.E. Woock. 1985. Roxboro Steam Electric Plant Hyco Reservoir 1984 Bioassay Report. Carolina Power and Light Company, New Hill, NC.

Cooke, T.D. and K.W. Bruland. 1987. Aquatic chemistry of selenium: evidence of biomethylation. *Environ. Sci. Technol.* 21:1214-1219.

Coyle, J.J., D.R. Buckler, C.G. Ingersoll, J.F. Fairchild, and T.W. May. 1993. Effect of dietary selenium on the reproductive success of bluegills (*Lepomis macrochirus*). *Environ. Toxicol. Chem.* 12: 551-565.

Cumbie, P.M. and S.L. Van Horn. 1978. Selenium accumulation associated with fish mortality and reproductive failure. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 32:612-624.

Cutter, G.A. 1982. Selenium in reducing waters. *Science* 217:829-831.

Cutter, G.A. 1985. Determination of selenium speciation in biogenic particles and sediments. *Anal. Chem.* 57:2951-2955.

Cutter, G.A. 1989. Freshwater systems. *In* M. Ihnat, ed., *Occurrence and Distribution of Selenium.* CRC Press, Boca Raton, FL, pp. 243-261.

Cutter, G.A. 1991. *Selenium Biochemistry in Reservoirs. Volume 1: Time Series and Mass Balance Results.* EN-7281, Volume 1, Research Project 2020-1. Electric Power Research Institute, Palo Alto, CA.

Cutter, G.A. and L.S. Cutter. 1998. Metalloids in the high latitude North Atlantic: sources and internal cycling. *Mar. Chem.* 61:25-36.

Cutter, G.A. and M.L.C. San Diego-McGlone. 1990. Temporal variability of selenium fluxes in the San Francisco Bay. *Sci. Total Environ.* 97:235-250.

Engberg, R.A. 1998. Selenium budgets for Lake Powell and the upper Colorado River basin. *J. Amer. Water Res. Assoc.* (in review).

Fan, T.W.-M., R.M. Higashi, and A.N. Lane. 1998. Biotransformations of selenium oxyanion by filamentous cyanophyte-dominated mat cultured from agricultural drainage waters. *Environ. Sci. Technol.*, in press.

Fan, T.W.-M., A.N. Lane, D. Martens, and R.M. Higashi. 1998. Synthesis and structure characterization of selenium metabolites. *Analyst* 123:875-884.

Frankenberger, W.T. and U. Karlson. 1994. Microbial volatilization of selenium from soils and sediments. *In* W.T. Frankenberger and S. Benson, eds., *Selenium in the Environment.* Marcel Dekker, New York, pp. 369-387.

Gillespie, R.B. and P.C. Baumann. 1986. Effects of high tissue concentrations of selenium on reproduction by bluegills. *Trans. Am. Fish. Soc.* 115:208-213.

Gobler, C.J., D.A. Hutchins, N.S. Fisher, E.M. Cosper, and S.A. Sanudo-Wilhelmy. 1997. Release and bioavailability of C, N, P, Se, and Fe following viral lysis of marine chrysophyte. *Limnol. Oceanogr.* 42:1492-1504.

Hamilton, S.J., K.J. Buhl, F.A. Bullard, and S.F. McDonald. 1996. Evaluation of toxicity to larval razorback suckers of selenium-laden food organisms from Ouray NWR on the Green River, Utah. Final Report. Colorado River Recovery Implementation Program, Denver, CO. 79 pp.

Hansen, D., P.J. Duda, A. Zayed, and N. Terry. 1998. Selenium removal by constructed wetlands: Role of biological volatilization. *Environ. Sci. Technol.* 32:591-597.

Hilton, J.W., P.V. Hodson, and S.J. Slinger. 1980. The requirement and toxicity of selenium in rainbow trout (*Salmo gairdneri*). *J. Nutri.* 110:2527-2535.

Holland, E.A. 1979. *Arsenic and selenium in the water, sediments, and biota near a coal-fired power plant — Belews Lake, North Carolina.* M.S. Thesis, School of Public Health, Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, NC.

Jahnke, R.A. 1988. A simple, reliable, and inexpensive pore-water sampler. *Limnol. Oceanogr.* 33:483-487.

Karlson, U. and W.T. Frankenberger, Jr. 1990. Volatilization of selenium from agricultural evaporation pond sediments. *Sci. Total Environ.* 92:41-54.

Kroll, K.J. and S.I. Doroshov. 1991. Vitellogenin: Potential vehicle for selenium bioaccumulation in oocytes of the white sturgeon (*Acipenser transmontanus*). *In* P. Williot, ed., *Acipenser*, Cemagref Publishers, pp. 99-106.

Kumar, H.D. and G. Prakash. 1971. Toxicity of selenium to the blue-green algae, *Anacystis nidulans* and *Anabaena variabilis*. *Ann. Bot. (Lond.)* 35:687-705.

Lemly, A.D. 1982. Response of juvenile centrarchids to sublethal concentrations of waterborne selenium. 1. Uptake, tissue distribution, and retention. *Aquat. Toxicol.* 2:235-252.

Lemly, A.D. 1985. Toxicology of selenium in a freshwater reservoir: Implications for environmental hazard evaluation and safety. *Ecotoxicol. Environ. Saf.* 10:314-338.

Lemly, A.D. 1993a. Teratogenic effects of selenium in natural populations of freshwater fish. *Ecotoxicol. Environ. Saf.* 26:181-204.

Lemly, A.D. 1993b. Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. *Environmental Monitoring and Assessment* 28:83-100.

Lemly, A.D. 1993c. Metabolic stress during winter increases the toxicity of selenium to fish. *Aquat. Toxicol.* 27:133-158.

Lemly. A.D. 1996. Winter Stress Syndrome: An important consideration for hazard assessment of aquatic pollutants. *Ecotoxicol. Environ. Saf.* 34:223-227.

Lemly, A.D. 1997. Ecosystem recovery following selenium contamination in a freshwater reservoir. *Ecotoxicol. Environ. Saf.* 36:275-28.

Luoma, S.N., C. Johns, N.S. Fisher, N.S. Steinberg, R.S. Oremlans, and J.R. Reinfelder. 1992. Determination of selenium bioavailability to a benthic bivalve from particulate and solute pathways. *Environ. Sci. Technol.* 26:485-491.

Maier, K.J., C.R. Nelson, F.C. Bailey, S.J. Klaine, and A.W. Knight. 1998. Accumulation of selenium by the aquatic biota of a watershed treated with seleniferous fertilizer. *Bull. Environ. Contam. Toxicol.* 60:409-416.

Moede, A., R.W. Greene, and D.F. Spencer. 1980. Effects of selenium on the growth and phosphorus uptake of *Scenedesmus dimorphus* and *Anabaena cylindrica*. *Environ. Exp. Bot.* 20:207-212.

Munwar, M., I.F. Munwar, P.E. Ross, and C.I. Mayfield. 1987. Differential sensitivity of natural phytoplankton size assemblages to metal mixture toxicity. *Ergeb. Limnol.* 25:123-139.

Ohlendorf, H.M. and G.M. Santolo. 1994. Kesterson Reservoir -- past, present, and future: an ecological risk assessment. *In* W.T. Frankenberger and S. Benson, eds., *Selenium in the Environment.* Marcel Dekker, New York, pp. 69-118.

Radtke, D.B, W.G. Kepner, and R.J. Effertz. 1988. Reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the lower Colorado River Valley, Arizona, California, and Nevada, 21986-87. Water-Resources Investigations Report No. 88-4002, U.S. Geological Survey, Tucson, Arizona.

Riedel, G.F. and J. G. Sanders. 1996. The influence of pH and media composition on the uptake of inorganic selenium by *Chlamydomonas reinhardtii*. *Environ. Toxicol. Chem.* 15:1577-1583.

Riedel, G.F., J.G. Sanders, and C.C. Gilmour. 1996. Uptake, transformation and impact of selenium in freshwater phytoplankton and bacterioplankton communities. *Aquat. Microbiol. Ecol.* 11:43-51.

Saiki, M.K., M.R. Jennings, and W.G. Brumbaugh. 1993. Boron, molybdenum, and selenium in aquatic food chains from the lower San Joaquin River and its tributaries, California. *Arch. Environ. Contam. Toxicol.* 24:307-319.

Saiki, M.K. and T.P. Lowe. 1987. Selenium in aquatic organisms from subsurface agricultural drainage water, San Joaquin Valley, California. *Arch. Environ. Contam. Toxicol.* 16:657-670.

Sanders, J.G., R.P. Gallagher, C.C. Gilmour , R.W. Osman, and G.F. Riedel. 1989. *Selenium Cycling and Impact in Aquatic Systems.* Annual Progress Report for 1989, Prepared for Electric Power Research Institute. November 1989.

Schroeder, R.A., D.U. Palawski, and J.P. Skorupa. 1988. Reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the Tulare Lake Bed Area, southern San Joaquin Valley, California, 1986-88. Water-Resources Investigations Report 88-4001, U.S. Geological Survey, Sacramento, CA.

Seiler, R.L. 1996. Synthesis of data from studies by the National Irrigation Water-Quality Program. *J. Am. Water Res. Assoc.* 32:1233-1245.

Skorupa, J.P. 1998. Selenium poisoning of fish and wildlife in nature: Lessons from twelve real-world examples. *In* W.T. Frankenberger and R.A. Engberg, eds., *Environmental Chemistry of Selenium.* Marcel Dekker, New York, pp. 315-354.

Skorupa, J.P. and H.M. Ohlendorf. 1991. Contaminants in drainage water and avian risk thresholds. *In* A. Dinar and D. Zilberman, eds., *The Economics and Management of Water and Drainage in Agriculture.* Kluwer Academic Publishers, Boston, MA, pp. 345-368.

Sorensen, E.M.B., P.M. Cumbie, T.L. Bauer, J.S. Bell, and C.W. Harlan. 1984. Histopathological, hematological, condition-factor, and organ weight changes associated with selenium accumulation in fish from Belews Lake, North Carolina. *Arch. Environ. Contam. Toxicol.* 13:153-162.

Spallholz, J.E. 1994. On the nature of selenium toxicity and carcinostatic activity. *Free Radical Biology and Medicine* 17(1):45-64.

Takayanagi, K. and G.T.F. Wong. 1984. Organic and colloidal selenium in southern Chesapeake Bay and adjacent waters. *Mar. Chem.* 14:141-148.

Van Derveer, W.D. and S.P. Canton. 1997. Sediment selenium toxicity thresholds and derivation of water-quality criteria for freshwater biota of western streams. *Environ. Toxicol. Chem.* 16:1260-1268.

Velinsky, D.J. and G. A. Cutter. 1990. Determination of elemental selenium and pyrite-selenium in sediments. *Anal. Chim. Acta* 235:419-425.

Velinsky, D.J. and G.A. Cutter. 1991. Geochemistry and selenium in a coastal salt marsh. *Geochim. Cosmochim. Acta* 55:179-191.

Wheeler, A.E., R.A. Zingaro, and K. Irgolic. 1982. The effect of selenate, selenite, and sulfate on six species of unicellular algae. *J. Exp. Mar. Biol. Ecol.* 57:181-194.

Woock, S.E., W.R. Garrett, W.E. Partin, and W.T. Bryson. 1987. Decreased survival and teratogenesis during laboratory selenium exposures to bluegill, *Lepomis macrochirus*. *Bull. Environ. Contam. Toxicol.* 39:998-1005.

Wrench, J.J. 1978. Selenium metabolism in the marine phytoplankters *Tetraselmis tetrathele* and *Dunaliella minuta*. *Marine Biol.* 49:231-236.

Zhang, L., R.S. Walsh, and G.A. Cutter. 1998. Estuarine cycling of carbonyl sulfide: Production and sea-air flux. *Mar. Chem.* 61:127-142.

Zhang, Y., and J.N. Moore. 1996. Selenium fractionation and speciation in a wetland system. *Environ. Sci. Technol.* 30:2613-2619.

Zhang, Y. and J.N. Moore. 1997. Environmental conditions controlling selenium volatilization from a wetland system. *Environ. Sci. Technol.* 31:511-517.

Santa Clara Valley Audubon Society
Founded 1926

January 6, 2004

Mr. John Forren
U.S. Environmental Protection Agency
1650 Arch Street, Philadelphia, PA 19103

REC'D JAN 0 9 2004

Re: Impose restrictions of mountaintop removal mining to limit environmental damage

Dear Mr. Forren,

On behalf of the nearly 4000 members of the Santa Clara Valley Audubon Society and myself, I wish to voice our alarm and concern at the Bush administration's plan to continue allowing coal production to destroy the Appalachia region with mining practices that level mountaintops, wipe out forests, bury streams, and destroy communities. Many of our members travel to the region most impacted by these practices to enjoy its natural resource and wildlife values. In doing so, they support the local economies in a relatively sustainable manner. Thus, while seemingly far from the damage, our members have seen the devastation for themselves. This devastation will be further aggravated by the continuation of these poor resource extraction policies. 1-9

According to the administration's draft Environmental Impact Statement (EIS) on mountaintop removal coal mining, the environmental effects of mountaintop removal are destructive, large-scale and permanent. Nonetheless, the draft EIS proposes elimination of mitigation measures such as placing restrictions on the size of valley fills that bury streams or limits on the number of acres of forest that can be destroyed through these practices. The administration offers little or no protections for imperiled wildlife and few safeguards for the communities that depend on the region's natural resources. 1-10

It is simply outrageous that the administration's "preferred alternative" for addressing the problems of the environmentally devastating effects of mountaintop removal mining would weaken existing environmental protections. The proposal is worse than current practices, which have been proved so harmful. This "preferred alternative" ignores the administration's own studies detailing the devastation caused by mountaintop removal coal mining, including:

- Over 1200 miles of streams damaged or destroyed by mountaintop removal to date;
- Forest losses in West Virginia with the potential of directly impacting as many as 244 vertebrate wildlife species;
- An additional proposal of 350 square miles of mountains, streams, and forests to be wiped out by mountaintop removal mining.

My fellow members of the Santa Clara Valley Audubon Society and I strongly urge you to consider alternatives that reduce the environmental impacts of mountaintop removal. Thank you for giving us an opportunity to voice our views on this important issue.

Sincerely,
Craig K. Breon
Executive Director

22221 McClellan Road, Cupertino, CA 95014 • Phone: 408-252-3747 • Fax: 408-252-2850
email: scvas@scvas.org • www.scvas.org

Printed on Recycled Paper with Soy Ink

January 6, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Jacob Street
Philadelphia, PA 19103
mountaintop.r3@epa.gov

RE: Ohio Coal Association Comments on the Mountaintop Mining/Valley Fill Draft Environmental Impact Statement

Dear Mr. Forren:

The Ohio Coal Association joined with the National Mining Association (NMA) and other state coal associations from Kentucky, West Virginia and Virginia in the delivery of joint comments on the Draft Programmatic Environmental Impact Statement (PEIS) addressing mountaintop mining and valley fills (MTM/VF) in the steep slope Appalachian coal fields. The Ohio Coal Association fully supports those comments.

The Ohio Coal Association is a non-profit trade association that is dedicated to representing Ohio's underground and surface coal mining production. The Association represents close to forty coal producing companies and over fifty Associate Members, which include suppliers and consultants to the mining industry, coal sales agents and brokers and allied industries. As a united front, the Ohio Coal Association is committed to advancing the development and utilization of Ohio coal as an abundant, economic and environmentally sound energy source.

A common thread among the state industry groups joining in the above noted comments is the fact that all conduct coal mining operations within the Huntington District of the Corps of Engineers.

However, there are also some major differences between coal operations within the PEIS study area and coal operations in the State of Ohio. In addition to the joint comments filed by the National Mining Association on behalf of the Ohio Coal Association the Association wishes to address the following specific concerns regarding the PEIS:

- **Applicability of PEIS to mining activities not involving MTM/VF outside of the study area**

The Study Area established for the PEIS was based upon where MTM/VF activities were located in the past and where MTM/VF activities were anticipated in the future. Ohio was not included in the Study Area, and impacts of Ohio coal mining activities were not specifically studied as part of the PEIS. One exception however was a single study on the recovery of reclaimed streams in central Ohio, which was included as supplemental material. As noted, this study did not involve valley fills. The research was conducted years ago by the Office of Surface Mining and provided positive results.

There was an attempt in the document to outline assumptions that would provide some correlation of MTM/VF activities in the study area to other mining activities in other areas, but these explanations fell short of acceptable. No justification can be found for expanding findings beyond the study area, or for adequately addressing impacts other than those associated with mountaintop mining and associated valley fills. The document should be modified to clarify that findings and recommended alternatives are not to apply to mining activities outside of the study area that do not involve valley fills. 1-13

- **Authority for the Corps' new "no net loss of stream function" policy**

There is no explanation and no justifiable authority found for the recent shift in Corps' policy to require no net loss of stream length and function, and yet the contents of this PEIS seem to be based almost entirely on this policy. There is even a statement in the document that claims that the goals of the CWA cannot be accomplished unless stream function is addressed (page I-4). The document should be expanded to clarify this statement.

Everyone is aware of the no net loss of wetland policy that was officially expanded to include no net loss of wetland functions. However, recent activities within the Corps have now resulted in a no net loss of stream function and there is no clear indication as to how this became official national policy. The Ohio Coal Association can find no official document mandating the use of this policy. Only that it is now policy. 5-7-1

While wetland functions are easily identifiable and understood, this is not the case for streams. In addition, the use of biological protocols to assess the range of stream functions is inappropriate, especially in the case of ephemeral streams and the upper reaches of intermittent streams. The US EPA went through an educational process on wetland functions and provided opportunities for public input prior to implementing the policy change from no net loss of wetlands to no net loss of wetland functions. This was not the case for the stream policy now being imposed by the Corps.

- **Use of a headwaters category**

The use of a "headwaters" category artificially increases the value of the majority of streams included in that category, namely 1st, 2nd and 3rd order streams, or ephemeral streams and upper reaches of intermittent streams. Through the use of the headwaters category an ephemeral stream will have the same value as perennial streams within the watershed because all would be considered as headwater streams. This then exaggerates the mitigation requirements to be imposed by the regulatory agency. The PEIS should retain the descriptions of ephemeral, intermittent and perennial for stream categorization. 5-7-4

- **Watershed approach to mitigation**

The Corps is proposing to consider watershed needs when imposing mitigation requirements. The Ohio Coal Association agrees with this approach. However, the Corps should also determine impacts of a proposed activity on a watershed basis and not 5-6-3

2

on a stream by stream basis. As an example, impacts to an individual ephemeral stream will appear significant when considering only the impacts to that individual stream. However, when you consider the impacts to that ephemeral stream relative to the watershed and downstream functions, the temporary loss of that ephemeral stream will be minimal at most. The Corps should make the necessary changes to reflect this more reasonable approach. 5-6-3

The Ohio Coal Association appreciates the opportunity to become involved in this process.

Sincerely,

Michael T.W. Carey
President

3

REC'D JAN 0 5 2004

Interstate Mining Compact Commission

445-A Carlisle Drive, Herndon, VA 20170
Phone: 703/709-8654 Fax: 703/709-8655
Web Address: www.imcc.isa.us E-Mail: gconrad@imcc.isa.us or bbotsis@imcc.isa.us

January 2, 2004

John Forren
U.S. Environmental Protection Agency
3ES30
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

This letter constitutes the comments of the Interstate Mining Compact Commission (IMCC) regarding the draft programmatic environmental impact statement on mountaintop mining/valley fills in Appalachia. IMCC is a multi-state governmental organization representing 20 mineral-producing states throughout the U.S., 15 of which operate federally approved regulatory programs pursuant to the Surface Mining Control and Reclamation Act of 1977 and most of which operate state programs/plans pursuant to the Clean Water Act. IMCC has participated at various times throughout the development of the draft EIS and in the preparation and review of the various technical studies that accompany and serve as the basis for the EIS. However, for the most part, IMCC has relied upon the expertise and input of the three primary states that have been the focus of the draft EIS, i.e. West Virginia, Kentucky and Virginia. In this regard, IMCC endorses the comments of the Commonwealth of Virginia that have been submitted on the draft EIS.

One of our primary concerns from the outset has been the development and identification of the appropriate alternatives that frame the basis of the draft EIS. Although the authors have come closer to the mark in the final draft, we still believe that the "no action" alternative (which is our preferred alternative) does not accurately reflect the realities of today's regulatory programs. 1-1 In this regard, we echo the comments of Virginia that the no action alternative should be recharacterized as an option that would continue the existing SMCRA, EPA and Corps of Engineers regulatory programs, including past and ongoing amendments to those programs. We have seen a plethora of changes over the past several months in all three regulatory programs, many of which are being considered for adoption by the states, that reflect the ever-changing regulatory landscape associated with mountaintop mining and valley fills. 1-13 It is essential that all three federal agencies continue to work cooperatively together, along with the states, to insure the implementation of comprehensive, realistic and legally sound regulatory programs that effectively protect the environment while maintaining and assuring an adequate supply of coal, our Nation's most abundant energy resource.

We are also concerned that the draft EIS, and its various recommendations, will have impacts and repercussions far beyond Appalachia. IMCC has articulated this view from the outset and our review of the draft EIS has heightened our concern. While EPA, OSM and the Corps have repeatedly stated that the EIS is focused only on Appalachia, it is difficult for us to believe that the alternatives being considered would not result in national rules, policies and guidelines that would impact other states' regulatory programs. In many instances these proposed changes would be either inapplicable or meaningless, due to the differences in geology, climate and terrain among the states. We urge all three federal agencies to be mindful of the "spill over" effect from the draft EIS and to guard against unnecessary and inappropriate impacts and intrusions to state programs. 1-13

Finally, should the federal agencies choose to move forward with the EIS (a course of action we do not support), we urge them to be mindful of the fact that in almost every instance, the states have the lead in implementing the applicable regulatory programs and thus any recommendations for action (in the way of regulations, guidelines and/or policies) should seriously consider the potential impacts on existing state regulatory programs and the implementation thereof by the states, especially in the context of permitting and enforcement.

Should you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Gregory E. Conrad
Executive Director

Comments Regarding The Draft Programmatic Environmental Impact Statement
July 24, 2004

Kent DesRocher
President and General Manager
Arch Of West Virginia

On Behalf Of The
West Virginia Coal Association

My name is Kent DesRocher and I am President and General Manager of Arch of West Virginia located at Yolyn, West Virginia. I have worked in the mining industry for nineteen years and in Central Appalachia for 10 years.

Over the past several years, coal companies have began to help diversify the economy of the fourteen coalfield counties. Through the development of post mine land sites including such diverse projects as industrial parks; golf courses; race track; recreational areas; commercial fish facility; housing; and public facilities, additional jobs are being provided for our children. 11-9-5

With the assistance of the West Virginia Coal Field Development Office, we are now even more capable to plan for the diversification of the economy in the coalfields. All fourteen counties have suffered from the lack of transportation and developable acreage for many years. The transportation routes are improving with the upgrading of US 119 (Corridor G) and Interstate 77 (West Virginia Turnpike) coupled with Interstate 64 and 79. The development of the King Coal Highway and the Coal Fields Expressway will further increase development opportunities.

The mountainous terrain of the fourteen counties has also slowed growth in the area. Industrial, commercial and housing sites have been at a premium. The development of flat to gently rolling sites will assist in the growth and stability of the area. 10-3-5

Charles Yuill of West Virginia University lists six provisions for new land uses and land use opportunities.

1. Mr. Yuill indicates "most potential future mountaintop mining areas will be reclaimed to various forest cover". The current rules relating to commercial forestry must be reviewed to allow for the highest yield practical. The rules must be reviewed with respect to compaction; competition, and composition of soils. Recent studies would indicate that the best method has not yet been proposed to provide the best opportunities for commercial forestry.
2. Much discussion has occurred over the past several years regarding the ~~uses of~~ post mine land use for agriculture such as vineyards, animal production; green house farming and aquaculture. Most of the sites where agriculture has been proposed will not occupy the entire site and approval of multiple uses will be required. For example, let's say the primary post mine land use is a vineyard, which would occupy fifty percent of the property. But since this is an agricultural project which is a higher and better use, the remaining portion of the property must be allowed to be developed into support areas, pasture lands or habitat which would not compete with primary higher use. Rules development must keep these issues in mind. 10-3-5
3. The study projects that "significant acreages of land suitable for developed post-mining land uses will result from future mining under all of the mining scenarios." The only way that the fourteen counties can significantly change the economy of the area is the development of large sites capable of supporting multiple uses. Mining scenarios that produce many acres of flat to gently rolling land areas can provide the opportunity to diversify and improve the economy of southern West Virginia.

4. Mr. Yuill is correct when he states that "Development limitations such as poor accessibility and infrastructure proximity will continue in nearly all of these areas." These issues will require the development agencies and environmental agencies to think out of the box. Such issues as the use of mitigation payments for water and sewer projects should be considered if there is a desire by the involved parties to redevelop and diversify the area. Smaller sites, less than 50 acres, will do little to diversify the economy of the 14 counties.
5. The environmental regulatory agencies must work closely with planning and development agencies when considering post mine land use. Here again, in order to allow for diversity and stabilization of the economy, regulatory agencies must think outside the box. Higher and better use must be site specific based upon many items normally associated in planning documents. 10-3-5
6. If we want the fourteen counties discussed in the study to diversify their economy, they must be allowed to create lands suitable for development. The sites must be of sufficient size ~~to allow~~ to make it worthwhile to provide the necessary infrastructure required for development.

With the advent of a responsible Environmental Impact Statement and a desire by the federal and state regulatory agencies to provide for affordable energy while providing sites for future economic transformation in the fourteen counties, we can provide a positive outcome for the citizens of the area. 10-3-5

In summary, large-scale surface mining can help support the development of infrastructure, access, and sites necessary for future development to allow for diversification of the economy in southern West Virginia.

Thank you for your time today.

Kent R. DesRocher
281 Ridgeview Terrace
Chapmanville, WV 25508

7/22/03

Partners in Flight
Northeast Working Group

John Forren
U.S. EPA (3EA30)
650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

Please accept the following comments in review of the Draft EIS on mountaintop coal mining and associated valley fills in West Virginia, Kentucky, Tennessee, and Virginia. These comments reflect discussions among members of the Northeast Working Group of Partners in Flight (PIF) regarding the likely impacts of mountaintop mining activities on the full suite of priority birds associated with mature deciduous forests, including populations of Cerulean Warblers, as well as a summary of landbird conservation priorities for the geographic area under consideration for the DEIS. A brief summary statement is presented below, with a more detailed discussion in the attached pages. These comments represent a synthesis of information gained from published literature, bird conservation plans developed by PIF, an extensive Cerulean Warbler Atlas Project conducted from 1997-2000, and discussions with colleagues. Figures from the Draft EIS on cumulative impacts of this mining activity in the study area suggest a massive and permanent impact within the EIS study area on the entire suite of priority mature forest birds (e.g., Cerulean Warbler, Louisiana Waterthrush, Worm-eating Warbler, Kentucky Warbler, Wood Thrush, Yellow-throated Vireo, Acadian Flycatcher) due to the estimated forest loss of approximately 760,000 acres from issued and future permits during the 20-year period of 1992 to 2012. Total cumulative forest loss from all mining activities, including permitted activities prior to 1992, is estimated at 11.5% of the total forest cover in the EIS study area. We consider this level of habitat loss to constitute a significant negative impact for the entire mature forest suite of birds, and especially for the Cerulean Warbler, the forest species of highest concern in this area. 8-1-2 The cumulative impacts from issued and proposed future mountaintop mine/valley fill permits during this period appear likely to eliminate breeding habitat for 10%-20% (our estimate is 17%) of the global population of Cerulean Warblers. This level of habitat loss is unacceptable for a species that has experienced steep population declines over the last 30 years and is facing other major threats. Furthermore, research within the EIS study area shows that densities of Cerulean Warblers are reduced in isolated forest patches left by mining and near mine edges, indicating an even greater impact beyond the direct habitat loss from mining activities. 9-1-2 According to PIF bird conservation plans, mature forest birds are a high conservation priority within the EIS study area, whereas grassland birds are not. In addition, the creation of poor quality, early-successional habitats that may be suitable for some shrub nesting species does not justify, or in any way compensate, the removal and fragmentation of extensive mature forest areas within the EIS study area. We encourage every effort to minimize the removal and fragmentation of existing mature forest habitat in the EIS study area. 7-3-3

Sincerely,
Randy Dettmers, Chair
Northeast Working Group of Partners in Flight
300 Westgate Center Drive
Hadley, MA 01035

Impacts of Mining Activities on Mature Forest Birds. The mountaintop removal mining/valley filling practices addressed by the EIS occur throughout what can be considered the core of the breeding range for many of the PIF high priority birds of eastern mature deciduous forests, including Cerulean Warbler, Louisiana Waterthrush, Worm-eating Warbler, Wood Thrush, Yellow-throated Vireo, and Acadian Flycatcher. According to Breeding Bird Survey (BBS) data, all of the species just mentioned occur at or near their peak abundances within the EIS study area, which largely overlaps with the Northern Cumberland Plateau physiographic area as delineated by PIF. Numerous other species of this habitat suite also occur in high relative abundances within this area, including Kentucky Warbler, Eastern Wood-Pewee, Ovenbird, and Scarlet Tanager. The mining and valley fill activities addressed by the EIS directly affect several of the primary habitats used by these species -- mature deciduous forest on Appalachian ridge tops (used by Cerulean Warbler, Yellow-throated Warbler, Eastern Wood-Pewee, Scarlet Tanager, Ovenbird, Wood Thrush), and mature mixed-mesophytic forest along headwater streams ("coves" – used by Cerulean Warblers, Louisiana Waterthrush, Worm-eating Warbler, Kentucky Warbler, Acadian Flycatcher, Wood Thrush). Preliminary figures from the EIS on cumulative impacts of mining activities in the study area suggest a massive and permanent impact on the mature forest suite of birds within the study are due to the estimated forest loss of approximately 760,000 acres from issued and future permits during the 20-year period of 1992 to 2012. An additional 648,000 forested acres appears to have been lost from permitted mining activities prior to 1992. 9-1-2

The total cumulative forest loss from mining activities equates to an 11.5% reduction in total forest cover in the study area. Removing >10% of the forest cover from a region is likely to have negative impacts on mature forest birds, even in well-forested landscapes. As overall forest cover drops in a region, negative impacts to forest breeding birds from fragmentation and edge effects will become more severe. Work by O'Connell et al. (2000) across the Mid-Atlantic Highlands region, which includes a large part of the EIS study area, suggests that as landscapes fall below a threshold of about 82% forest cover, the ecological integrity of the forest community becomes increasingly compromised. Removing almost 12% of the forest from the EIS study area through mining activities alone will bring the % forest cover of this entire area down close to this threshold and certainly will cause some landscape-level areas within this larger area to fall well below this threshold. We consider the level of breeding habitat loss resulting from permitted and proposed mining activities to represent a significant negative impact for the suite of mature deciduous forest birds in the EIS study area, particularly for those species for which this area represents the core of their breeding range.

Specific Impacts to Cerulean Warblers. Because the Cerulean Warbler is the mature forest species of highest concern according to PIF assessments and because it has been petitioned for listing under the Endangered Species Act, we provide a more detailed analysis on the impacts that mining activities are likely to have on this species. 8-1-2

Population status and trends. The general status and population trends of Cerulean Warbler in most parts of its range are fairly well documented. These have been previously summarized in the USFWS Status Assessment (Hamel 2000), as well as final report to USFWS of the Cerulean Warbler Atlas Project (Rosenberg et. al., 2000). We believe that population trends as reported by the BBS are sufficiently reliable for Cerulean Warbler at range-wide and regional scales. These trends show a roughly 4.5%-per-year decline range-wide since1966, with steep declines in nearly every region including in the core of the species' range, which overlaps almost entirely with the EIS study area.

As part of the development of a PIF North American Landbird Conservation Plan, estimates of the total continental breeding populations of most species have been developed for the purpose of setting conservation objectives. Using this method of extrapolating BBS relative abundances, the current total population estimate (using data from the decade of the 1990s) for Cerulean Warblers is about 560,000 birds, or roughly 280,000 pairs. Based on the BBS data, an estimated 70% of the total breeding population occurs in the Ohio Hills and Northern Cumberland Plateau physiographic areas, from southern Ohio and Pennsylvania, through West Virginia to Tennessee. Vast areas of suitable habitat in this region support large populations of Cerulean Warblers, especially on privately owned forestlands. We should note that although 280,000 pairs seem like a sizable population, it is among the smallest populations of any passerine bird in North America, which mostly number in the millions.

Threats to populations. We consider the major threats to Cerulean Warblers to fall within four main categories: (1) direct loss of breeding habitat from mining activities; (2) loss of breeding and migration stop-over habitat due to development; (3) loss of suitable breeding habitat from silvicultural practices; and (4) habitat loss on wintering grounds in South America. We consider the practice of mountaintop removal mining/valley filling to be the greatest immediate threat within the core of the Cerulean Warbler's breeding range.

Applying similar methods to those used in calculating total population sizes for the PIF North American Landbird Conservation Plan, BBS survey data indicate that the average breeding density of Cerulean Warblers across the Northern Cumberland Plateau physiographic area during the 1990s was 0.065 pairs/acre. Most of the EIS study area occurs in this physiographic area. This estimate does not include a time-of-day correction used in calculating the total population size, and therefore might be an underestimate. However, this density is similar to breeding densities estimated from territory mapping plots surveyed in southern West Virginia, although locally higher densities were observed in some locations. Using this BBS-derived estimate of breeding densities and applying it to the estimated forest loss of approximately 760,000 acres from issued and future mining permits between 1992 and 2012, habitat for approximately 49,400 pairs (17% of the estimated total Cerulean Warbler population) would be eliminated through mining activities during this period. This is a very rough estimate of the number of birds likely to be impacted and is based on the assumption that the entire area within permit boundaries would be disturbed. Nonetheless, we are confident in stating that breeding habitat for as much as 10%-20% of the known Cerulean Warbler population is likely to be directly eliminated by proposed and permitted mountaintop mines/valley fills during the 20-year period of 1992-2012. These numbers reflect direct loss of breeding habitat and do not reflect reductions in habitat suitability around mine sites. Research within the EIS study area has shown that densities of Cerulean Warblers are reduced in forest patches remaining from mining activities and in forest near mine edges. We consider the level of breeding habitat loss due to mining activities in the EIS study area to represent a significant negative impact for this species of high continental concern that is already experiencing steep population declines and is threatened by other major impacts such as development and loss of wintering ground habitat. 8-1-2

Relative Conservation Value of Reclaimed Mines vs. Undisturbed Forest Habitat. We do not consider removal of extensive areas of mature forest and replacement with the poor quality, early-successional habitats resulting from current reclamation practices to be an appropriate

action for bird conservation in the EIS study area. First, this habitat alteration is occurring in core breeding areas for many high priority birds of the mature eastern deciduous forest suite. Removing almost 12% of the forest cover from this area is likely to negatively impact all of these species. In particular, this area is critical for the long-term persistence of the Cerulean Warbler and the estimated forest loss from mining activities will represent a significant negative impact for this species of high continental concern. Second, current reclamation practices result in large acreages of grassland habitat, but the grassland suite of birds is a relatively low PIF conservation priority in the EIS study area. The vast majority of grassland bird species benefiting from the current mining activities are rather low in conservation priority, and this area is not a core breeding area for grassland birds. Third, current methods of reclamation following mountaintop removal mining/valley fill activities result in poor quality, early-successional habitats of grasses and shrubs that are likely to remain in these early-successional conditions for very long periods of time due to the soil disruption and compaction during the mining and reclamation process. Estimates of the length of time it will take tree species to colonize and re-forest these areas are in the many hundreds of years (e.g., 500-1000 years). The minimal value that habitats reclaimed under current methods might have for early-successional bird species does not justify replacing mature forests with extremely long-lasting, poor-quality, early-successional habitats. Maintaining extensive tracts of mature deciduous forests to support the high diversity of mature forest birds, many of which are high conservation concern species, is one of the highest PIF conservation priorities within the EIS study area. We encourage every effort to minimize the removal and fragmentation of existing mature forest habitat within the EIS study area. 19-3-2

----- Forwarded by David Rider/R3/USEPA/US on 01/09/2004 02:51 PM -----

Mark Donham
<markkris@earthlink.net>
01/05/2004 08:46 PM

To: R3 Mountaintop@EPA
cc:
Subject: Heartwood comments on mountain top removal draft EIS

Dear US EPA,

These are the comments of Heartwood regarding the draft EIS on mountain Top removal (MTR). Heartwood has many members who are directly and indirectly impacted by MTR.

How can the government let coal companies destroy Appalachia with mining practices that level mountaintops, wipe out forests, bury streams, and destroy communities. 1-9

According to the administration's draft Environmental Impact Statement (EIS) on mountaintop removal coal mining, the environmental effects of mountaintop removal are widespread, devastating, and permanent. Yet the draft EIS proposes no restrictions on the size of valley fills that bury streams, no limits on the number of acres of forest that can be destroyed, no protections for imperiled wildlife, and no safeguards for the communities of people that depend on the region's natural resources for themselves and future generations. What kind of mitigation is that. In the absence of mitigation, the agency must explain in detail what the impacts will be without any mitigation. 1-5

How can relaxing the current regulations protect the environment? The draft EIS proposes streamlining the permitting process, allowing mountaintop removal and associated valley fills to continue at an accelerated rate. The draft EIS also suggests doing away with a surface mining rule that makes it illegal for mining activities to disturb areas within 100 feet of streams unless it can be proven that streams will not be harmed. This "preferred alternative" ignores the administration's own studies detailing the devastation caused by mountaintop removal coal mining, including 1-10

- over 1200 miles of streams have been damaged or destroyed by mountaintop removal

- direct impacts to streams would be greatly lessened by reducing the size of the valley fills where mining wastes are dumped on top of streams

- the total of past, present and estimated future forest losses is 1.4 million acres

- forest losses in West Virginia and Kentucky have the potential of directly impacting as many as 244 vertebrate wildlife species 1-5

- even if hardwood forests can be reestablished in mined areas, which is unproven and unlikely, there will be a drastically different ecosystem from pre-mining forest conditions for generations, if not thousands of years

- without new limits on mountaintop removal, an additional 350 square miles of mountains, streams, and forests will be flattened and destroyed by mountaintop removal mining

One thing we want to specifically comment on is any potential "no jeopardy" opinions regarding the critically endangered Indiana Bat. We do not believe that agencies can justify any more taking of Indiana bats, and that any taking is jeopardizing the continued existence of the species. 8-1-2

These impacts are nothing short of devastating to local neighborhoods and the ecology of the region. We oppose any decision to continue MTR. This is a barbaric, injust, and destructive practice that our childrens' children will be paying for. Please stop MTR. 1-9

Sincerely,

Mark Donham
Heartwood Program Director
RR# 1, Box 308
Brookport, IL 62910

618-564-3367

Forwarded by David Rider/R3/USEPA/US on 01/08/2004 01:58 PM -----

Jenny Dorgan <cleanair@aeconline.ws> To: R3 Mountaintop@EPA
cc:
Subject: For the People
01/06/2004 10:27 AM

Mr. John Forren,

I am writing on behalf of the Alabama Environmental Council, a statewide non-profit organization dedicated to protecting environment, citizens and biodiversity. This purpose of this message is to state our opposition to mountaintop removal and valley fills and any change in the rule protecting stream buffer zones. 1-9

It is extrordinarily disppointing that the federal govenrment is ignoring its own studies by proposing to reduce protections for people and the environment. 1-10

We ask for a new study that looks at the alternatives to prevent new mountaintop removal and valley fill operations and to stop the existing ones within 5 years or by the expiration of the current mining permit, whichever date occurs first. 1-5

As a government official and a part of the major governing process of protecting the environment and the citizens of this country, I hope that you will do your patriotic duty to stand up for what is right and good for the people.

Jenny Dorgan
Program Coordinator
Alabama Environmental Council, Inc.
2717 7th Avenue South Suite 207
Birmingham, AL 35233
(205) 322-3126

REC'D AUG 0 4 2003

The Synod of
WEST VIRGINIA-WESTERN MARYLAND
of the
EVANGELICAL LUTHERAN CHURCH IN AMERICA
The Atrium • 503 Morgantown Avenue, Suite 100 • Fairmont, West Virginia 26554-4374

The Reverend Ralph W. Dunkin, Bishop
Email: Ralph.Dunkin@ecunet.org

Phone: (304) 363-4030
Fax: (304) 366-9846

The Season of Pentecost
July 31, 2003

Mr. John Forren
USEPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren,

Grace and peace be unto you during this spirit-filled season.

Before the time of public comment on the Environmental Impact Study ends, I wish to make the following comments.

In 2001 devastating rains that resulted in four major floods in this region impacted southeastern West Virginia. In early August of 2001 I toured the flood-ravaged area. People in these areas pointed out the lands that had been "reclaimed" from mountain top and strip mining. My initial observation was that of why were there no trees growing on top of these mountains?

Common sense states that where trees are on top there will be less run off and the chance for fewer floods. Seeds from said trees would naturally flow downward and create new growth. Natives to these regions state that so much ground/dirt has been removed that roots cannot thrive in this poor soil. 17-3-2

Unless the Federal Government works to take care of our own people we will waste billions of dollars on the clean up from floods. The churches of West Virginia have stood by our people. We have re-built homes, cleaned up mud, and sadly moved people out of state.

I am aware that there seems to be a fine line between the creation of jobs and fairness to those who live near the mining sites. There is also a very fine line between clean drinking water and an ecosystem that will be devastated for generations.

Scientific studies have shown that mountaintop removal and valley fills bury and destroy important headwater streams, destroy biological rich forest and stream ecosystems, damage drinking water sources used by millions of people, cause frequent and severe flooding, and harm the quality of life in mountain communities. 9-2-2 9-4-2

Our vision as Lutherans is to be Christ-like servants of hospitality sent to share God's gift of grace in Jesus Christ in the community of Appalachia.

A layman's reading of the Clean Water Act and Surface Mining Laws not only allows by requires our government to prohibit the use of valley fills and mountaintop removal. Twenty-five years of lax enforcement have created an unacceptable situation. Existing laws should not be weakened, but strenuously enforced.

My prayers are with you and the people who are live daily with your decisions.

Yours in our Lord's service,

+Ralph

Ralph W. Dunkin, Bishop

CC: Carol Warren, West Virginia Council of Churches
Tena Willemsma, Commission on Religion in Appalachia
Danielle Welliever, ELCA Director for Environmental Education
Dory Campbell, Evangelical Lutheran Coalition for Mission in Appalachia

ACI
ARCH COAL, INC.

LAWRENCE D. EMERSON
Director of Environmental Performance

December 17, 2003

Mr. John Forren
US Environmental Protection Agency (3EA30)
1650 Arch Street
Philadelphia, PA 19103

RE: Written Comments on the Draft Mountaintop Mining EIS

Dear Mr. Forren,

In accordance with the press release dated August 14, 2003, please find enclosed two (2) sets of written comments related to the aquatic section of the draft Environmental Impact Statement document. More specifically, these comments are responses to EPA's written comments to our benthic macroinvertebrate report that Arch Coal Inc., conducted within the Mud River, Spruce Fork and Island Creek watersheds located in southern West Virginia. 6-6-5

In the spring of 2002, Arch Coal Inc. submitted to EPA Region III a supplemental quantitative report of benthic studies conducted in the watersheds associated with three our coal mining operations. The studies were based on our own sample collections from the EPA selected sites, using quantitative sampling methods. That report was submitted to EPA for peer review purposes, and the documents submitted herewith are our responses to EPA's comments.

The first document, entitled "Response to US EPA's Comments…" is in a comment and response format. In those instances where EPA's comment resulted in a change in the body of the Arch report, those changes were made and are reflected in the final supplemental report, also enclosed.

Thank you for the opportunity to comment. We look forward to the release of the final EIS document.

Sincerely,

Lawrence D. Emerson

10 Kenton Drive Charleston, WV 25311 (304) 357-5716 Fax: (304) 357-5725

POTESTA POTESTA & ASSOCIATES, INC.
Engineers and Environmental Consultants

September 2003

RESPONSE TO UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY'S
COMMENTS ON
"SUPPLEMENTAL QUANTITATIVE BENTHIC MACROINVERTEBRATE STUDIES
IMPLEMENTED IN CONJUNCTION WITH THE USEPA
MOUNTAINTOP MINING/VALLEY FILL
ENVIRONMENTAL IMPACT STATEMENT STUDY WITHIN
THE MUD RIVER, SPRUCE FORK, AND ISLAND CREEK WATERSHEDS"

Prepared for:

Arch Coal, Inc.
10 Kenton Drive
Charleston, West Virginia 25311

Prepared by:

Potesta & Associates, Inc.
2300 MacCorkle Avenue, S.E.
Charleston, West Virginia 25304
E-mail: potesta@potesta.com

Project No. 01-0057-006

**Response to United States Environmental Protection Agency's
Comments on
"Supplemental Quantitative Benthic Macroinvertebrate Studies Implemented
In Conjunction with the USEPA Mountaintop Mining/Valley Fill
Environmental Impact Statement Study Within
The Mud River, Spruce Fork, and Island Creek Watersheds"**

Prepared by: Potesta & Associates, Inc.

The United States Environmental Protection Agency (EPA) comments are in normal type with the response inserted into the document in **bold** font.

Points where we are in agreement:

1. The filled sites are in worse biological condition than the unmined sites.
2. The filled residential sites are in worse biological condition than the unmined sites.
3. The filled sites represent a wide range of conditions (good to impaired).
4. The filled residential sites are in a narrower range of conditions (impaired).
5. The unmined sites are in a narrow range of conditions (good to very good).
6. Water chemistry is significantly different between classes.
7. Habitat and substrate are not significantly different between the classes.
8. The biological and water chemistry changes are typical of mining impacts.
9. These biological and water quality effects are statistically significant.
10. Sulfate is likely a significant contributor to the high conductivity.

GENERAL COMMENTS:

In general, we disagree with the way water quality issues are treated as an afterthought throughout the report. The report repeatedly infers that temperature, ponds, and stream order are the main contributing factors to the biological condition rather than changes in water chemistry. The report secondarily refers to other factors such as flow, low dissolved oxygen, embeddedness, scouring from flooding, canopy changes from deciduous to evergreen, and the amount of canopy.

The report provides no correlation analyses and, in some cases, no or inadequate data to support these statements, and in some cases, the authors ignore their own statistical analyses where there are relevant data. Our exploratory correlation analyses indicated conductivity (-0.741 for EPA field conductivity) and total dissolved solids (-0.716) had the strongest and most significant relationships to biological condition. Both of these parameters are directly related to mining impacts.

POTESTA: **The report does not infer that temperature, ponds, and stream order are the main contributing factors to the biological condition, but does conclude that the effects of these factors cannot, with the data available, be separated from mining effects or effects of valley fills, and that all aforementioned variables are potential contributors to the current in-stream conditions. POTESTA's analysis of the data did not include correlation analysis because there are too many factors not included in the EPA's study to have confidence in the results. For example, the conductivity and total dissolved solids would be higher in areas with more mining activity. These areas would also have more numerous ponds, but may or may not have more numerous or larger valley fills. Under this scenario, it is not clear whether a correlation exists between the biological condition and the area mined, area of the settling ponds, or number and size of the valley fills.**

No changes were made to the text as a result of this comment.

The only temperature data offered in the report is the field data for the Winter and Spring of 2000. The statistical analyses of these data indicated there was no significant difference between the site classes. This finding does not support the Potesta conclusions. Even if there were temperature differences Potesta offers no supporting information or data to confirm it. The emergence time issue is not scientifically defensible.

POTESTA: **Temperature data available for this study are from two dates in the Spring and Winter 2000 and no significant differences exist between the site classes on these days. However, data from two dates which are not representative of the seasonal temperature variations does not adequately describe what goes on in the system over the course of an aquatic insect's lifecycle. While no information may be specifically available regarding the temperature conditions which occur below valley fills, the temperature differences below impoundments and the impacts to the benthic macroinvertebrate community are well documented. Warmer than normal winter temperatures eliminate**

the thermal cues needed for many species to break egg diapuase. Cool summer temperatures can result in too few degree-days to complete development. Life cycles can loose their synchrony and impair reproductive success (Allen, 2000). A shift in temperature as small as 2°C to 6°C has been shown to alter life-history characteristics (Ward, 1992). The text will be revised to include a discussion of relevant literature.

If the ponds were the primary factor in determining the benthic community downstream, then we would expect to see similar biological communities downstream of all the ponds but instead the data indicate a range of conditions below ponds. The condition of filled communities in our study ranged from poor to very good in both the Winter and Spring of 2000. The correlation between TOC, DOC, and biological condition was -0.388 and -0.183, respectively. Other parameters, including base cations and metals had higher correlation coefficients than the carbon parameters: e.g. Ca(-0.710), Mg(-0.689), Se(-0.528).

POTESTA: **Paragraph 4. The ponds are not indicated to be a "primary factor" in determining the benthic community downstream, but one of several factors which may be influencing the community. This study did not purport to have sufficient information to discern between the potential impacts. That said, the idea that the communities at all sampling locations downstream of the pond should be similar is not plausible. There is no available information on the size or number of ponds upstream of each site, the distance from the sampling location to the pond, whether the pond is surface or bottom release and many other variables. Also, consideration must be given to variables such as water chemistry for which there is some limited information available. The range of conditions which are found to exist downstream of the ponds undoubtedly reflects the range of conditions upstream of and within the ponds.**

This report has no biological or chemical data from sites above ponds and in our study we only had two sites above ponds. These sites ranged in condition from fair to good during the Winter and Spring of 2000. If we had more information about the water above the ponds, we would be better able to understand what impact the ponds were having on the streams below the ponds.

POTESTA: **Paragraph 5. We are in agreement that more information is needed about the conditions upstream of the ponds. Of the two sites upstream of ponds which were included in the EPA study, one site is apparently bedrock substrate and therefore not comparable to the gravel cobble substrate sampled in free flowing reaches. It is true that if there was more information about the water above the ponds, we would be better able to understand what impact the ponds were having on the streams below the ponds. This variable would have best been considered before the data were collected during the site selection phase.**

Stream order is not an issue when comparing unmined and filled sites in this study since sites in both classes were on small, low order streams. All the unmined sites were on first and second order streams and all but two of the filled sites were on first and second order streams based on 1:24,000 scale maps. In the mountaintop mining area of West Virginia, there are no large streams(third and fourth order) without some type of mining in the watershed. The statistical analyses in the report (Table 19) indicate there is no significant difference between these two classes. These stream orders (1-3) are often included together in index development and often have the same reference condition because in that size range, stream order does not explain a lot of natural variability in the reference sites and the data do not indicate a need for classification to stream order (e.g. the WVSCI, the regional EMAP MAHA and the MD MBSS ffils are for 1-3rd order streams based on a 1: 1 00,000 scale map). Based on your statistical analyses the stream order of the filled/ residential sites are significantly different from the unmined sites. The larger stream size of the filled/ residential sites will mask any potential impairment and not amplify it. These larger streams can appear to be less impaired because they have the potential to contain more taxa than smaller streams.

POTESTA: **Stream order is always an issue when selecting sites for comparison and should have been considered prior to study initiation so that appropriate references could have been determined for each stream class. The stream orders from the unmined and filled sites do overlap so there is no statististical difference; however, the differences in the stream sizes should be considered as a potential source of the variability seen in the filled sites. The larger streams in the filled/residential sites are significantly different than the reference streams and are not suitable for comparison to the headwater reaches. To say that such a comparison will "mask impairment" is not a clear representation of the situation. Any changes in community structure, such as those described by the river continuum concept, will show up in data analysis as being a "different" community; which, as has already been established, is then labeled as "impaired". These comparisons are inappropriate and if suitable reference sites were not included in the study it indicates a poor study design, rather than actual impairment.**

SPECIFIC COMMENTS

Cover Letter Page 2 -Disagree that the overall difference between the USEPA's two contractor laboratories cause all of the water chemistry data to be called questionable. Blank and duplicate samples provided information regarding the accuracy and precision of the data. In the blank and duplicate data from the second laboratory there is no evidence to suggest that the data from this laboratory is not reliable. We do agree with the following statement "These QA/QC issues do not change the overall conclusion that significant differences exist between the filled and reference (unmined) sites and between the filled/residential and reference sites."

POTESTA: **As has been explained to the US EPA personnel previously, the language in the cover letter to which they are objecting was written as a caveat to readers when the revised data set was discovered. At the time, it was not apparent which data used in the original report were acceptable and which were questionable. No changes will be made resultant from this comment.**

Page i -We agree with the last sentence in Al Hendricks excerpt.

POTESTA: **The last sentence of Al Hendricks review, with which the US EPA agrees, summarized the POTESTA findings.**

Page i and ii -Is it possible to see the full comments from the reviewers?

POTESTA: **Specific comments from the reviewers were incorporated into the text. General comments from the reviewers are provided.**

Page 1, paragraph 4 -See general comments.

POTESTA: **See response to general comments.**

Page 1, paragraph 4 -The last sentence of this paragraph is clearly speculation and not supported by the data. Our correlation analysis indicates the changes are strongly related to chemistry parameters. The filled /residential sites do have additional stressors in them that the filled sites do not. The filled/residential sites have refuse piles, other mining, larger roads and highways, and residences, all of which can contribute to a more degraded community.

POTESTA: **While the reviewer may find the last sentence objectionable, no other explanation is offered for the discrepancy between the "impairment" indicated by the water chemistry and the biological data. The data clearly indicates that if water chemistry alone is responsible for the "impairment" in the biological community, then the filled sites should be more significantly degraded than the filled residential sites. The refuse piles and other mining influences offered as potential additional degradation in the filled/residential sites would have shown up in the water chemistry. The larger roads and highways should have shown up as a significant stressor in the water chemistry (TSS and TDS) and in the embeddedness and habitat evaluation.**

The impact of the residences is noteworthy and does show up in water chemistry analysis in the form of nutrients. This is exactly why sites with residential impacts should not be included in the analysis of valley fills and mining without appropriate reference sites.

Page 1, paragraph 5 and continued page 2

The discussion of changes in function and the reliance on functional feeding group indicators is highly suspect since it is well known that it is difficult to correctly assign functional feeding groups at the family level (due to generic differences) and to early instars. More importantly, these types of metrics are almost never chosen for multimetric development for stream assessment they do not adequately discriminate between reference and impaired sites. For example, in the WVSCI report, the following information appears on page 16: % Filterers, the trend was opposite of that expected, interpretation unclear; % Scrapers, poor discrimination; % Collectors, trend opposite from expected, interpretation unclear; % Predators, poor discrimination; % Shredders, skewed distribution, high variance, and marginal discrimination. These metrics are not used because they cannot identify impairment.

POTESTA: **Both Merrit and Cummings (1996) and the US EPA's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (EPA 841-B-99-002) provide functional feeding group information at the family level and while it is more variable than generic level information, it is still valid. Most of the information used in this report and the US EPA's report relative to the benthic macroinvertebrate community structure (i.e. number of taxa, tolerance values, etc.) would be more specific if identifications had been conducted to the generic level. However, the US EPA made the decision that family level data was sufficient for the purpose of this study, and POTESTA is reporting the data to be comparable with the US EPA study.**

The use of functional feeding group analysis to document the changes in the benthic macroinvertebrate community as a result of disturbance are widely documented (Camargo and de Jalon, 1995; Poff and Matthews, 1986; Short and Ward, 1980). The data are not included herein as metrics to indicate whether significant changes exist, but as a tool to evaluate the factors contributing to significant changes (already indicated by more traditional metrics). Macroinvertebrate community structural elements (e.g. numbers, taxa, diversity, etc.) often present an incomplete picture of community responses to stress (Barret 1981; Matthews et al. 1982 in Poff and Matthews, 1986). Considering the functional feeding group distribution provides additional insight into the nature of community responses and may reflect altered tropic conditions which can profoundly affect community structure (Poff and Matthews, 1986). In this manner, the functional feeding group information serves in a similar manner to the habitat data and the water chemisty in providing information on factors contributing to the changes in the biological community. The reviewer appears to have misunderstood the

intent of the discussion. A discussion of the intent of the analysis has been added to the text for clarification.

If we did make a big assumption and say they did work, then the first and last sentence of this paragraph do not fit in with your own statistics. The first sentence states no significant adverse impacts and the last sentence states stream function does not appear to be compromised. In looking at your own statistics, there are significant differences between the stream classes for both the spring and winter sampling seasons. This would indicate that functional feeding groups are being impaired or compromised at the filled and filled/residential sites. The fact that they are all represented does not mean they are in good condition.

POTESTA: **As stated above, there is no need for an assumption that functional feeding group metrics "work" in this analysis. The first sentence in the paragraph states that there appears to be no significant adverse impacts on the stream function with respect to downstream segments. This does not contradict the finding of statistical differences in the biological community. Stream function refers to the ability of the stream to support a benthic macroinvertebrate community, process nutrients in different forms, and provide nutrient sources to downstream communities. The functional feeding group analysis indicates a shift in the community which indicates differences in food supply; however, the stream function is preserved. Failure of the community to utilize an available food source (i.e. loss of a functional feeding group) or failure to respond to a shift in available food sources would indicate lack of stream function. A significant difference in the functional feeding groups between unmined and filled or filled/residential sites does not indicated "impairment". It indicates an abundance of some other type of food source, which is being utilized by the community. This is exactly the type of information a researcher hopes to find when trying to determine factors contributing to the significant differences seen in the community metrics. There will be no change in the text in response to this comment.**

Page 2, paragraph 2

The changes in water quality and biological communities below the fills is related to the entire mining operation (the mined area above the fill, the fill, the roads associated with the mining, and the sediment ponds). But, the one fact that cannot get lost, that is directly associated with the fills, is direct stream loss under the fills.

POTESTA: **The objective of this study was to determine effects of valley fills on the biological community downstream of the fill. This is why all the study sites were located downstream of the filled areas. Stream loss under a fill is not a focus of this particular study. We appear to be in agreement that changes in water quality and biological communities below the fills are related to the entire mining operation (the mined area above the fill, the fill, the roads**

associated with the mining, and the sediment ponds) and fill effects cannot be specifically differentiated with the current study design.

Page 2, paragraph 3

Stream Order: See general comments.

POTESTA: **As stated previously and in the text of the report, the changes associated with increasing stream order should have been considered in the study design phase and should certainly be considered in the data interpretation. There will be no change in the text in response to this comment.**

Page 5, Section 2.2.1 and 2.2.2

It should be noted that although many of the unmined sites could not be sampled during the summer and fall of 1999, they were not all necessarily dry. When these streams were sampled the following winter they were all in good or very good condition. That indicates that even though there may not have been any visible surface flow or not enough surface flow to collect a representative sample, the invertebrates were still there. Many of these streams did have perceptible surface flow, they definitely had subsurface interstitial flow, and many had residual pools. The macro invertebrates had refugia during the drought. We just could not sample them.

POTESTA: **The report text is changed to reflect little or no flow creating conditions which prohibited sampling.**

Page 8, 2.6 Bioassessment Metrics
There should be some better justification for metric selection other than " the standard metrics that Potesta uses". Is there some background work or documentation that has been done to justify their selection? Generally metric are selected based on discrimination ability, variability, and redundancy. Has any of this been done? This section needs beefed up.

POTESTA: **The metrics selected for use in the bioassessment were selected by Dr. Frank Borsuk based on guidance by the US EPA's bioassessment methods document. It is acceptable to use metrics suggested by the US EPA without discriminatory analysis on every study because the discriminatory ability has been tested in a wide range of conditions by the US EPA or (or other researchers and presented in the EPA document) prior to the presentation of the metrics in the RBP protocol. Additionally, multiple metrics are presented with benefits and limitation of each so that professionals can use their judgment in selecting an array of metrics for use in a particular study. A reference to the US EPA document used in the metric selection has been added to the text.**

Functional feeding groups are used in the report, but there is no write up in this section justifying their use and the importance of using them. There is also no discussion how each taxa was assigned to a group and there is no list of the taxa assignments.

POTESTA: **A discussion of the intent of the functional feeding group analysis has been added to the text for clarification. A discussion regarding group designations and a table showing the functional feeding group classification for each family has also been added to the text.**

Page 10,3.1

"The impacts that the drought in 1999 had on the reference streams are unknown." This is not a correct statement. All the streams were sampled in the winter and spring of 2000, and all were in good or very good condition.

POTESTA: **Sampling of the reference streams in Winter and Spring 2000 gives an indication of the condition when the streams were sampled, good or very good. However, this does not give any indication of the impacts that the drought had on the stream communities. Effects of drought on benthic macroinvertebrate communities are well documented and include decreased abundance, increased intra and inter specific competition and predation, an initial increase in taxa richness during the recolonizing period, changes in community structure resultant from alteration in food availability, and water chemistry changes (dissolved oxygen, temperature and other changes associated with slower flow) (Lake, 2000; Allen, 2000). The sampling conducted to determine that the communities were "good or very good" were qualitative and would not indicate a decrease in abundance. They in no way accounted for community level changes from increased intra and inter specific competition and predation or changes in community structure resultant from alteration in food availability. The effects on taxa richness are also unknown because there is no "pre-drought" data available for comparison. The statement that the impacts of the drought on the reference streams is unknown will not be changed in the text.**

Page 11, paragraph 2
"Also noteworthy is the increase in filter- collectors in the filled/residential groups, which could be attributed to the organic levels from domestic inputs." The numbers in the table indicate 20.56 % of the individuals in the filled/residential sites were filter-collectors and 20.07 % were filter-collectors at the filled sites. If this is true, where did the nutrients come from in the filled sites?

POTESTA: **Not including a discussion of filter-collector increases in the filled sites was an oversight and has been corrected. The nutrient source for the filter feeding organisms is the ponds themselves. Their contribution of a nutrient rich food source and the subsequent increase in collectors is well documented (Stanford and Ward, 1979; Petts, 1984; Allen, 2000).**

Page 13, paragraph 1
See previous comments concerning post drought condition of unmined streams. There is no data to support the comment about temperature and D.O. having an influence on the communities. Our D.O. data did not indicate a problem.

POTESTA: This statement is from ***Stream Ecology: Structure and Function of Running Waters*** **(Allen 2000), a stream ecology textbook. The author is relying on a basic knowledge of stream dynamics that the reviewers were believed to share. Not only was 1999 a drought year, but also one of the hottest years on record. Under drought conditions, flows are reduced. The reviewer has stated that flow was negligible, often subsurface and in some places only pools remained for refugia for the organisms. Without measuring, it is safe to assume that the more water you have, the less likely it is to respond to temperature fluctuations in the environment. Subsequently, the less water available, the harder it is to maintain water temperature in the stream and the greater are temperature fluctuations. It is well documented that dissolved oxygen is inversely related to temperature. So, with high temperatures (such as those reported during one of the hottest years on record), dissolved oxygen saturation would have been reduced. Since the most reaeration occurs in riffles and under flowing conditions, the low flow conditions (as stated by the reviewer) would not have been conducive to rearation. Also, organic material in the sediments and in pools exerts an oxygen demand not present in riffle/gravel/cobble substrates which would further add to the oxygen demand. The reviewer states that their data did not indicate a dissolved oxygen problem; however, the author would not expect dissolved oxygen readings taken during the daylight hours to necessarily reflect a problem. These data would represent one instance in time, and not the conditions to which the organisms are exposed. An analogy would be to sample the organically rich area below a waste treatment plant on a warm summer afternoon when the water is supersaturated with oxygen ignoring the diurnal fluctuations and nighttime sag and stating that DO is not a problem. A researcher has to interpret data using all the information at their disposal. A discussion is included in the text describing the impacts of drought on streams and biological communities.**

Page 13, paragraph 2
The term "moderate richness and abundance" is used in this paragraph. What is it moderate in relationship too?

POTESTA: **The terms "moderate richness and abundance" and "low richness and abundance" are both used in this paragraph. They are subjective terms, which refer to low levels and medium levels of richness and abundance based on the other sampling locations used in this study and the researcher's knowledge of the communities expected to be present under ideal conditions in the streams. No change has been made to the text as a result of this comment.**

Page 13, paragraph 3
"Chironomidae, another filter feeder". Is this the group you put them in or is this a mistake?

POTESTA: **Chironomidae are collector-gatherers and were placed into this category for functional feeding group analysis. The text has been changed to reflect the collector-gatherer category.**

Page 13, 4.2 Winter Benthic Macroinvertebrates

The abundance at the unmined sites was not significantly different from the filled sites but the filled residential sites were significantly different from the unmined sites. Higher abundance is not an indicator of better conditions, it is generally an indication of impaired condition. The condition of the benthic community by site class indicates the unmined sites are in the best condition, followed by filled sites and then the filled/residential sites. The abundance data would put them in the same order which clearly indicates that more is not necessarily better.

POTESTA: **Abundance data can either increase or decrease in response to stress. While it can indicate enrichment of a food source, as in the filled/residential sites, it can also indicate impairment. Reduced abundance is associated with recovery from drought conditions and it is the professional judgment of the researcher that an average of only 100 organisms in a surber sample is on the low side. There is no indication that the unmined sites are "better" than the filled sites with respect to abundance. No changes will be made in the text.**

Page 14, paragraph 1

Some stoneflies are tolerant to the constituents found in mine drainage and acid rain impacted streams. Mayflies on the other hand are not. The statement that water quality may not be the limiting factor is rather erroneous. True, they are both sensitive orders but they can be sensitive to different constituents.

POTESTA: **According to the RBP, the tolerance values of mayflies range from 0 to 9 while the tolerance values of stoneflies ranges from 0 to 6.3, indicating that both groups of organisms are similar in their sensitivities. While it is true that some stoneflies have been found to be somewhat tolerant to mining related discharges, the number and diversity of stonefly taxa present and the discrepancy between the water chemistry and biological data still indicate that more information is needed to determine that water quality is the limiting factor in the streams. No change is made in the text in response to this comment.**

Page 14, paragraph 2
The report indicates that the characteristics of the fills might explain the variability in the biological communities. The report also lists many of the things that can affect the fills but does not state that all these things will also have an impact on the water quality exiting the sediment pond. In our report, the range of biological conditions was best explained by water quality.

POTESTA: **The paragraph in the text has been expanded to include a discussion of several other factors which may be contributing to the variability seen in the**

filled sites. The author disagrees that in the US EPA report the range of biological conditions was explained by water quality. The US EPA report failed to consider significant sources of variability and relies on correlation analysis without taking into account the potential for alternate correlations with the variables they ignored. "The presence of a correlation between two variables does not necessarily mean there exists a causal link between them." (Glass and Hopkings 1984)

Page 14, paragraph 3

"The algae and detrital material flowing from the ponds acts as the food source for the downstream communities." We are not pond experts but would think that ponds would be detrital sinks not a source.

POTESTA: **The lentic system can act as a detrital sink, but they are also a source. While much of the productivity comes from photosynthesis of algae, this is dependent on the rich nutrient source of detrital breakdown. However, "detritus includes particulate and dissolved organic carbon..." (Smith 1992) which is discharged via the outfall. This reference is a general ecology text book.**

The statement, "Since this is a more continuous and less variable food supply than leaf litter", has nothing to support it. There is no data in the report and no references to defend this statement. We did not measure in stream leaf litter but our visual observations and photographic record indicate there is leaf litter in these streams below the ponds.

POTESTA: **The potential changes below impoundments include reduced variability in thermal regime, food quality and quantity, flow conditions, and other parameters which are well documented in the literature (Stanford and Ward 1979; Petts 1984; Kondratieff and Voshell 1980). A photographic record of leaf litter does not indicate the quality or quantity of a food supply. The availability of the food source is related to many variables.**

"While this represents a fundamental shift in the biological community, the community created is not necessarily undesirable," The Clean Water Act was written to protect biological integrity and integrity is defined as an unimpaired condition not a changed condition.

POTESTA: **The goal of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." The author is unaware of any place in the Clean Water Act where biological integrity is defined or where "change" is defined as impairment. The reviewer should provide a reference for that interpretation. If that is the case, than any dam constructed for any reason (flood control, hydroelectric power, sediment retention, recreation) would be in violation of the Clean Water Act, as would be many other activities which are currently permitted or acceptable practices.**

Page 15, paragraph 1
The only habitat data we observed in the report was ours and that embeddedness data did not indicate a problem with the filled sites. If there is data out there that can support the statements about embeddedness, increased flooding and scouring, or changes in the type and amount of canopy cover in the filled sites it should be in the report or these speculative statements should be dropped from the report. If there is increased flooding and scouring below the mines it would not be good news for the industry.

POTESTA: **Changes in sediment deposition from mining, timbering, road construction, and other development are widely documented. It is somewhat of a surprise, and a testimony to the effectiveness of the sediment control structures (ponds), that embeddedness was not significantly higher in the mining influenced sites in this study. However, embeddedness has been removed as a potential variable contributing to scraper declines in mining influenced streams. Changes in the flow regime below mine sites are not news to the industry. As required by regulation, specific steps are taken on mine sites to move water quickly away from areas of overburden storage where infiltration may lead to saturation and potential stability problems. The direction of water away from these areas, and the movement of water through these areas, results in hydrographs very different from a natural stream. The presence of a pond further alters the hydrograph of the downstream reaches. Care is taken during the planning stages of mining activities to ensure that stream channels are capable of receiving the flow magnitude and velocities generated on the sites. Depending on the site conditions, increased peak discharges and scouring in a downstream reach are possible, as are lower flow conditions in a stream reach. The "speculative" statements will not be removed from the report. They are, in the best professional judgment of the author, plausible explanations for variability seen in the data and perfectly appropriate for the discussion section of a scientific study.**

Page 15, paragraph 3
Simuliidae filter FPOM with fans, they do not siphon water.

POTESTA: **The text has been clarified.**

Caddisflies are ubiquitous except in the most toxic conditions, so to say they are found below ponds and waste treatment plants is not news; they are found everywhere.

POTESTA: **While caddisflies are ubiquitous, the point of the discussion is that they occur in increased abundance and are often the dominant organism in communities below ponds and waste treatment plants, a condition found in the current study. The importance of the shift of the benthic community to one comprised of 75% collectors has been clarified in the text for the reader.**

Page 16, paragraph 1
There are no data to support the temperature data. See previous comments.

POTESTA: See response to general comments.

Page 16, paragraph 2
The increased alkalinity is not "a significant benefit to the streams." These streams are naturally low in alkalinity and conductivity and support diverse macro invertebrates community. To suggest that the water quality is improved below the filled sites totally ignores the biological data. Again, there is no data to support the statement "acidic precipitation could cause excursions of the pH below the acceptable level." We observed no indications of a problem.

POTESTA: The EPA's April 8, 2002 document entitled "A survey of the Water Quality of Streams in the Primary Region of Mountaintop/Valley Fill Coal Mining" states that the only pH excursions below the 6.0 SU water quality standard were in unmined streams and "could be a result of acid deposition" (Page 73). The previous statement that no indications of a problem were observed is incorrect. Also, POTESTA's analysis of the field data indicated significant differences between the unmined and filled sites with the unmined sites having pH values lower than the filled sites. Acid precipitation is increasing globally (US EPA Acid Rain Program Website), as most scientists are aware. West Virginia is in an area of increasing acid deposition as indicated by the isopleth diagrams from 1994 and 2000 (attached). In 1998, West Virginia's 303-d list was expanded to include a number of streams listed as impaired due to acid precipitation. While atmospheric deposition is not listed on the 2000 303-d list, due to the uncertainty from mining influences and the naturally acidic conditions of some streams, it is still considered to be a limiting factor in some streams both locally and globally. Further, due to leaching of the buffering capacity of soils and the continued decline in precipitation pH, the acidification of streams related to acid rain is not expected to decline in the near future. It is the judgment of the author that the increased alkalinity is a benefit to the streams. The text was not modified in response to this comment.

Page 16
There is no mention of the Selenium criteria violations. Is it because the data was not available at that time?

POTESTA: Selenium criteria violations were noted in the unmined, filled and filled/residential streams in the water chemistry samples analyzed in this study. Although the water chemistry data were revised to remove all samples not passing quality assurance testing, the values from the Winter and Spring 2000 data are still higher (often an order of magnitude) than the second EPA contractor laboratory. Given these discrepancies, both datasets are of little value for comparison to water quality standards until one dataset can be shown to be accurate. As such, selenium is used only for relative comparisons between the three treatments.

Page 16, last paragraph
The report acknowledges here that there were few habitat differences among the site classes and embeddedness was not one of them. See previous comments for page 15.

POTESTA: See response to comment on Page 15, Paragraph 1.

Page 17, paragraph 1
See previous comments on stream order.

POTESTA: See response to general comments.

Page 17, paragraph 2
Again, increased abundance is a classic indication of stress, as competition decreases from the loss of intolerant organisms there is an increase in the number more tolerant organisms. This is well documented in the literature. Small headwater streams, such as these, with low alkalinity and low conductivity tend to have low numbers of macroinvertebrates. The discussion about the emergence times of the stoneflies is speculation and is not supported by data or literature review.

POTESTA: As indicated previously, abundance can either decrease (as in response to flooding or drought) or increase (as in response to an organic food source) in response to perturbation in a stream. A change in either direction is an indication of stress. The reduced condition is well documented in the literature, particularly with respect to the recovery period of benthic communities following flooding events (Lake, 2000). The increase in abundance in response to organic inputs is also well documented (Allen, 2000). The shift in community structure from an intolerant to a tolerant community described above is not generally accompanied by an overall increase in abundance (rather a replacement) unless an additional food supply is available.

The dependence of the development and emergence time of stoneflies on temperature is well known, as are the responses of the Plecopterans to both "winter warm" and "summer cold" conditions which may prevail below impoundments (Stanford and Ward, 1979). The discussion in the text regarding the effects of valley fills and ponds on stonefly populations is a plausible explanation for the variability seen in the study and is appropriate for the discussion section of the study. No changes have been made to the text as a result of this comment.

Page 17, paragraph 3 and top of page 18
The statement, "decreased scraper community in the spring when leaf cover shades the stream", cannot be documented. We did not do any canopy measurements and we do not see any data to indicate Potesta did either. We sampled in late April and early May before leaf out was complete.

POTESTA: Samples were collected January 21-31, 2000 (Winter) and May 17-18, 2000 (Spring). Although specific measurements were not taken, common sense would dictate that the tree cover in headwater streams would differ substantially between these two periods. That lacking, the attached photographs support increased shade during the spring sampling event (Attachment 2). No changes have been made to the text as a result of this comment.

Page 18, paragraph 1
There is no data or supporting literature to back up the idea that there is a greater food supply for collectors in the streams below fills and ponds.

POTESTA: While the scientific knowledge is limited regarding conditions below fills, there is no shortage of information regarding the conditions below impoundments and pond discharges. In general, an increased density, primarily of filter feeders and collectors is expected resulting from flow constancy, organic loading, or both (Stanford and Ward, 1979; Petts, 1984; Allen, 2000). Although it should be noted that the responses of benthic communities to impoundments are highly variable depending on such factors as release location (surface or bottom release), impoundment size and retention time, water quality, geographic location, and many others. A discussion of the changes in the benthic macroinvertebrate community below impoundments has been added elsewhere in the text.

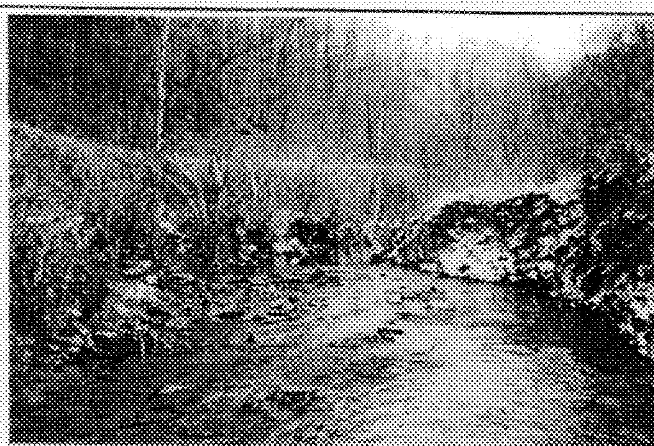
Page 20
Both the structure and function of streams below valley fills have been altered and as such would not meet the objectives of the Clean Water Act.

POTESTA: The changes in an aquatic system downstream of an impoundment are well documented (Allan, Ward and Stanford, 1979, Petts, 1984, Allen, 2000). If the Clean Water Act (Act) is interpreted such that "restoration and maintenance of chemical, physical and biological integrity" means no change is acceptable below an impoundment, than there are many impoundments created for flood control, hydroelectric production, drinking water reservoirs and beaver housing which are also in violation of the Act. Additionally, many other activities such as removing canopy cover, dredging a channel, building in a watershed, and others, would also be a violation of the Act. The discharge of organic material from a waste treatment plant, while within the permit limits, increases the filter feeding organisms below the discharge and this too would be a violation of the Act. We disagree with the conclusion that because streams are "altered" the activities do not meet the objectives of the Act and would request that the reviewer provide documentation for this interpretation.

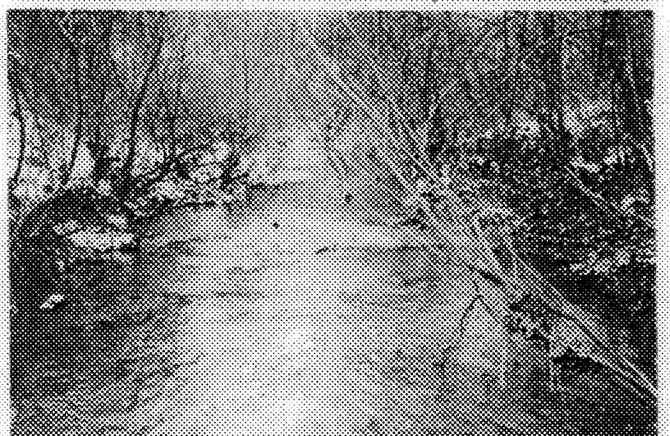

MT-2 Rushpatch Branch Upstream View, January 2000


MT-2 Rushpatch Branch Downstream View, January 2000

Potesta & Associates, Inc.	Arch Coal, Inc.
2300 MacCorkle Avenue, SE, Charleston, WV 25304 Phone: (304) 342-1400 Fax: (304) 343-9031 E-Mail: potesta@potesta.com	PO Box 6300 Huntington, West Virginia 25771-6300 *Project No. 99098-003*



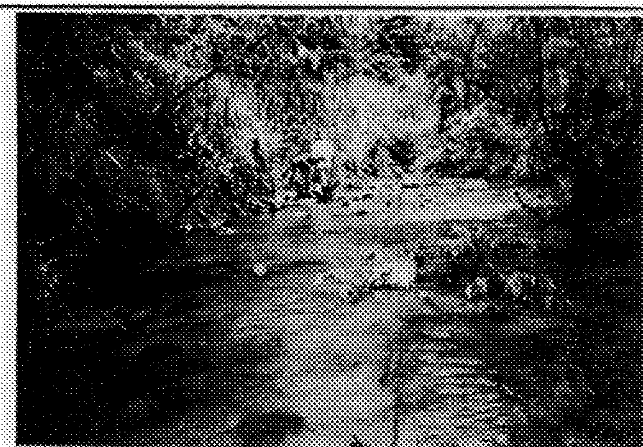
MT-23 Mud River Downstream of Connelly Branch Upstream View, January 2000



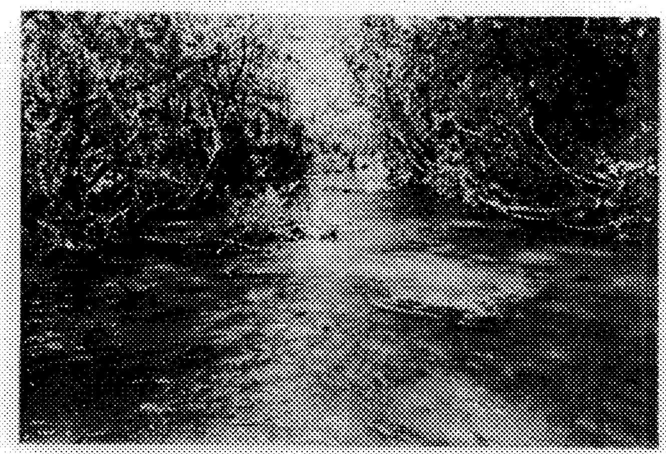
MT-23 Mud River Downstream of Connelly Branch Downstream View, January 2000

Potesta & Associates, Inc.
2300 MacCorkle Avenue, SE, Charleston, WV 25304
Phone: (304) 342-1400 Fax: (304) 343-9031
E-Mail: potesta@potesta.com

Arch Coal, Inc.
PO Box 6300
Huntington, West Virginia 25771-6300
Project No. 99090-003



MT-23 Mud River Upstream View, May 2000



MT-23 Mud River Downstream View, May 2000

Potesta & Associates, Inc.
2300 MacCorkle Avenue, SE, Charleston, WV 25304
Phone: (304) 342-1400 Fax: (304) 343-9031

E-Mail: potestaeng@newwave.net

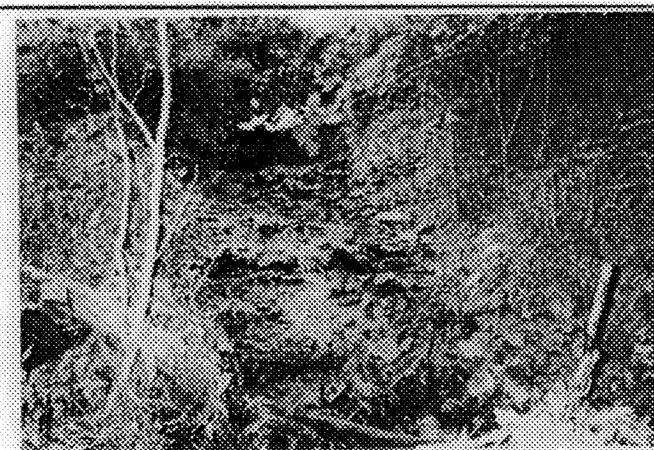
Arch Coal

PO Box 6300
Huntington, West Virginia 25771-6300
Project No. 99090-003

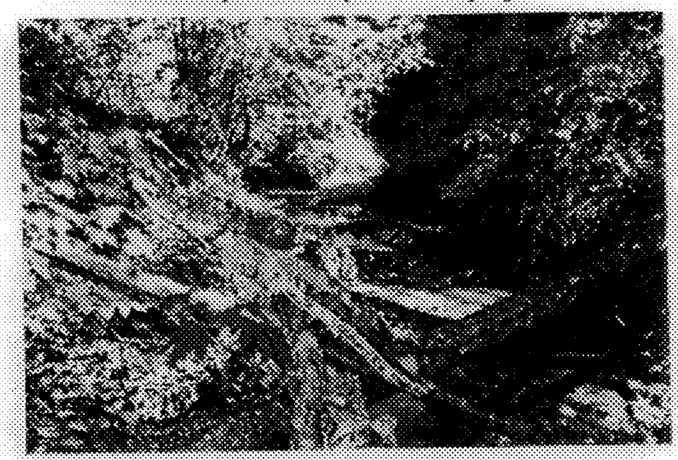
MT-32 Beech Creek Downstream of Peats Branch Upstream View, January 2000

MT-32 Beech Creek Downstream of Peats Branch Downstream View, January 2000

Potesta & Associates, Inc.	Arch Coal, Inc.
2300 MacCorkle Avenue, SE, Charleston, WV 25304	PO Box 6300
Phone: (304) 342-1400 Fax: (304) 343-9031	Huntington, West Virginia 25771-6300
E-Mail: potesta@potesta.com	*Project No. 99090-003*

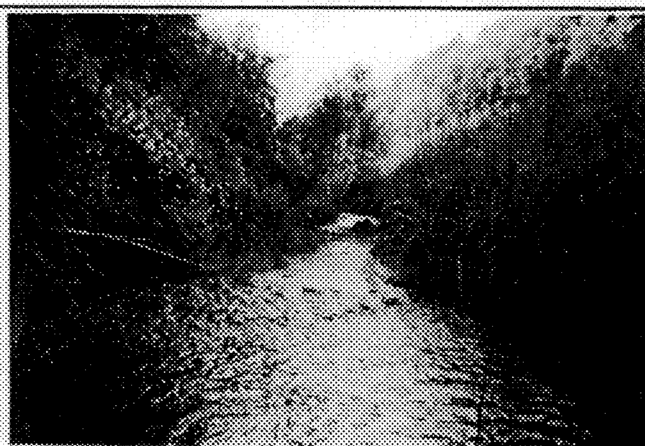


MT-02 Rushpatch Branch Upstream View, Spring 2000



MT-02 Rushpatch Branch Downstream View, Spring 2000

Potesta & Associates, Inc.	Arch Coal, Inc.
2300 MacCorkle Avenue, SE, Charleston, WV 25304	PO Box 6300
Phone: (304) 342-1400 Fax: (304) 343-9031	Huntington, West Virginia 25771-6300
E-Mail: potestaeng@newwave.net	*Project No. 99090-003*



MT-32 Beech Creek Upstream View, May 2000

MT-32 Beech Creek Downstream View, May 2000

Potesta & Associates, Inc. 2300 MacCorkle Avenue, SE, Charleston, WV 25304 Phone: (304) 342-1400 Fax: (304) 343-9031 E-Mail: potestaeng@newwave.net	Arch Coal, Inc. PO Box 6309 Huntington, West Virginia 25711-6309 *Project No. 99090-003*

POTESTA

POTESTA & ASSOCIATES, INC.
Engineers and Environmental Consultants

September 2003

SUPPLEMENTAL QUANTITATIVE BENTHIC MACROINVERTEBRATE STUDIES IMPLEMENTED IN CONJUNCTION WITH THE USEPA MOUNTAINTOP MINING/VALLEY FILL ENVIRONMENTAL IMPACT STATEMENT STUDY WITHIN THE MUD RIVER, SPRUCE FORK, AND ISLAND CREEK WATERSHEDS

Prepared for:

Arch Coal, Inc.
10 Kenton Drive
Charleston, West Virginia 25311

Prepared by:

Potesta & Associates, Inc.
2300 MacCorkle Avenue, S.E.
Charleston, West Virginia 25304
E-mail: potesta@potesta.com

Project No. 01-0057-006

2300 MacCorkle Avenue, S. E. - Charleston, West Virginia 25304 • Phone: (304) 342-1400; Fax: (304) 343-9031; www.potesta.com

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

SUPPLEMENTAL BENTHIC MACROINVERTEBRATE STUDIES IMPLEMENTED IN CONJUNCTION WITH THE USEPA MOUNTAINTOP MINING/VALLEY FILL ENVIRONMENTAL IMPACT STATEMENT STUDY WITHIN THE MUD RIVER, SPRUCE FORK, AND ISLAND CREEK WATERSHEDS

1.0 EXECUTIVE SUMMARY

Arch Coal, Inc. (ARCH) acquired the services of Potesta & Associates, Inc. (POTESTA) to collect supplemental benthic macroinvertebrate samples in conjunction with the United States Environmental Protection Agency (USEPA) during the implementation of the Summer 1999, Fall 1999, Winter 2000, and Spring 2000 index periods of the Mountaintop Removal/Valley Fill Mining Environmental Impact Statement Study (MTR/VF-EIS) within the Mud River, Spruce Fork, and Island Creek watersheds. POTESTA collected six supplemental quantitative Surber samples at each monitoring station sampled by the USEPA (except MT-24 which was a wetland-type habitat) during each of the four index periods.

This report is a presentation of the benthic macroinvertebrate data at the familial level. Also incorporated are water chemistry and habitat data collected at the sites by the USEPA. In sampling seasons, when sufficient data were available, statistical comparisons were made between the unmined (reference), valley filled and valley filled/residential sampling sites.

The majority of the reference streams within the three watersheds were dry during the summer and fall index periods. Six of the seven unmined reference streams within the three watersheds were dry during the summer index period. All seven reference streams were dry during the Fall 1999 index period. In contrast, all monitoring stations associated with valley fills had flowing water in the Summer1999 period, and all but one of the monitoring stations had flowing water in the Fall 1999 index period. All 22 monitoring stations had flowing water during the Winter 2000 index period.

Significant differences were seen in both the benthic community and water chemistry between the unmined streams and the filled and filled/residential sites. Differences between the unmined streams and the filled streams may be related to differences in temperature regimes (and therefore emergence times), the presence of ponds (additional food source), and water chemistry differences between the treatments. One interesting finding is that while the most significant biological impairment was indicated in the filled/residential sites, as compared to the unmined sites, the most significant differences in water chemistry were seen between the filled sites and the unmined sites. This indicates that the significant changes in the communities at the filled/residential sites (and possibly the filled sites) results from some variable other than water chemistry parameters.

Neither the changes in the biological community, nor the changes in the water chemistry in the filled sites appear to have significant adverse impacts on the stream function with respect to downstream segments. 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 filled and filled/residential sites. The changes in community structure likely result from the presence of ponds and changes in temperature regimes. This typically occurs in streams whenever ponds, dams or municipal discharges are present. The reduced mayfly populations in the filled and filled/residential sites are not uncommon in areas with mining influence or below impoundments. Although a reduction in mayfly populations is often attributed to the presence of metals, the contribution of sulfate and other dissolved ions may also be important. Increased abundance at the filled sites, as compared to the unmined sites, and the presence of a similar shredder community indicates that sufficient food is available to support a benthic community at these locations and that downstream communities are likely receiving particulate organic material from these more upstream segments. Filled sites and filled/residential sites did not always have identical functional feeding group distribution. For example, a higher percentage of collector-gathers were found below filled/residential sites. The reduction of the mayflies does not appear to affect the function of the streams. Sites influenced by mining continue to support an abundant population with representatives of all the functional feeding groups, and stream function does not appear compromised at these sites.

The changes in the benthic macroinvertebrate communities and water chemistry at the filled and filled/residential sites are consistent with expected changes in any mining influenced streams. These potential changes are related to mining in general, not necessarily to the practice of valley fill construction. Of the changes in both the water chemistry and biological communities which are described in this report, none can be attributed to the fill specifically, and all potentially result from coal mining, road construction or residential development. Additionally, the same changes in water chemistry and biological communities result from large scale development projects and ore extraction and processing operations (ore and gold extraction, steel mills, smelters).

Another consideration in this study is the imbalance in comparing a mined site on a third, fourth or fifth order stream with an unmined site on a first or second order stream. No unmined sites were selected on third, fourth or fifth order streams. Although not necessarily an objective of this study, changes in water chemistry and biological communities between first or second order streams and third or fourth order streams are expected (Vannote et al 1980). The changes associated with increasing stream order should be considered in the data interpretation.

2.0 INTRODUCTION

Arch Coal, Inc. (ARCH) acquired the services of Potesta & Associates, Inc. (POTESTA) to collect quantitative benthic macroinvertebrate samples in conjunction with the United States Environmental Protection Agency (USEPA) during the implementation of the Summer 1999, Fall 1999, Winter 2000, and Spring 2000 index periods of the Mountaintop Removal/Valley Fill Mining Environmental Impact Statement Study (MTR/VF-EIS) within the Mud River, Spruce Fork, and Island Creek watersheds.

The USEPA survey established monitoring stations on the mainstem of the major receiving streams that bracketed the historical and current mining activities. They proposed to assess the biological condition of the streams with the use of the semi-quantitative kicknet sampling technique at each of the monitoring stations and the use of the quantitative Surber (1 square foot area) sampling technique at selected monitoring stations. POTESTA recommended the collection of six quantitative Surber samples at each monitoring station to improve the statistical power of the analyses.

The USEPA established 23 monitoring stations within the Mud River, Spruce Fork, and Island Creek watersheds (Table 1). Kicknet samples were collected from each of the 23 monitoring stations and Surber samples were collected from selected sites for the EPA study. POTESTA collected six supplemental Surber samples from each site where the USEPA collected a benthic macroinvertebrate sample. The supplemental surber samples were collected during the same time frame as the USEPA studies. Efforts were made to collect samples in the Summer 1999, Fall 1999, Winter 2000 and Spring 2000 sampling seasons. Due to the drought conditions of 1999, several of the study streams were dry and benthic macroinvertebrate samples were not collected in these streams in the summer and fall sampling periods. Supplemental surber samples were not collected from MT-24 because the site was located within a drainage ditch/wetland that was not conducive to quantitative Surber sampling.

POTESTA independently analyzed the quantitative data using the EPA collected water chemistry and habitat evaluation data from the sampling sites. The data were analyzed statistically comparing the EPA identified categories or "treatment" groups of sites which were unmined or reference, sites which were influenced by valley fills, and sites influenced by both valley fills and residential areas. Other groups, such as sites influenced by mining but not valley fills, and sites in sediment control structures were not included in this analysis due to low replication that prohibited statistical analysis. Benthic macroinvertebrate data were summarized and analyzed using metrics indicative of biological condition. Also, differences in the benthic communities were evaluated using a comparison of functional feeding groups to assess the nature of the community changes indicated by the statistical analysis. While changes in functional feeding groups have not consistently proven to be discriminative metrics useful for identifying changes in benthic community structure, consideration of the functional feeding groups distribution provides additional insight into the nature of community responses (Poff and Matthews, 1985) and is a useful tool in evaluating the potential causes of community level changes.

3.0 METHODS

3.1 Study Areas

The USEPA established 23 monitoring stations within the three watersheds as part of the MTR/VF-EIS study (Table 1). Nine monitoring stations were established within the Mud River watershed (Figure 1), eight monitoring stations within the Spruce Fork watershed (Figure 2), and six monitoring stations within the Island Creek watershed (Figure 3). Figures 1, 2, and 3 are copies of USEPA documents showing their selected monitoring stations are used with the permission of the agency. The monitoring stations were designated by the USEPA as either unmined (reference) stream segments, or stream segments with valley fill mining (filled). The filled category was further divided into filled with no residential impacts and filled with residential impacts (filled/residential).

Additional samples were collected in areas that had historical mining with no valley fills (mined) or were historically mined with residential areas. These data are not discussed herein because the sample sizes were so small that they could not be included in the statistical analysis. They are, however, included in the lists of samples collected.

In addition, the USEPA sampling program included sampling locations selected to indicate cumulative mining impacts in the watershed and reference locations were selected for each downstream sampling location. It was later determined by the USEPA that the impacts of mining could not be separated from other multiple influences in the watersheds (Memorandum: From Rebecca Hanmer, January 8, 2001). Therefore, a discussion of cumulative impacts is not included in this report.

3.1.1 Mud River Watershed

The USEPA established three reference stream segments, one mined stream segment, and four filled stream segments within the Mud River watershed. The three reference stream segments were located on Rushpatch Branch (MT-02), Lukey Fork (MT-03), and Spring Branch of Ballard Fork (MT-13). The mined stream segment was located on the upper Mud River (MT-01). Although MT-01 was sampled, the data were not included herein because the sample sizes were too small. The four filled stream segments were located on Ballard Fork (MT-14), Stanley Fork (MT-15), Sugartree Branch (MT-18), and the lower Mud River (MT-23). The lower Mud River, MT-23, was a filled/residential stream segment. The USEPA also established a second mined stream segment within the sediment control drainage ditch at the headwaters of Stanley Fork (MT-24), but POTESTA did not sample this site.

3.1.2 Spruce Fork Watershed

The USEPA established two reference stream segments, one mined stream segment and five filled stream segments within the Spruce Fork watershed. The two "reference" stream segments were located on White Oak Branch (MT-39) and Oldhouse Branch (MT-42). The mined stream segment was located on Pigeonroost Branch (MT-45). Although MT-45 was sampled, the data is not presented in this report. The five filled stream segments were located on Rockhouse Creek (MT-25B), Beech Creek (MT-32), Left Fork of Beech Creek (MT-34B), Spruce Fork (MT-40), and Spruce Fork (MT-48). The two Spruce Fork stream segments, MT-40 and MT-48, are also influenced by residences and are therefore considered filled/residential.

3.1.3 Island Creek Watershed

The USEPA established two reference stream segments, one mined stream segment and three filled stream segments within the Island Creek watershed. The two "reference" stream segments were located on upper Cabin Branch (MT-50) and the lower Cabin Branch (MT-51). The three filled stream segments were located on Cow Creek (MT-52), Hall Fork of Left Fork of Cow Creek (MT-57B), and Left Fork of Cow Creek (MT-60). The Cow Creek station MT-55 was filled/residential.

3.2 Sampling Seasons

As part of the MTR/VF-EIS study, the USEPA sampled over five seasons (Spring 1999, Summer 1999, Fall 1999, Winter 2000 and Spring 2000). POTESTA collected quantitative benthic macroinvertebrate samples over four seasons (Summer 1999, Fall 1999, Winter 2000, and Spring 2000) within the Mud River, Spruce Fork, and Island Creek watersheds. The Summer 1999 studies were implemented during late July 1999, the Fall 1999 studies were implemented during late October 1999, the Winter 2000 studies were implemented during late January 2000, and the Spring 2000 studies were implemented in mid-May 2000.

3.2.1 Summer 1999

Sampling during the summer season was implemented within the three watersheds from July 27 to July 29, 1999. Drought conditions existed during this collection period. POTESTA collected benthic macroinvertebrate samples from four of the nine sampling stations within the Mud River watershed, seven of the eight monitoring stations within the Spruce Fork watershed, and four of the six monitoring stations within the Island Creek watershed.

Within the Mud River watershed, the three unmined monitoring stations (MT-02, MT-03, and MT-13) did not have sufficient flow to collect representative samples during late July 1999, and benthic macroinvertebrate samples were not collected from these monitoring stations. In addition, POTESTA did not collect benthic macroinvertebrates from the drainage ditch (MT-24). Quantitative benthic macroinvertebrate samples were collected from three filled monitoring stations (MT-14, MT-15, and MT-18) and the filled/residential site, MT-23.

Within the Spruce Fork watershed, one (MT-39) of the two unmined stream segments was dry. The second unmined stream segment (MT-42) exhibited low flow conditions. However, POTESTA was able to collect samples at this site. Macroinvertebrate samples were also collected from the filled stations MT-25B, MT-32, and MT-34B, as well as the filled/residential sites MT-40 and MT-48 and the mined site MT-45.

Within the Island Creek watershed, benthic macroinvertebrate samples were not collected from the unmined sites, MT-50 and MT-51, due to dry conditions. Benthic macroinvertebrate samples were collected from the filled stations MT-60, MT-57B, and MT-52 and from the filled/residential site MT-55.

3.2.2 Fall 1999

Sampling during the fall season was implemented within the three watersheds from October 26 to October 28, 1999. All of the unmined streams were dry during the fall sampling season. POTESTA was able to collect benthic macroinvertebrate samples from five of the nine sampling stations within the Mud River watershed, five of the eight monitoring stations within the Spruce Fork watershed, and four of the six monitoring stations within the Island Creek watershed.

Within the Mud River watershed, the three unmined monitoring stations (MT-02, MT-03, and MT-13) did not have sufficient flow to collect representative samples during late October 1999, and benthic macroinvertebrate samples were not collected from these monitoring stations. POTESTA did not collect quantitative samples from the drainage ditch (MT-24). Benthic macroinvertebrate samples were collected from the filled sites MT-14, MT-15, and MT-18. In addition, benthic macroinvertebrate samples were collected from the filled/residential site MT-23. A sample was also collected from the mined site MT-01.

Within the Spruce Fork watershed, both unmined monitoring stations (MT-39 and MT-42) were dry in late October 1999, and benthic macroinvertebrate samples were not collected from these monitoring stations. Benthic macroinvertebrate samples were collected from two of the three filled segments (MT-25B, MT-32), the mined stream segment (MT-45), and both the filled/residential sites (MT-40 and MT-48). The stream segment associated with MT-34B was dry, and benthic macroinvertebrate samples were not collected from this monitoring station.

Within the Island Creek watershed, the "reference" stream segments (MT-50 and MT-51) were dry during late October 1999, and benthic macroinvertebrate samples were not collected from these monitoring stations. Additionally, the stream segment associated with MT-51 was severely disturbed by the installation of a natural gas line by the local gas company. Filled monitoring stations MT-52, MT-60, and MT-57B, and the filled/residential station MT-55 stations had flowing water conditions, and benthic macroinvertebrate samples were collected from each of these sites.

3.2.3 Winter 2000

Sampling during the Winter 2000 season was implemented within the three watersheds from January 21 to January 31, 2000. Ice had to be removed from several locations to collect benthic macroinvertebrate samples. POTESTA collected benthic macroinvertebrate samples from eight of the nine sampling stations within the Mud River watershed, seven of the eight monitoring stations within the Spruce Fork watershed, and all six monitoring stations within the Island Creek watershed.

Within the Mud River watershed, benthic macroinvertebrate samples were collected from the three unmined monitoring stations (MT-02, MT-03, and MT-13), the three filled monitoring stations (MT-14, MT-15, MT-18), the filled/residential station, MT-23, and the mined site MT-01. POTESTA did not collect macroinvertevbrate samples from the drainage ditch (MT-24).

Within the Spruce Fork watershed, benthic macroinvertebrate samples were collected from both unmined stream segments (MT-39 and MT-42), two of the three filled monitoring stations (MT-25B, MT-32), the mined station (MT-45), and both the filled/residential stations (MT-40 and MT-48). The stream segment associated with MT-34B was completely frozen, and benthic macroinvertebrate samples were not collected from this monitoring station during the Winter 2000 index period.

Within the Island Creek watershed, the unmined stream segments (MT-50 and MT-51), the filled monitoring stations (MT-52, MT-60 and MT-57B), and the filled/residential (MT-55) monitoring station had flowing water conditions, and benthic macroinvertebrate samples were collected from each of these sites during the Winter 2000 index period.

3.2.4 Spring 2000

Sampling during the Spring 2000 season was implemented within the three watersheds May 17 and 18, 2000. Within the Mud River watershed, benthic macroinvertebrate samples were collected from eight of the nine USEPA monitoring stations. POTESTA did not collect macroinvertevbrate samples from the drainage ditch (MT-24) due to inappropriate substrate for surber sampling. Within the Spruce Fork and Island Creek watersheds, benthic macroinvertebrate samples were collected from all of the USEPA monitoring stations.

3.3 Quantitative Surber Sampling

3.3.1 Sample Collection

The benthic macroinvertebrate population at each station was sampled using the quantitative Surber sampler with a 500 μm nylon mesh. The sampling procedure followed standard sampling protocols described in Standard Methods 10500B (Standard Methods, 1995). The Surber sampler was placed on the stream bottom, ensuring that the bottom frame edges of the sampler were flat against the stream bottom so that all organisms within the sampling frame would drift into the net. Cobble and large gravel were brushed thoroughly and removed from the sampling frame. The substrate was then disturbed to a depth of approximately three inches with the handle of the brush. Six Surber samples were collected at each sampling station and retained as individual replicate samples.

3.4 Sample Sorting & Identification

The samples were removed from the Surber sampler net and transferred to one-liter plastic jars with the use of a 500 μm sieve. Each sample was assigned a unique sample identification code based on the sampling site, date, and replicate number. A sampling label with the unique identification code was filled out with pencil and inserted into the jar. The unique identification code also was written on the lid of the plastic jar with a black permanent marker. The unique sample identification code also was noted in the field notebook for that specific sampling site. The samples were preserved in the field with 70 to 75 percent ethyl-alcohol. The samples were transported to the offices of POTESTA in Charleston, West Virginia, by car, by the POTESTA biologists who collected the samples.

Upon arrival at the offices of POTESTA, the samples were stored in the locked sample storage room until they were processed and identified. Samples were sorted and identified by Dr. Thomas Jones' laboratory at Alderson-Broaddus College located in Philippi, West Virginia. Some benthic macroinvertebrate samples were sorted by staff and identified to familial level by senior scientists at POTESTA and an outside consultant at Pennsylvania State University (resumes for the subcontractors have previously been provided to the USEPA). All of the samples were identified to the familial taxonomic level. Taxonomic keys used for this project included Merritt and Cummins

(1996), Wiggins (1996), and Stewart and Stark (1993). Standard quality assurance/quality control (QA/QC) measures were followed to keep track of the samples (USEA QAPP).

3.5 Data Management

3.5.1 Data Entry

The data from each sample log sheet were entered into a Microsoft ACCESS database. The database, which was developed by the West Virginia Division of Environmental Protection and the USEPA, calculated a series of bio-assessment metrics. The database was modified by POTESTA to calculate all the metrics included in this analysis. Data utilized in the analysis included only aquatic life stages of aquatic and semi-aquatic organisms. Terrestrial organisms and adults which were not aquatic were excluded. These organisms are not contributing solely to the aquatic ecosystem at the time of sampling, and their exclusion for data analysis is standard procedure. Similarly, pupae were excluded from the data set. The metrics for each sample were exported to a Microsoft EXCEL spreadsheet. Summary statistics such as mean, standard deviation, minimum value, and maximum value for each of the stream segments were calculated using Number Cruncher Statistical System (NCSS) 2000 software.

3.5.2 Statistical Analysis

The Summer and Fall 1999 datasets were not complete due to the dry conditions. These datasets were not subjected to statistical analysis. Data from the Winter and Spring 2000 sampling events were more complete and were therefore utilized in significance testing. These data are also represented graphically using Box and Whisker plots. The graphical displays allow for visualization of differences between groups and violations of assumptions. To compare different types of stream segments (unmined, filled and filled/residential) analysis of variance (ANOVA) methods were used. The calculations were performed using the general linear models (GLM) procedure on NCSS. Prior to the analysis, the data were rank transformed to reduce the effects of violations of the assumptions. Following the overall test of mean differences, the reference (unmined) mean was compared to the filled and filled/residential means using multiple comparisons based on Bonferroni adjusted t-tests. For all of the analyses, a Type I error rate of 0.05 was used.

Functional feeding groups, as described by Merrit and Cummings (1996) were determined for benthic macroinvertebrate taxa collected during the Winter and Spring 2000. The USEPA's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers - EPA 841-B-99-002 (RBP Protocol) was also referenced for functional feeding group information as necessary. Functional feeding groups included collector, filterer, scraper, shredder, predator and piercer. The feeding group designation for each identified family is indicated in Table 2. Statistical comparisons between the filled, filled/residential and unmined sites to Statistical comparison of functional groups between the filled, filled/residential and unmined sites were made using the GLM procedure on the ranked data followed by Bonferroni t-test comparisons.

3.6 Bioassessment Metrics

The metrics included herein were based on the family-level classification and have been selected by POTESTA as the most appropriate and comprehensive for use in conducting assessments of benthic macroinvertebrate communities. The metrics were selected from a larger group of widely applicable candidate metrics described in the RBP Protocol. Each of the selected metrics measured a different component of the community structure and has a different range of sensitivity to pollution/disturbance stress in the aquatic ecosystem. A description of each metric along with the expected change in response to stress is included in Table 3. The 11 metrics were:

- Total Number of Individuals (Abundance)
- Total Number of Taxa (Richness)
- Hilsenhoff Biotic Index (HBI)
- Percent Two Dominant Taxa
- Percent Chironomidae
- Total Number of EPT taxa
- Number of EPT individuals
- Percent EPT taxa
- Percent Ephemeroptera
- Percent Plecoptera
- Percent Trichoptera

3.7 Water Chemistry Analysis

USEPA personnel have collected water chemistry samples for analysis as described in the EIS document. Those data are included herein so that comparisons can be made between the treatment classes with regard to the water chemistry.

Please note that while no data included herein were disqualified due to quality assurance problems with the USEPA contract laboratories, the results of the analysis are from the "first contract laboratory" and were excluded from some of the USEPA's analysis due to perceived problems with the laboratory. Despite the potential quality issues, the data are included since they represent the only water quality information available from the study period. The data should be interpreted with caution.

Water chemistry data were analyzed using the GLM procedure on the ranked data followed by Bonferroni t-test comparisons. Statistical comparisons between the filled, filled/residential and unmined sites were made where possible. Sample size was sometimes limiting.

3.8 Habitat and Substrate Assessment

USEPA personnel have performed habitat assessments and collected substrate information at each sampling location as described in the preliminary draft EIS document. Those data are included

herein so that comparisons can be made between the treatment classes with regard to the available habitat and substrate.

Total habitat scores and measured values relating to habitat variability were analyzed using the GLM procedure on the ranked data followed by Bonferroni t-test comparisons. Statistical comparisons between the filled, filled/residential and unmined sites were made where possible.

4.0 RESULTS

The 11 bio-assessment metrics calculated for each monitoring station and season are provided in Table 3.

4.1 Summer 1999

When the benthic macroinvertebrate samples were collected in the Summer 1999 index period, six of the seven reference streams within the Mud River, Spruce Fork and Island Creek watersheds were dry or had insufficient flow to collect a sample. In contrast, all valley fill mining-influenced monitoring stations had flowing water in the summer and could be sampled. Due to the lack of reference information, no comparisons can be drawn between the reference conditions and the filled and filled/residential conditions. In addition to the obvious drought conditions, low flow conditions occurring during the highest temperatures of the year make evaluation of mining influences difficult. It appears that the presence of fills in the watershed may minimize the effects of drought conditions by supplying a more consistent flow of water to the headwater streams. However, the actual impacts that drought conditions have on stream communities are variable depending on the length and severity of the drought and the extent of refugia available for benthic macroinvertebrates to inhabit until surface conditions are more favorable. The impacts that the drought in 1999 had on the reference streams are unknown.

Data collected from the filled, filled/residential, and flowing unmined sites in the three watersheds are presented in Table 4.

4.2 Fall 1999

As occurred in the Summer 1999 sampling event, all the reference streams within the three watersheds were dry during the fall index period. One of the filled monitoring stations was dry during the Fall 1999 index period. As indicated previously, due to the lack of reference information, no comparisons can be drawn between the reference conditions and the filled and filled/residential conditions.

Data collected from the filled and filled/residential sites in the three watersheds are presented in Table 5.

4.3 Winter 2000

All 21 monitoring stations had flowing water during the Winter 2000 index period, although one monitoring station was completely frozen over and samples were not collected during the Winter 2000 sampling event. Summary statistics for each site sampled are given in Table 6. Summary statistics for each of the site types (reference, filled, or filled/residential) are included in Table 8 and the data are presented graphically in Figures 4 to 14. Boxplots are constructed using the average of the surber samples to represent one data point for each site.

Data from the three groups were compared statistically using a general linear model procedure on the ranked data. Where statistically significant differences were found between the groups, pairwise comparisons were made using t-tests with the Bonferroni adjustments. Results of the statistical analysis are presented in Table 9. As is indicated in the table, the greatest difference between the groups is in the percent mayfly metric followed by the percent EPT, percent chironomids, and percent two dominant taxa. The filled/residential sites were significantly different from the unmined sites for eight of the eleven metrics. The filled sites were significantly different from the unmined sites for two of the eleven metrics, percent mayflies and percent two dominant taxa.

The functional feeding group for each identified family was determined. Functional feeding groups are classifications that distinguish insects based on the manner in which they process nutrients. For example, a collector filter is an organism which filters nutrient material from the water column. Examining functional feeding groups may indicate to what degree a stream segment is dependent on a particular food resource (Merritt and Cummins, 1984). The function feeding groups were represented graphically for the filled, filled/residential, and unmined sites (Figure 15). The filter feeders increased in the filled and filled/residential sites with respect to the unmined sites. The collector group increased in the filled/residential sites as compared with the unmined and filled sites. Scrapers declined in the filled and filled/residential sites with respect to the unmined sites. Shredders increased slightly below the filled sites but declined in the filled/residential sites with respect to the unmined sites. Predators were similarly represented in the filled and unmined sites but decreased in the filled/residential sites.

Statistical analyses of the data indicate that collector-gatherers were significantly higher in the filled/residential sites as compared to the unmined sites (Table 10). Representatives of the piercer feeding group were also significantly reduced in the filled/residential sites as compared with the unmined category; however, there were so few piercers in the population that the differences are slight. Organisms from the scraper functional feeding group dominated the unmined sites and were significantly greater than representatives of this functional feeding group with respect to the filled sites. Of particular significance is the similarity between the unmined and filled groups with respect to shredders having 19.3 percent and 25 percent of each community comprised of these individuals, respectively. Also noteworthy is the increase in filterer-collectors in the filled and filled/residential groups, which could be attributed to increases in the organic inputs. The sources of organic enrichment would likely be domestic inputs at the filled/residential sites and the pond influence at the filled sites. Increases in collectors, particularly filter feeders, below impoundments are well documented in the literature (Allen, 2000; Stanford and Ward, 1979; Petts, 1984).

4.4 Spring 2000

All 22 monitoring stations had flowing water during the Spring 2000 index period and samples were collected from each station except MT-24, which was not sampled due to substrate limitations. Summary statistics for each site sampled are given in Table 7. Summary statistics for each of the site types (reference, filled, or filled/residential) are included in Table 11, and the data are presented graphically in Figures 16 to 26. Boxplots are constructed using the average of the surber samples to represent one data point for each site.

As with the winter index period, data from the three groups were compared statistically using a general linear model procedure on the ranked data. Where statistically significant differences were found between the groups, pairwise comparisons were made using t-tests with the Bonferroni adjustments. Results of the statistical analysis are presented in Table 12.

As shown in Table 12, the greatest difference between the groups is in the percent mayfly metric followed by the percent EPT, percent chironomids, HBI, and percent two dominant taxa. The filled/residential sites were significantly different from the unmined sites for six of the eleven metrics. The filled sites were significantly different from the unmined sites for five of the eleven metrics, including: EPT richness, percent Plecoptera, percent Ephemeroptera, and HBI.

The functional feeding group for each identified family was determined. The functional feeding groups were represented graphically for the filled, filled/residential, and unmined sites (Figure 27). As seen also in the winter data, the filter feeders increased in the filled and filled/residential sites with respect to the unmined sites. The collector group increased slightly in the filled/residential sites as compared with the unmined and filled sites. There were fewer scraper taxa in the filled and filled/residential sites with respect to the unmined sites. In contrast to the winter sampling event, shredders decreased below the filled and the filled/residential sites with respect to the unmined sites. Predators were similarly represented in the filled and unmined sites but decreased in the filled/residential sites.

Statistical analysis of the data indicates that there were no statistical differences between the unmined, filled and filled/residential groups with respect to the collector-gatherers, scrapers, or piercers (Table 13). Collector-gatherers dominated all treatments. Shredders were significantly lower in the filled and filled/residential sites than the unmined sites and filterer-collectors were significantly greater in the filled and filled/residential sites than the unmined. Predators were again significantly reduced in the filled/residential sites as compared with the unmined.

4.5 Water Chemistry Analysis

USEPA personnel have collected water chemistry samples for analysis as described in the EIS document. Those data discussed herein are included in Tables 14 and 15 with summaries showing statistical comparisons given in Tables 16 and 17.

4.6 Habitat and Substrate Assessment

Selected habitat and substrate parameters were compared with the metrics found to indicate significant differences between the unmined, filled, and filled/residential sites. The data used in the comparisons are included in Table 18 and the results of the statistical comparisons are included in Table 19.

5.0 DISCUSSION

This report is a presentation of the benthic macroinvertebrate data at the familial level. The study focused on the Mud River, Spruce Fork, and Island Creek watersheds. There was a drought during the Summer and Fall 1999 index periods.

5.1 Drought Effects

The majority of the reference streams within the three watersheds were dry during the summer and fall index periods. In contrast, valley fill stations had flowing water in the summer and all but one in the Fall 1999 index period. The extent to which the drought conditions affected the benthic communities is unknown. In response to reduced flow conditions, higher temperatures, and lower dissolved oxygen levels associated with drought conditions (Allen, 2000; Lake, 2000; Miller and Golladay, 1996), the benthic macroinvertebrate communities may experience increased predation and competition, increasing richness of opportunistic species, low abundance, and change in functional feeding group structure (Lake, 2000; Miller and Golladay, 1996). The unmined sites, which were too flow limited to be sampled, and to some extent, the filled, and filled/residential streams may have experienced all or some of these conditions related to drought conditions.

During the summer drought conditions, benthic communities in the filled and filled/residential streams were characterized by low abundance and richness in the Mud River watershed with moderate richness and abundance in the Spruce Fork and Island Creek watersheds. Filter feeding caddisflies from the family Hydropsychidae dominated benthic communities at most of the filled sites. Filled/residential sites were dominated by riffle beetles which may reflect increased algae growth due to nutrient loading from residences or decreased canopy cover in the larger, higher order streams. Stoneflies and mayflies were poorly represented in the samples; however, EPT abundance and percent EPT metrics were high due to the dominance of the Trichoptera.

Similar drought conditions were seen in the fall index period. In the Mud River watershed, the abundance increased at the filled sites. Richness also showed a slight increase as compared with the summer condition. Stoneflies were dominant at the filled site, MT-14, and increased throughout the watershed. The shredders from families Leuctridae/Capniidae and Taeniopterygidae were prevalent, and Philopotamidae, another filter feeding caddisfly, was dominant in addition to the Hydropsychidae. Chironomidae, a collector, was dominant at the filled site, MT-18. Spruce Fork and Island Creek watersheds also had increases in abundance and moderate richness. As seen in Mud River, stoneflies increased in both watersheds which also raised the EPT abundance.

Communities at sampling locations in the Spruce Fork watershed were still dominated by hydropsychids with riffle beetles, Leuctricae/Capniidae, and midges also contributing to the percent two dominant taxa metric.

Data collected during the Summer and Fall of 1999 should be interpreted carefully due to the stressful conditions of the drought and the lack of reference data for comparison. Overall, streams with valley fills are more likely to maintain flowing water conditions during dry periods. These streams are dominated by filter feeding organisms followed by shredders with scrapers, the riffle beetles, appearing in the larger more open streams.

5.2 Winter Benthic Macroinvertebrates

Benthic macroinvertebrate data collected during the winter sampling event showed differences between the unmined, filled and filled residential groups. Abundance was reduced in the unmined reference locations possibly due to the drought conditions experienced in the previous two index periods. As indicated, the effects of the fills appear to mitigate the drought and likely contributed to the higher abundance in the filled and filled/residential sites. Differences between the benthic macroinvertebrate communities in the unmined and filles sites were evident in the metrics involving the mayfly population which was decreased below the fill sites. Stoneflies were prevalent in these sites, however, indicating that water quality may not be the limiting factor for the absent mayflies, as they are both sensitive taxa. Below the filled sites, the sensitive EPT taxa still comprised an average of 50 percent of the population.

The increased variability for several metrics in the filled sites, as compared with the unmined sites, indicates that there are differences within the filled group which may limit the benthic communities at some sites but not consistently in this group. Significant differences in the filled group, which pertain to mining influences, may include the age of fill, time elapsed since fill completion, type of overburden placed in the fill, number of fills in the watershed, size of the fills, and engineering practices used in fill construction. Differences may also be due to site related conditions such as the presence of ponds or impoundments, distance from the sampling site to the impoundment, number of ponds upstream of the site, size and age of the ponds, impoundment release mechanism (surface or bottom release), general watershed characteristics (gradient, soil type, cover) and many other variables. Overall, the filled sites are only significantly different from the unmined sites with respect to the percentage of the population comprised of mayflies and the percentage of the two dominant taxa, which is not necessarily a mayfly influenced metric. Differences in both of these metrics may be attributed to the differences in food sources for the organisms in the filled sites located below the ponds associated with the fills, stream order, and differences in temperature regimes associated with the fills and the ponds.

Flowing stream systems rely on food sources typically contributed from upstream segments which are dependent on allochthonous inputs, such as leaf litter, for nutrients. The leaves are broken down by shredders which eat the leaf material and the fungi and bacteria colonizing the leaf litter. Small parts of the leaves, associated fungi and bacteria, as well as feces from the organisms contribute to the food supply of downstream collector-gatherers and filter feeding organisms. The streams with valley fills have a sediment retention pond located typically in the most upstream reaches of the stream just below the fill area. These ponds carry out a similar function for the upstream reaches of the streams. In the ponds, biological communities are established which are dependent on algal growth, not leaf litter, as a food source. The algae and detrital material flowing from the ponds act as the food source for the downstream communities. Since this is a more continuous and less variable food supply than leaf litter, the filter feeding and gathering organisms increased below the ponds, much like they would be in the downstream reaches of rivers described by the river continuum concept. While this represents a fundamental shift in the biological community, the community created is not necessarily undesirable, it is simply different and more representative of a community located much farther downstream.

Changes in the benthic macroinvertebrate community structure below impoundments are well documented. In general, increase in density and biomass, primarily of filter feeders and collectors, and a decrease in diversity, is expected downstream of an impoundment. These changes may result from flow constancy, organic loading, temperature changes or a combination of multiple factors (Stanford and Ward, 1979; Petts, 1984; Allen, 2000). Temperature changes often play an important role in shaping community structure and vary depending on many factors including the location of the impoundment water release (surface or bottom), source of water, size and depth of the pond and retention time of the pond Kondratieff and Voshell, 1980). Summer cools and winter warms particularly impact taxa dependent on thermal cues for life cycle completion. Mayflies and stoneflies are often eliminated below impoundments (Stanford and Ward, 1979). Caddisflies and other collectors and filter feeders, as well as, amphipods, isopods, gastropods, oligochaetes, and turbellarians often increase (Stanford and Ward, 1979)

Also of interest below the fills is the presence of a shredder community very similar to the unmined reference streams. It appears that leaf litter and detritus are still available as a food source for these organisms in addition to the pond inputs. In streams where an established riparian zone is in place, stoneflies of the families Leuctridae, Capniidae, Tanaepoterygidae, and Nemouridae comprise the shredder communities in unmined areas and below the fill areas. The similar communities in the filled and unmined streams indicate that the downstream reaches of the streams are being supplied with the coarse and fine particulate organic material which are the major contribution of headwater reaches described in the river continuum theory (Vannote, et al., 1980).

During the winter sampling event, the percentage of scrapers was high in the unmined areas. This community, primarily composed of the mayfly, Ameletidae, and the beetle, Elmidae, was lower in the filled sites which may reflect the changing food source below the ponds and may be indicative of competition with the filter feeders and collectors which increased below the fills and ponds. This shift away from the scraper abundance in the filled sites contributes significantly to the decline in the mayflies below the filled sites. Because they are a sensitive taxa, a decrease in the mayfly community may appear to indicate community degradation associated with the fills and has been represented as being indicative of poor water quality due to the fills. While this may be the case, it cannot be overlooked that the entire scraper community declines in the fill sites, not just the mayflies. This includes snails, beetles (riffle beetles and waterpennys) and one caddisfly taxa. This type of shift away from a functional feeding group is most likely related to a shift in the food source.

Scouring from flooding, canopy cover from evergreen trees as opposed to deciduous trees, and many other factors could all be causing or contributing to the decline in scrapers. At this time it is not possible to discern the cause without more study.

The filled/residential sites were significantly different from the unmined sites with respect to eight of the eleven metrics and represent a different type of biological community than that which exists in the reference sites or the filled sites. Differences in the biological communities likely resulted from both the effect of fills/ponds, differences in stream order (2nd order vs. 4th order) and the increased nutrients associated with sewage inputs from residences. This is supported by the increase in filter feeders and collector gatherers with respect to the reference streams. Unlike the filled sites, the filled/residential sites did not generally show increased variability with respect to the unmined sites but consistently scored below the reference sites. While having the highest abundance, the filled/residential sites had the lowest percent EPTs and the highest percent Chironomidae. The Chironomidae are organisms more tolerant to water quality degradation including increases in metals and oxygen depletion associated with nutrient loading, such as from sewage inputs.

Most of the chironomids feed by collecting organic material from the water column. Simuliids feed by filtering nutrient rich particles from the water. Both of these tolerant organisms are prevalent in the filled/residential sites. The filter feeding caddisflies of the family Hydropsychidae were also prevalent in streams with filled/residential influences. These caddisflies are often found below ponds and below waste treatment outfalls in flowing waters. The collectors and filterers comprised almost 75 percent of the community in filled/residential stream segments indicating a significant shift in the benthic community at these sites from a scraper dominated community. The collector dominated community is dependent on organic loading from external or upstream sources. This significant shift in the community resulting from a food source change indicates that significant differences between the biological communities at the unmined and filled/residential locations are due, at least in part, to changes in organic loading between the two categories of stream.

5.3 Winter Water Chemistry

The water chemistry collected by the USEPA contributes some information to be used when discerning the causes of changes seen in the benthic communities in the filled and filled/residential sites. The parameters measured in the field include dissolved oxygen, temperature, pH and specific conductivity. The higher dissolved oxygen concentrations in the filled/residential sites support the previous discussion regarding nutrient loading in those stream segments. During the daylight hours, when photosynthesis is occurring, the dissolved oxygen is higher in nutrient rich systems. During the night time hours when there is no oxygen input from photosynthesis, there is often an oxygen sag, particularly when associated with higher temperatures, which contributes to the tolerant communities in areas with high nutrient loadings (Wetzel and Likens, 1991). Temperatures associated with the filled sites are generally higher in the winter (and likely lower in the summer) which can alter reproduction and emergence strategies of the benthic macroinvertebrates. The alkalinity is higher in the filled and filled/residential streams which will better buffer the impacts of acid precipitation in these streams. Specific conductivity, an indication of dissolved ions, is significantly higher in the filled and filled/ residential sites as compared with the unmined sites. This is most likely caused by increased dissolution of minerals such as calcium and magnesium, that are commonly found in the sandstone and shales disturbed by mining activity. Increased surface area of fragmented rock and exposure to the elements increases weathering rates, resulting in higher concentrations of alkaline or basic ions in the runoff. This tends to be the case regardless of whether the rock material remains on top of the mined area or placed in fills.

In the Winter 2000 data, only 14 of the 33 water chemistry parameters measured by the USEPA had sufficient sample sizes for statistical comparisons of all three groups. Of these parameters, all but three were significantly different in the unmined as compared to the filled and eight were significantly different between the unmined and the filled/residential. For three of the parameters, sufficient data were available to statistically compare the only the unmined and filled sites. Sample sizes of filled/residential sites were insufficient for statistical comparisons. Of these three parameters, selenium, antimony and lead, all three were found to be significantly higher in the filled sites as compared to the unmined. The alkalinity of the unmined streams was extremely low, averaging only 13.31 mg/l $CaCO_3$. The filled and filled/residential sites had significantly higher buffering capacity than the unmined sites which is a significant benefit to the aquatic life in the streams. While the pH of the unmined streams was in the six to eight standard unit range (significantly lower than the filled and filled/residential sites), due to the reduced stream buffering capacity, acidic precipitation could cause excursions of the pH below the acceptable levels. Similarly, calcium and magnesium, which make up total hardness, were both higher in the filled and filled/residential streams. Hardness mitigates metals toxicity to aquatic organisms and may be important because metals, like selenium and lead, were present in all stream types.

The levels of other ions, such as chloride, nitrate, sodium and potassium, were statistically significantly elevated. However, the low levels overall likely have no biological significance. Sulfate, which is a component of rock that dissolves and leaches into the water, is significantly higher in the filled and filled/residential sites as compared with the unmined. This is likely a significant contributor to the high conductivity measured in the field.

Parameters such as iron and manganese, which are typically associated with the mining activity, were elevated in samples collected at the filled and filled/residential sites with respect to the unmined sites. However, all the samples were well below their associated water quality criteria and not in the range of causing biological impairment. Aluminum met the acute water quality criteria. There was insufficient data on these three metals for comparisons between the treatment groups.

5.4 Winter Habitat

The sites were scored using the USEPA rapid bioassessment procedures habitat analysis metrics in addition to substrate measurements. There were few differences between the habitat and substrates at the unmined, filled and filled/residential sites. The filled/residential sites tended to be from higher order streams which may explain some differences in the communities at those sites. This may also indicate that the reference streams used in this study are not appropriate to represent expected communities at the filled/residential sites. The only significant difference in habitat characteristics

between the unmined sites and the filled sites was greater stream channel alteration in the filled sites. This metric was also significantly different in the filled/residential sites.

5.5 Spring Benthic Macroinvertebrates

As in the winter sampling event, differences are seen between the unmined, filled, and filled/residential sites. Abundance was still lower in the reference streams as compared to the filled and filled/residential streams. This may result from the previous summer's drought conditions or reflect differences in food supply or other variables between the treatment groups. The EPT abundance was similar between the filled and unmined streams but higher in the filled/residential streams, which indicates the increase in the filter feeding caddisflies as described in the winter sampling event. The percentage of EPT organisms decreased slightly in the filled sites with respect to the unmined sites resulting from a decrease in percent stoneflies. The percent mayflies increased slightly. Five of the eleven metrics were significantly different in the filled treatment with respect to the unmined conditions. These metrics were primarily those associated with the EPT taxa and the HBI. Overall, variability increased in the filled streams with respect to the unmined streams. Again this indicates that while the communities at some sites may be different from the reference condition, this is not true of all the filled sites. The percentage of EPT individuals in the unmined streams changed very little from the winter sampling event while the same metric dropped 10 percent in the filled sites. This trend was mirrored in the percent plecoptera metric where there were 19 and 21 percent stoneflies in the reference streams (winter and spring, respectively) and 27 and 11 percent stoneflies in the filled streams (winter and spring, respectively). Caddisflies also decreased in both populations, and the mayflies increased in both populations. The significant difference in the EPT related metrics results from the significant differences in the stoneflies. The decline in stonefly numbers between the two sampling events perhaps results from the emergence of stoneflies in filled sites earlier than their counterparts in the reference streams due to the more consistent temperatures in the filled streams. This is supported by the substantial decrease in the shredder population in the filled sites with respect to the unmined sites. The HBI increased in both the unmined and the filled sites with the loss of the sensitive Plecoptera taxa probably contributing to the significant difference between the treatments. This is supported by the fact that the percentage of Chironomidae did not increase in either the filled or the unmined sites, which would have indicated a shift toward a more tolerant population.

While the EPT richness was significantly reduced in the filled/residential sites, the percentage of sensitive EPT taxa increased in the spring sampling event with respect to the winter event. This 23 percent increase in EPT taxa is directly attributable to a 22 percent increase in ephemeroptera. The increase is primarily due to the increase in the collector/gatherer mayflies of the family Baetidae. The increases in collector/gatherer organisms, particularly baetids, are also seen in the unmined and filled treatments and perhaps are occurring in response to the decreased scraper community in the spring when leaf cover shades the streams. This effect is pronounced in the filled and filled/residential sites due to increasing production in the ponds with increasing temperatures which provides a food supply for the collectors greater than that what would occur in typical headwater streams.

The filled/residential sites were significantly different than the unmined sites for six of the eleven metrics measured. In the winter sampling event, there were eight metrics significantly different with the overall abundance and the EPT abundance being more similar in the spring event. The increased EPT abundance indicates the previously mentioned baetid increases in the filled/residential sites. Like the filled sites, the filled/residential sites also had increases in the collector/gatherer and filterer functional feeding groups and a decrease in the scraper component of the community.

5.6 Spring Water Chemistry

In the Spring 2000 sampling event, 18 of the 35 water chemistry parameters measured by the EPA had sufficient sample sizes for statistical comparisons. Of these parameters, all but four were significantly different in the unmined sites as compared to the filled sites, and ten were significantly different between the unmined and the filled/residential. Field chemistry analysis was similar to the winter sampling event with conductivity and pH significantly higher in the filled and filled/residential sites as compared with the unmined sites. The higher temperatures and dissolved oxygen in the filled and filled/residential sites that was evident during the colder winter months was not apparent in the spring season.

The water chemistry parameters with sufficient sample sizes for statistical comparisons were slightly different in Spring 2000 from the Winter 2000 sampling event. Parameters measured in the winter showed similar trends to the previous sampling event with alkalinity and hardness related parameters highest in the filled sites. Total organic carbon was significantly higher in the filled sites again indicating a food source for aquatic organisms. Other ions, such as chloride, nitrate, sodium and potassium, were statistically significantly elevated; however, the levels are so low overall that they likely have no biological significance. Sulfate, was again elevated in the filled and filled/residential sites.

Parameters measured in the Spring 2001 sampling event that were not measured in the previous sampling event included: dissolved organic carbon, total iron, total dissolved solids and total suspended solids. Like total organic carbon, dissolved organic carbon was also significantly higher in the filled sites as compared with the unmined sites. Total suspended solids was similar among the three treatments. The average iron concentration was higher in the filled and filled residential sites, although not significantly higher. None of the average iron concentrations in either treatment approached the water quality standard for iron, so it is unlikely that this parameter will have any biological effects.

6.0 CONCLUSIONS

Changes were seen in both the benthic macroinvertebrate community and water chemistry between the unmined streams and filled and filled/residential reaches. Differences between the unmined streams and the filled streams may be related to differences in temperature regimes (and therefore emergence times), the presence of ponds (additional food source), and water chemistry differences between the treatments. Differences in stream order may also contribute to the difference between

the communities at the unmined, filled and filled/residential sites. Different biological communities would be expected in a first or second order stream as compared to a third, fourth or even fifth order stream. One interesting finding is that while the most significant biological impairment was indicated in the filled/residential sites with respect to the unmined sites, the most significant changes in water chemistry, with respect to the reference sites, were seen in the filled sites. This indicates that the significant changes in the communities at the filled/residential sites (and possibly the filled sites) results from some variable other than water chemistry parameters alone.

Much information has been published on the effects of mining on benthic macroinvertebrate community structure. Among the most significant and easily observable impacts is a reduction in the sensitive EPT taxa (Beltman, et al, 1999), particularly mayflies and stoneflies which would be accompanied by a shift toward a more tolerant community. In recent years, several authors have further reported that some stoneflies were not only present but dominant in mining influenced streams where mayflies were reduced (Carlisle & Clements, 1999). While mining related impacts are often tied to metals, it is not always evident whether other factors such as sedimentation, pH, and other dissolved ions, such as sulfate, are also involved in community structure changes. The current study also indicates that changes in community structure may result from the presence of ponds which provide a different food source. All of these potential changes are related to mining in general, not necessarily to the practice of valley fill construction. Of the changes in both the water chemistry and biological communities which are described in this report, none can be attributed to the fill specifically and all potentially result from coal mining, road construction or residential development. Additionally, the same changes in both water chemistry and biological communities result from large scale development projects, and ore extraction and processing operations (ore and gold extraction, steel mills, smelters).

Neither the changes in the biological community, nor the changes in the water chemistry in the filled sites appear to have significant adverse impacts on the stream function with respect to downstream segments. The most significant changes in stream biological community appear to be the shift in the functional feeding groups toward more filter feeding organisms. This typically occurs in streams whenever ponds, dams or municipal discharges are present. The increased abundance in these sites, which likely results from the increased food sources, indicates that sufficient food is available to support a benthic community at these locations and downstream. Also, the shredder community is not reduced at the filled sites, so it can be concluded that downstream communities should be receiving a particulate organic material from these more upstream segments. While the benthic communities at the sites associated with valley fills may have a reduced mayfly population, they still support an abundant population with representatives of all the functional feeding groups, and stream function does not appear compromised at these sites.

From the data contained herein, it is not possible to discern any in-stream effects specifically attributable to valley fills as distinguished from other mining practices or other disturbances such as development, road construction, and ore extraction. Additionally, more information is necessary to identify factors which contribute to the variability in the benthic community and the water quality at the valley fill influences sites.

7.0 CLOSING

Potesta & Associates, Inc. has prepared this report describing the activities associated with the quantitative benthic macroinvertebrate surveys that were conducted in conjunction with the USEPA MTR/VF-EIS study on the Mud River, Spruce Fork and Island Creek watersheds during the Summer 1999, Fall 1999, and Winter 2000 sampling events. This report was prepared for the exclusive use of the client, Arch Coal, Inc. The survey sampling was conducted in accordance with generally accepted environmental practices and guidelines.

The intent of the report is to document field activities and present field observations and associated data analysis based upon our experience and professional judgement. Conclusions regarding the assessed condition(s) of the stream(s) do not necessarily represent a warranty that all segments of the stream(s) are of the same quality. Specific conditions may not be observable or readily interpreted from available information, but may become evident at a later date.

Respectfully Submitted,

POTESTA & ASSOCIATES, INC.

Laidley Eli McCoy

Laidley Eli McCoy
Vice President, Environmental Consulting

Mindy Yeager Armstead

Mindy Yeager Armstead
Senior Scientist

8.0 REFERENCES

Allen, J. D.. 2000. Structure and function of running waters. Stream Ecology.

Beltman, D. J., W. H. Clements, J. Lipton and D. Cacela. 1999. Benthic invertebrate metals exposure, accumulation and community-level effects downstream from a hard-rock-mine site. Environmental Toxicology and Chemistry. 18(2):299-307.

Carlisle, D. M. and W. H. Clements. 1999. Sensitivity and variability of metrics use in biological assessments of running waters. Environmental Toxicology and Chemistry. 18(2):285-291.

Kondratieff, C. and Voshell, J. R. 1980. Life History and Ecology of *Stenonema modestum* (Banks) (Ephermoropters: Heptageniidae) in Virginia, USA.

Lake, P. S. 2000. Disturbance, patchiness, and diversity in streams.

Merrit, R.W., and K.W. Cummins (eds.). 1996. An Introduction to the Aquatic Insects of North America, Third Edition. Kendall/Hunt Publishing Company. IA. 862 p.

Miller, A. M and Golladay, S. W. 1996. Effects of spates and drying on macroinvertebrate assemblages of an intermittent and a perennial prairie stream. Journal of the North American Benthological Society [J. N. AM. BENTHOL. SOC.]. Vol. 15, no. 4, pp. 670-689. Dec 1996.

Petts, G. E. 1984. Perspectives for ecological management. Impounded Rivers.

Poff, N. D. and Matthews, R. A. 1985. Benthic macroinvertebrate community structural and functional group response to thermal enhancement in the Savannah River and a coastal plain tributary.

Stanford, J. A. and Ward, J. V. 1979. Dammed rivers of the world: Symposium Rationale.

USEPA. 1999b. A Survey of the Condition of Streams in the Promary Region of Mountain Top Removal/Valley Fill Coal Mining.

Vannote, R. L., G.W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing. 1980. The river continuum concept. Can. J. Fish. Aquat. Sci. 37: 130-137.

Wiggins, G.B. 1998. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press. Canada. 457 p.

Wetzel, R.G. and G. E. Likens. 1991. Limnological Analyses. Springer-Verlag. NY. 305 p.

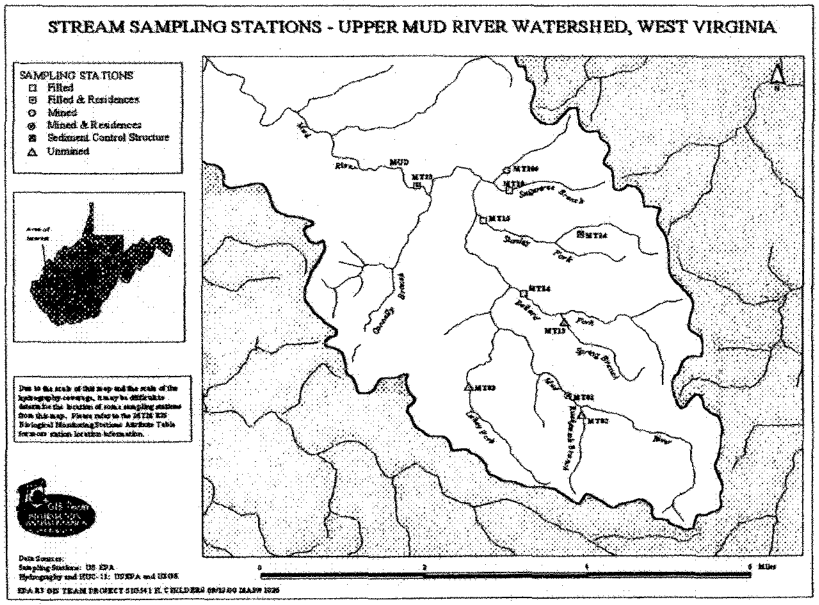


Figure 1 . Stream Sampling Stations - Upper Mud River Watershed, West Virginia

Reprinted from "Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement". US EPA June 2003

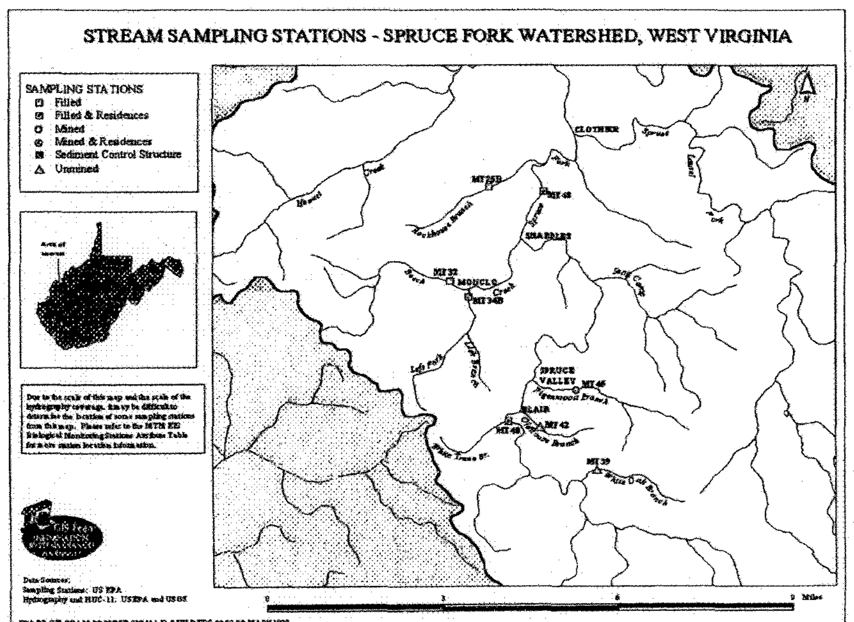


Figure 2 . Stream Sampling Stations - Spruce Fork Watershed, West Virginia

Reprinted from "Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement". US EPA June 2003

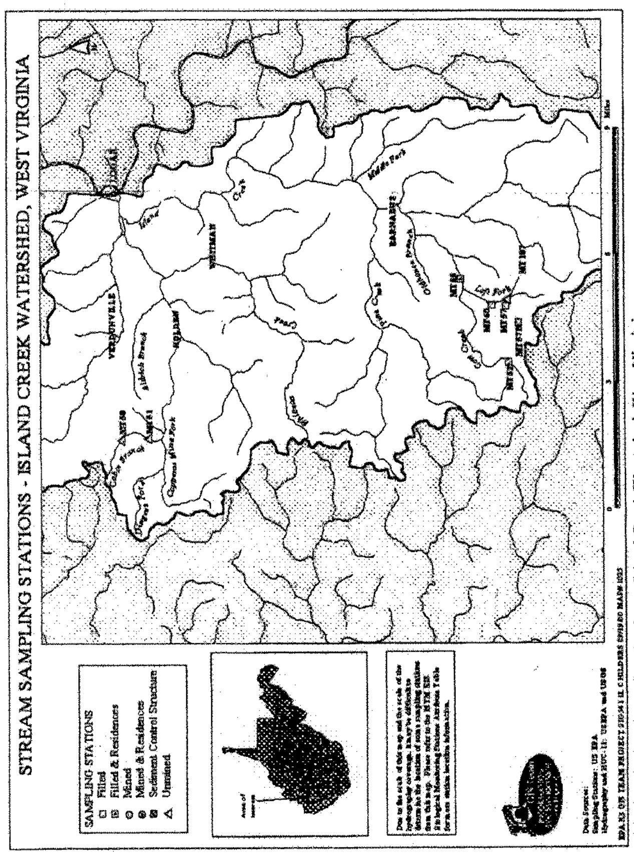


Figure 3. Stream Sampling Stations - Island Creek Watershed, West Virginia

Reprinted from "Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement". US EPA June 2003

Figures 4 – 14. Box plots of the metrics for benthic macroinvertebrate communities at Unmined, Filled and Filled/Residential sites in the Mud River, Spruce Fork and Island Creek watersheds during the Winter 2000 sampling event.

Figure 4

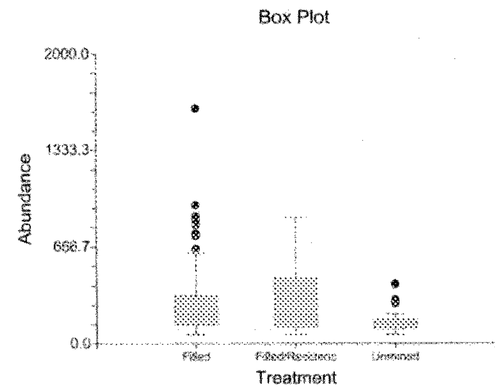


Figure 5

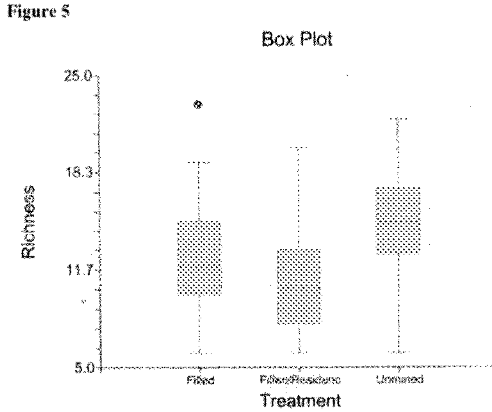


Figure 6

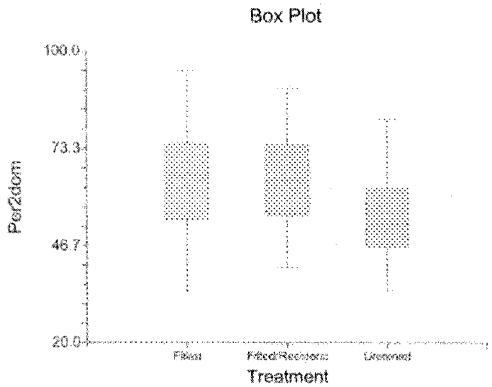


Figure 7

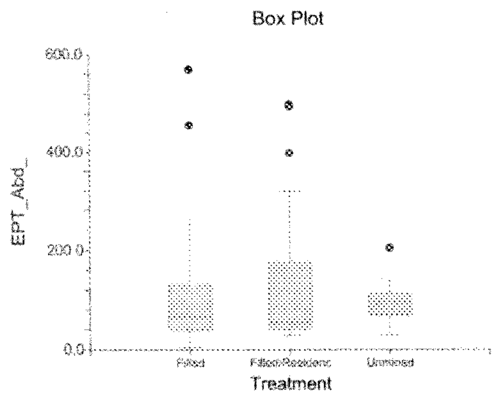


Figure 8

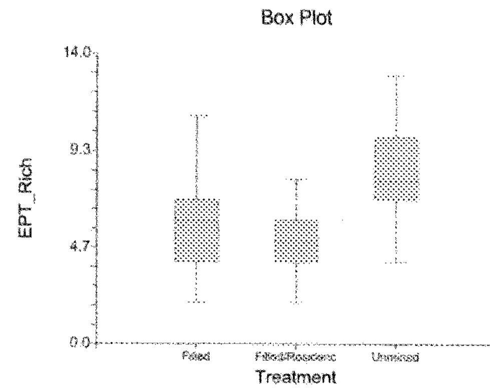


Figure 9

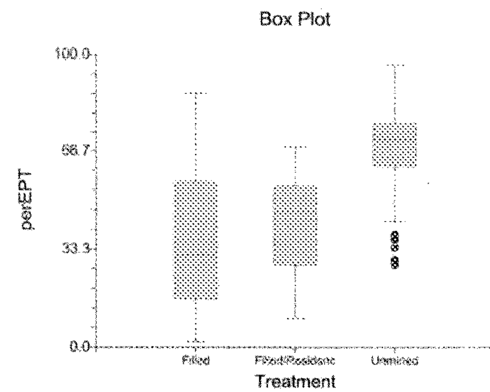


Figure 10

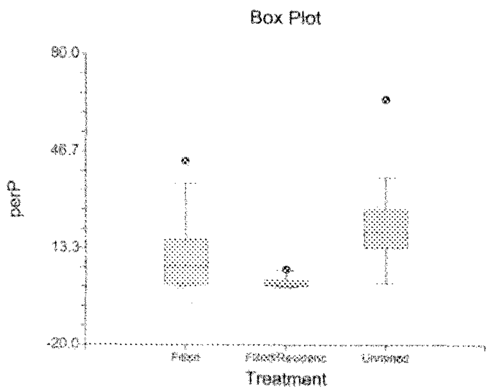


Figure 11

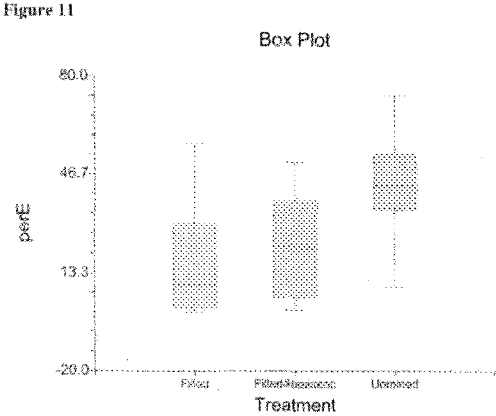


Figure 12

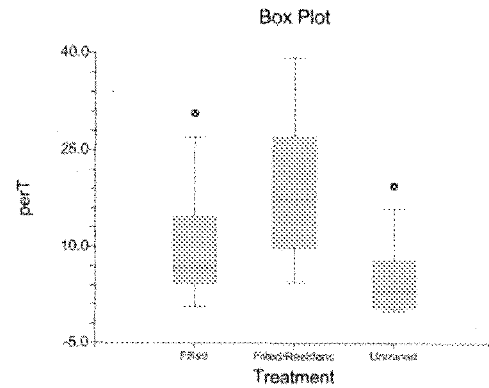


Figure 13

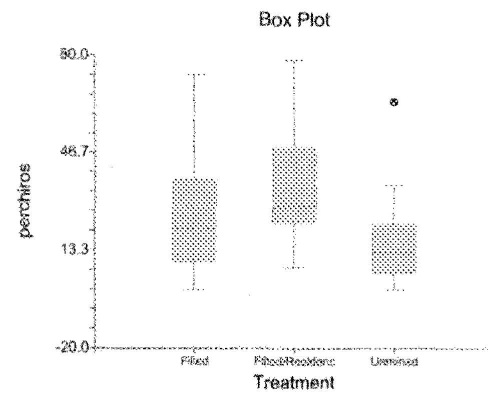


Figure 14

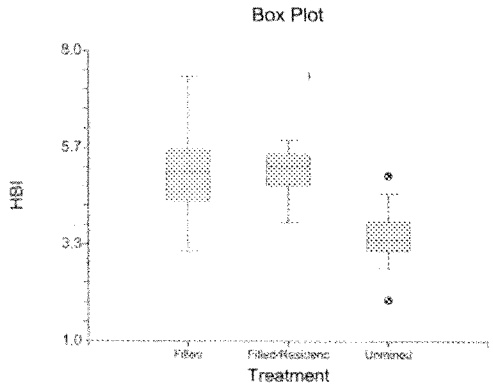
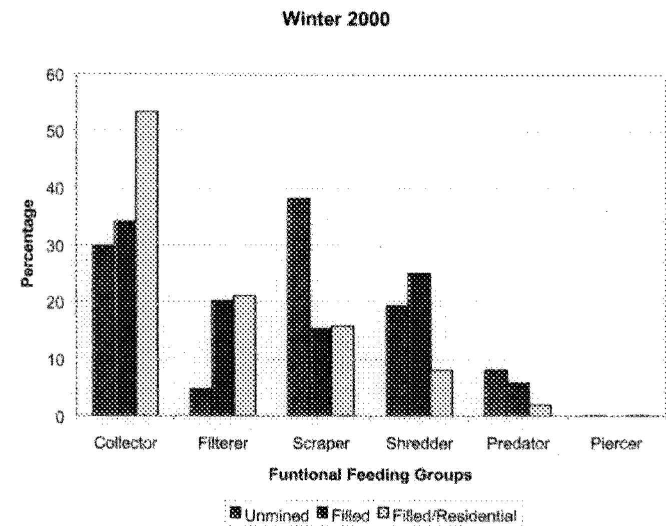


Figure 15. Functional feeding groups represented at the Unmined, Filled and Filled/residential sites from the Winter 2000 sampling event.



Figures 16 – 26. Box plots of the metrics for benthic macroinvertebrate communities at Unmined, Filled and Filled/Residential sites in the Mud River, Spruce Fork and Island Creek watersheds during the Spring 2000 sampling event.

Figure 16

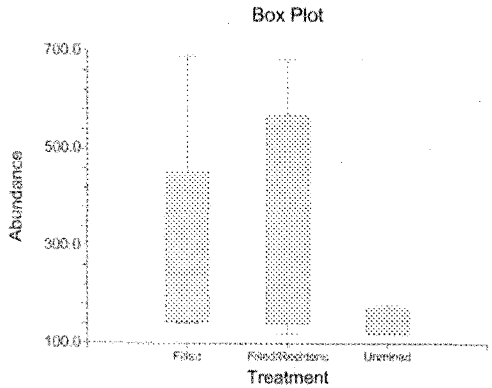


Figure 17

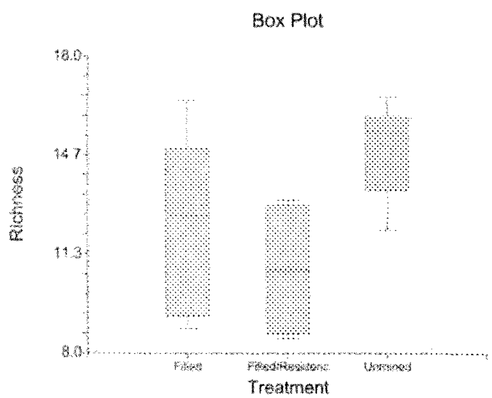


Figure 18

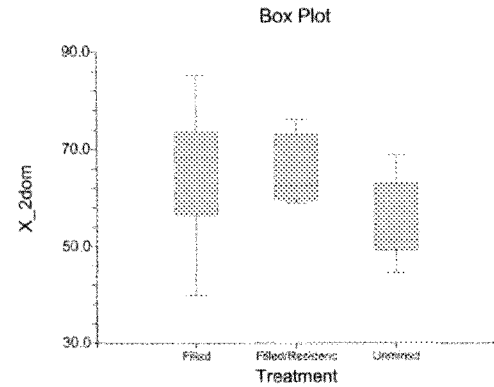


Figure 19

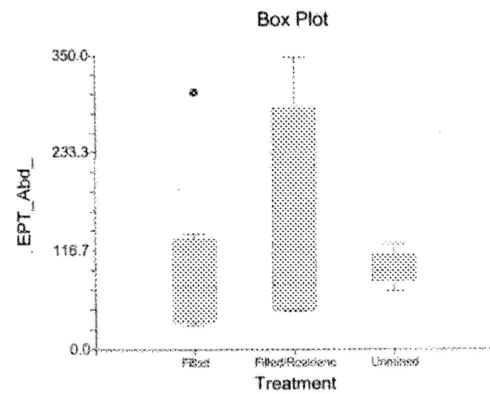


Figure 20

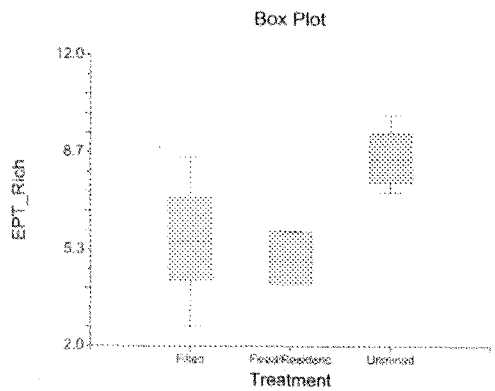


Figure 21

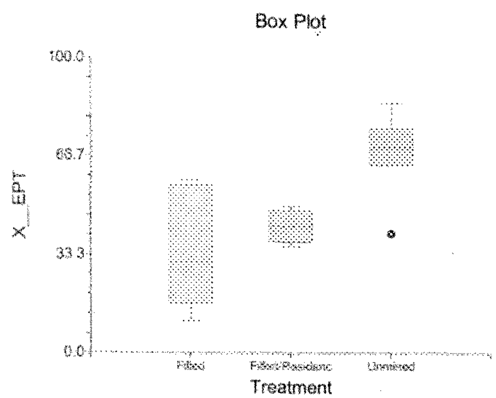


Figure 22

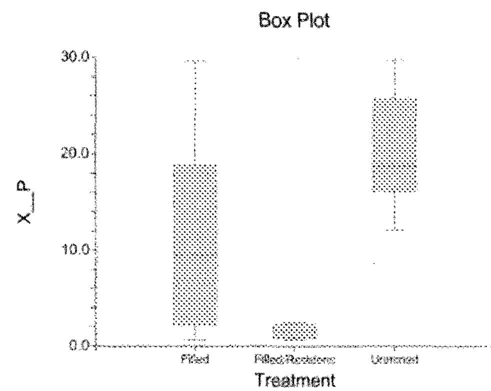


Figure 23

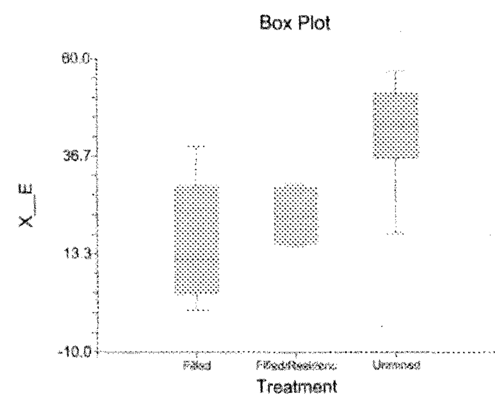


Figure 24

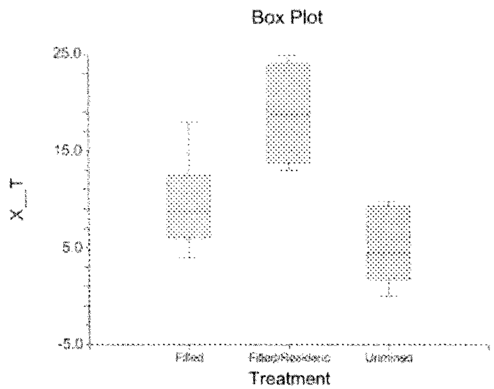


Figure 25

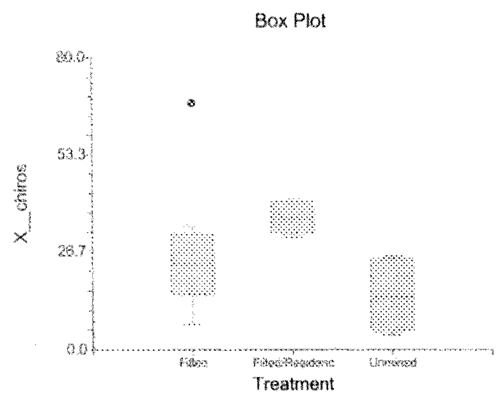


TABLE 1

TABLE 1

Monitoring Sites within the Mud River, Spruce Fork, and Island Creek Watersheds

	Station Code and Name	Station Description
Unmined	MT-02 Rushpatch Branch	A second order stream, is located approximately 500 feet upstream of confluence with the Mud River.
Unmined	MT-03 Lukey Fork	A second order stream, is located approximately one mile upstream of confluence with the Mud River.
Unmined	MT-13 Spring Branch of Ballard Fork	A first order stream, is located approximately 585 feet upstream of confluence with Ballard fork.
Filled	MT-14 Ballard Fork	A second order stream, is located approximately 900 feet upstream of confluence with Mud River.
Filled	MT-15 Stanley Fork	A third order stream, is located approximately 700 feet upstream of confluence with Mud River.
Filled	MT-18 Sugartree Branch	A second order stream, is located approximately 2000 feet upstream of confluence with Mud River.
Filled/ residential	MT-23 Mud River	A fourth order stream, is located approximately 1300 feet downstream of confluence with Connelly Branch.
Not included in assessment	MT-24 Stanley	This stream segment is a sediment control structure located in the Stanley Fork Drainage.
Filled	MT-25-B Rockhouse Branch	A second order stream, is located approximately 1.2 miles upstream of the confluence with Spruce Fork.
Filled	MT-32 Beech Creek	A third order stream, is located approximately 1.9 miles upstream of the confluence with Spruce Fork.
Filled	MT-34-B Left Fork of Beech Creek	A first order stream, is located approximately 900 feet upstream of confluence with Beech Creek.
Unmined	MT-39 White Oak Branch	A second order stream, is located approximately 2000 feet upstream of confluence with Spruce Fork.
Filled/ residential	MT-40 Spruce Fork	A fourth order stream, is located in Blair, directly upstream of confluence with White Trace Branch. Site is downstream of 9 valley fills, including 2 refuse fills.
Unmined	MT-42 Oldhouse Branch	A first order stream, is located approximately 2400 feet upstream of confluence with Spruce Fork.
Mined	MT-45 Pigeonroost Branch	A third order stream, is located approximately 4500 feet upstream of confluence with Spruce Fork.
Filled/ residential	MT-48 Spruce Fork	A fifth order stream, is located approximately 5100 feet downstream of confluence with Beech Creek.
Unmined	MT-50 Cabin Branch	A second order stream, is located approximately 650 feet upstream of confluence with Jack's Fork.
Unmined	MT-51 Cabin Branch	A second order stream, is located approximately 1800 feet upstream of confluence with Copperas Mine Fork.
Filled	MT-52 Cow Creek	A first order stream, is located approximately three miles upstream of confluence with Left Fork.
Filled/ residential	MT-55 Cow Creek	A third order stream, is located approximately 1000 feet downstream of confluence with Left Fork.
Filled	MT-57-B Hall Fork	A first order stream, is located approximately 3600 feet upstream of confluence with Left Fork.
Filled	MT-60 Left Fork	A second order stream, is located approximately 5000 feet upstream of the confluence with Cow Creek.

TABLE 2

TABLE 2

Benthic macroinvertebrate samples collected within the Mud River, Spruce Fork, and Island Creek Watersheds on the four sampling dates.

Station		Summer 1999	Fall 1999	Winter 2000	Spring 2000
MT-02	Unmined	NS	NS	S	S
MT-03	Unmined	NS	NS	S	S
MT-13	Unmined	NS	NS	S	S
MT-14	Filled	S	S	S	S
MT-15	Filled	S	S	S	S
MT-18	Filled	S	S	S	S
MT-23	Filled/ residential	S	S	S	S
MT-24	Sediment structure	NS	NS	NS	NS
MT-25-B	Filled	S	S	S	S
MT-32	Filled	S	S	S	S
MT-34-B	Filled	S	NS	NS	S
MT-39	Unmined	NS	NS	S	S
MT-40	Filled/ residential	S	S	S	S
MT-42	Unmined	S	NS	S	S
MT-45	Mined	S	S	S	S
MT-48	Filled/ residential	S	S	S	S
MT-50	Unmined	NS	NS	S	S
MT-51	Unmined	NS	NS*	S	S
MT-52	Filled	S	S	S	S
MT-55	Filled/ residential	S	S	S	S
MT-57-B	Filled	S	S	S	S
MT-60	Filled	S	S	S	S

S = Sampled
NS=Not Sampled

TABLE 3

TABLE 3

Benthic macroinvertebrate samples collected within the Mud River, Spruce Fork, and Island Creek Watersheds on the four sampling dates.

Metric	Description and response to stress
Total Abundance	The total number of individuals, or total abundance, characterizes the number of individuals present within the sample. This number should decrease in response to increasing perturbation (i.e., disturbance) in the stream ecosystem. However, certain individuals may increase in response to selected types of disturbance (e.g. filter feeding organisms in response to sewage pollution).
Taxa Richness	The total number of taxa, or taxa richness, characterizes the diversity of taxa present within the sample. The number of taxa should decrease in response to increasing perturbation in the stream ecosystem.
Hilsenhoff Biotic Index (HBI)	The HBI characterizes the tolerance/intolerance of the benthic macroinvertebrate community. The HBI weights each taxon in the sample by the proportion of individuals and the taxon's tolerance value. Tolerance values are assigned to each taxon on a scale of 0 to 10, with 0 identifying the least tolerant (most sensitive) organisms, and 10 identifying the most tolerant (least sensitive) organisms (USEPA 1999). The HBI is expected to increase in response to increased perturbation within the aquatic ecosystem.
Percent Two Dominant Taxa	The percent two dominant taxa metric characterizes the percentage of the two most abundant taxa in the sample. It is expected to increase in response to increased perturbation within the aquatic ecosystem.
Percent Chironomidae	The percent Chironomidae metric characterizes the percentage of midge taxa present in the sample. It is expected to increase in response to increased perturbation within the aquatic ecosystem.
EPT Richness	The total number of EPT taxa, EPT richness, characterizes the number of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa present in the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.

Metric	Description and response to stress
EPT Abundance	The number of EPT individuals, EPT abundance, characterizes the number of sensitive EPT taxa within the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.
Percent EPT Individuals	The percent EPT individuals characterizes the percent of sensitive EPT organisms present in the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.
Percent Ephemeroptera	The percent Ephemeroptera characterizes the percent of mayflies present in the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.
Percent Plecoptera	The percent Plecoptera characterizes the percent of stoneflies present in the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.
Percent Trichoptera	The percent Trichoptera characterizes the percent of caddisflies present in the sample. It is expected to decrease in response to increased perturbation within the aquatic ecosystem.

TABLE 4a

Table 4. Summary of benthic macroinvertebrate analysis from samples collected in the Summer of 1999.

4.a. Mud River - Summer 1999				
	MT-14	MT-15	MT-18	MT-23
	Filled	Filled	Filled	Filled/Resid
Number (Abundance)				
Avg	60.33	23.17	71.50	173.67
SD	59.59	12.70	58.58	114.85
Max	146.00	47.00	172.00	348.00
Min	8.00	12.00	17.00	17.00
Taxa (Richness)				
Avg	7.67	5.00	8.00	10.50
SD	2.34	1.26	1.67	2.88
Max	11.00	6.00	11.00	14.00
Min	5.00	3.00	6.00	6.00
Percent 2 Dominant Taxa				
Avg	70.67	77.50	65.00	74.47
SD	7.04	13.38	17.15	8.65
Max	81.51	95.00	86.63	90.52
Min	62.50	58.33	45.28	65.70
EPT Abundance				
Avg	34.67	15.50	51.83	23.17
SD	40.25	10.80	57.11	14.23
Max	100.00	31.00	149.00	42.00
Min	1.00	1.00	4.00	1.00
EPT Richness				
Avg	2.33	1.50	2.00	3.17
SD	1.51	0.55	0.00	1.33
Max	5.00	2.00	2.00	5.00
Min	1.00	1.00	2.00	1.00
Percent EPT				
Avg	45.10	60.93	56.25	14.56
SD	20.72	29.61	26.29	9.49
Max	68.49	87.50	86.63	29.00
Min	12.50	8.33	23.53	5.88
Percent Plecoptera				
Avg	1.67	0.00	0.00	0.00
SD	2.02	0.00	0.00	0.00
Max	4.76	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00
Percent Ephemeroptera				
Avg	0.00	0.00	0.00	0.00
SD	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00
Percent Trichoptera				
Avg	43.43	60.93	56.25	14.56
SD	20.82	29.61	26.29	9.49
Max	66.44	87.50	86.63	29.00
Min	12.50	8.33	23.53	5.88
Percent Chironomidae				
Avg	5.52	2.78	13.99	11.77
SD	5.48	6.80	10.04	6.40
Max	14.29	16.67	26.92	19.68
Min	0.00	0.00	3.49	2.59
HBI				
Avg	5.04	4.67	5.43	4.51
SD	0.32	0.38	1.02	0.31
Max	5.50	4.91	6.76	4.95
Min	4.52	3.92	4.32	4.14

TABLE 4b

4.b. Spruce Fork - Summer 1999						
	MT- 25B	MT-32	MT-34B	MT-40	MT-42	MT-48
	Filled	Filled	Filled	Filled/Resid	Unmined	Filled/Resid
Number (Abundance)						
Avg	286.17	564.50	21.33	398.33	83.83	378.17
SD	115.77	316.95	4.72	174.64	14.19	72.13
Max	496.00	1146.00	28.00	534.00	102.00	457.00
Min	164.00	230.00	14.00	103.00	65.00	288.00
Taxa (Richness)						
Avg	11.00	13.67	5.83	11.33	15.67	16.00
SD	2.28	3.44	1.47	2.07	2.80	3.58
Max	13.00	20.00	8.00	14.00	21.00	20.00
Min	8.00	11.00	4.00	9.00	13.00	11.00
Percent 2 Dominant Taxa						
Avg	78.41	86.34	75.78	74.21	40.66	76.67
SD	6.42	3.26	10.67	10.20	5.28	9.48
Max	90.32	90.84	89.47	89.29	50.53	89.02
Min	73.15	83.44	61.90	63.30	35.38	67.83
EPT Abundance						
Avg	177.83	31.83	2.83	213.67	33.17	86.17
SD	116.73	11.82	3.25	88.30	10.72	65.80
Max	402.00	49.00	9.00	322.00	49.00	209.00
Min	69.00	17.00	0.00	56.00	22.00	14.00
EPT Richness						
Avg	3.00	3.17	1.17	4.67	6.00	4.67
SD	0.89	1.94	0.75	1.21	1.79	1.21
Max	4.00	6.00	2.00	6.00	9.00	6.00
Min	2.00	1.00	0.00	3.00	4.00	3.00
Percent EPT						
Avg	58.16	6.14	14.33	56.36	40.00	22.34
SD	13.54	1.48	17.12	17.08	11.97	13.88
Max	81.05	8.22	47.37	85.71	56.98	45.73
Min	42.07	4.28	0.00	37.40	23.16	3.41
Percent Plecoptera						
Avg	0.20	0.03	0.60	0.00	22.32	0.00
SD	0.50	0.08	1.46	0.00	8.17	0.00
Max	1.22	0.20	3.57	0.00	29.23	0.00
Min	0.00	0.00	0.00	0.00	7.37	0.00
Percent Ephemeroptera						
Avg	0.15	0.37	0.00	7.65	9.92	1.06
SD	0.37	0.44	0.00	4.68	4.19	0.98
Max	0.92	1.07	0.00	15.53	15.79	2.63
Min	0.00	0.00	0.00	2.86	3.08	0.00
Percent Trichoptera						
Avg	57.81	5.74	13.74	48.71	7.76	21.28
SD	13.83	1.67	17.62	19.98	5.94	13.22
Max	81.05	8.22	47.37	82.86	16.28	43.11
Min	40.85	4.10	0.00	29.07	0.00	2.93
Percent Chironomidae						
Avg	14.82	2.72	0.79	26.17	18.15	5.28
SD	10.60	0.60	1.94	11.57	14.60	3.25
Max	27.56	3.47	4.76	36.89	40.00	8.57
Min	0.60	1.83	0.00	6.43	3.08	0.98
HBI						
Avg	5.73	4.32	7.70	5.21	3.89	4.49
SD	0.21	0.18	0.83	0.12	0.66	0.15
Max	6.08	4.58	8.92	5.40	5.05	4.72
Min	5.49	4.14	6.75	5.10	3.23	4.29

TABLE 4c

4.c. Island Creek - Summer 1999				
	MT-52	MT-55	MT-57B	MT-60
	Filled	Filled/Resid	Filled	Filled
Number (Abundance)				
Avg	99.00	528.17	64.67	110.50
SD	61.08	158.17	72.01	44.23
Max	214.00	745.00	195.00	191.00
Min	36.00	313.00	1.00	67.00
Taxa (Richness)				
Avg	11.67	15.17	10.17	15.50
SD	2.80	2.86	7.63	1.87
Max	17.00	19.00	20.00	17.00
Min	9.00	11.00	1.00	12.00
Percent 2 Dominant Taxa				
Avg	63.60	74.36	68.29	57.32
SD	9.13	6.01	17.25	12.15
Max	74.70	81.56	100.00	71.43
Min	47.22	67.59	54.46	38.96
EPT Abundance				
Avg	53.50	211.33	29.33	60.00
SD	29.49	83.97	36.49	25.26
Max	104.00	301.00	89.00	92.00
Min	19.00	100.00	1.00	30.00
EPT Richness				
Avg	4.33	4.67	3.00	6.50
SD	0.82	1.03	2.45	1.22
Max	5.00	6.00	7.00	8.00
Min	3.00	3.00	1.00	5.00
Percent EPT				
Avg	54.82	39.00	48.63	53.85
SD	5.66	6.43	30.49	10.33
Max	62.86	47.78	100.00	68.07
Min	48.60	31.95	9.09	38.96
Percent Plecoptera				
Avg	9.96	0.23	1.00	8.72
SD	5.83	0.09	1.67	6.32
Max	19.44	0.32	3.96	19.48
Min	3.33	0.13	0.00	2.09
Percent Ephemeroptera				
Avg	0.16	1.51	0.00	2.17
SD	0.38	0.52	0.00	1.28
Max	0.93	1.92	0.00	4.48
Min	0.00	0.52	0.00	0.88
Percent Trichoptera				
Avg	44.71	37.29	47.63	42.96
SD	10.24	6.32	30.30	13.99
Max	56.19	46.03	100.00	59.66
Min	33.33	29.71	9.09	18.18
Percent Chironomidae				
Avg	1.81	11.78	8.67	5.89
SD	0.66	2.80	4.27	3.26
Max	2.78	15.74	15.15	11.69
Min	1.11	7.67	3.85	2.08
HBI				
Avg	4.24	5.02	4.39	4.66
SD	0.34	0.27	0.39	0.16
Max	4.67	5.33	5.00	4.84
Min	3.77	4.66	3.91	4.47

TABLE 5a

Table 5. Summary of benthic macroinvertebrate analysis from samples collected in the Fall of 1999.

5.a. Mud River - Fall 1999				
	MT-14	MT-15	MT-18	MT-23
	Filled	Filled	Filled	Filled/Resid
Number (Abundance)				
Avg	503.50	79.50	130.17	155.00
SD	304.43	25.89	58.51	84.19
Max	1065.00	115.00	218.00	279.00
Min	239.00	43.00	66.00	65.00
Taxa (Richness)				
Avg	8.50	8.83	10.33	10.00
SD	1.52	1.72	1.86	2.10
Max	10.00	11.00	12.00	14.00
Min	6.00	7.00	7.00	8.00
Percent 2 Dominant Taxa				
Avg	92.83	60.81	56.04	60.11
SD	3.72	10.04	6.80	10.72
Max	98.03	72.55	65.31	72.55
Min	87.65	48.10	49.04	40.91
EPT Abundance				
Avg	481.67	48.67	65.17	90.17
SD	305.03	20.03	49.45	63.08
Max	1046.00	73.00	144.00	165.00
Min	220.00	16.00	15.00	28.00
EPT Richness				
Avg	3.00	3.67	3.17	4.00
SD	0.63	1.03	0.41	1.10
Max	4.00	5.00	4.00	6.00
Min	2.00	2.00	3.00	3.00
Percent EPT				
Avg	94.45	59.76	45.81	53.78
SD	2.97	14.89	19.56	16.80
Max	98.22	79.45	66.06	75.00
Min	0.00	0.00	0.00	0.00
Percent Plecoptera				
Avg	91.48	24.96	14.60	11.97
SD	2.44	12.84	9.09	4.53
Max	94.93	43.14	25.69	17.05
Min	87.65	6.98	2.04	3.92
Percent Ephemeroptera				
Avg	0.00	0.00	0.00	0.00
SD	0.00	0.00	0.00	0.00
Max	0.00	0.00	0.00	0.00
Min	0.00	0.00	0.00	0.00
Percent Trichoptera				
Avg	2.97	34.80	31.20	41.81
SD	1.39	12.06	11.78	15.15
Max	5.01	53.42	43.94	62.73
Min	1.21	16.67	13.27	23.53
Percent Chironomidae				
Avg	0.59	12.19	34.15	11.60
SD	0.46	11.64	15.84	3.78
Max	1.26	34.88	56.12	16.13
Min	0.00	3.48	17.89	6.36
HBI				
Avg	1.37	4.66	4.69	4.40
SD	0.13	0.86	0.75	0.32
Max	1.60	5.70	5.81	4.83
Min	1.19	3.57	3.67	3.91

TABLE 5b

5.b. Spruce Fork - Fall 1999					
	MT-25B	MT-32	MT-40	MT-45	MT-48
	Filled	Filled	Filled/Resid	Filled/Resid	Filled/Resid
Number (Abundance)					
Avg	138.67	1141.50	574.17	135.00	706.50
SD	36.79	795.27	316.66	72.09	451.44
Max	185.00	2707.00	1146.00	233.00	1530.00
Min	82.00	528.00	229.00	41.00	294.00
Taxa (Richness)					
Avg	10.33	11.67	10.50	14.17	15.83
SD	1.97	2.50	2.59	2.32	4.31
Max	14.00	15.00	15.00	17.00	21.00
Min	9.00	8.00	8.00	11.00	10.00
Percent 2 Dominant Taxa					
Avg	61.16	66.64	79.77	46.04	64.00
SD	4.58	3.31	7.19	12.86	10.24
Max	65.93	70.61	90.84	67.80	75.17
Min	53.66	63.17	69.20	29.89	48.30
EPT Abundance					
Avg	89.17	416.33	408.00	94.17	233.17
SD	27.84	519.62	295.90	62.09	231.51
Max	132.00	1443.00	982.00	172.00	671.00
Min	55.00	25.00	198.00	24.00	34.00
EPT Richness					
Avg	5.33	3.67	3.83	6.83	6.67
SD	1.21	1.63	1.17	1.60	2.16
Max	7.00	5.00	6.00	9.00	10.00
Min	4.00	1.00	3.00	5.00	4.00
Percent EPT					
Avg	64.42	28.81	68.98	65.55	27.52
SD	10.47	17.64	14.56	12.43	11.73
Max	77.86	53.31	86.46	80.49	43.86
Min	50.00	4.73	52.46	45.98	10.18
Percent Plecoptera					
Avg	27.62	10.30	0.59	30.94	7.57
SD	6.93	7.04	1.22	18.46	7.33
Max	37.80	20.17	3.06	56.10	18.30
Min	19.08	0.00	0.00	10.34	0.00
Percent Ephemeroptera					
Avg	0.36	0.23	6.14	13.15	4.63
SD	0.64	0.37	4.19	7.37	2.32
Max	1.59	0.85	13.54	25.29	8.15
Min	0.00	0.00	1.83	5.85	2.40
Percent Trichoptera					
Avg	36.44	18.28	62.25	21.47	15.32
SD	10.34	13.83	14.00	7.05	7.13
Max	49.73	33.14	83.86	31.71	21.70
Min	21.43	0.98	46.67	10.34	5.10
Percent Chironomidae					
Avg	25.27	9.22	14.62	6.85	24.03
SD	8.47	8.22	12.29	5.42	10.16
Max	40.48	19.59	33.10	17.07	36.73
Min	16.76	0.00	0.00	1.46	7.65
HBI					
Avg	4.50	4.48	4.97	3.47	4.56
SD	0.48	0.55	0.20	0.66	0.30
Max	5.32	5.55	5.10	4.49	4.92
Min	3.98	4.01	4.58	2.63	4.18

TABLE 5c

5.c. Island Creek - Fall 1999				
	MT-52	MT-55	MT-57B	MT-60
	Filled	Filled/Resid	Filled	Filled
Number (Abundance)				
Avg	328.17	254.83	195.67	139.83
SD	141.60	128.07	128.21	86.30
Max	446.00	403.00	330.00	286.00
Min	110.00	103.00	21.00	57.00
Taxa (Richness)				
Avg	13.17	9.67	12.17	11.50
SD	3.13	1.86	2.56	1.05
Max	19.00	13.00	15.00	13.00
Min	10.00	8.00	9.00	10.00
Percent 2 Dominant Taxa				
Avg	76.20	79.48	75.66	60.78
SD	8.43	8.41	12.17	8.52
Max	88.86	91.26	85.62	73.68
Min	65.50	65.38	57.14	52.31
EPT Abundance				
Avg	249.67	129.83	165.17	94.67
SD	160.59	114.58	113.87	63.02
Max	399.00	274.00	291.00	201.00
Min	17.00	5.00	10.00	38.00
EPT Richness				
Avg	5.67	2.67	5.17	5.83
SD	1.63	1.37	1.47	1.17
Max	8.00	5.00	7.00	7.00
Min	4.00	1.00	3.00	4.00
Percent EPT				
Avg	65.73	40.55	77.64	66.68
SD	29.75	27.12	15.97	9.56
Max	92.58	70.26	89.58	75.44
Min	15.45	4.85	47.62	51.79
Percent Plecoptera				
Avg	50.93	0.93	66.42	21.48
SD	26.55	0.85	18.75	9.46
Max	82.60	2.20	83.40	37.76
Min	5.45	0.00	42.05	10.53
Percent Ephemeroptera				
Avg	0.76	0.94	0.79	1.08
SD	1.15	1.15	1.94	1.39
Max	2.73	2.75	4.76	3.57
Min	0.00	0.00	0.00	0.00
Percent Trichoptera				
Avg	14.04	38.69	10.43	44.13
SD	9.29	28.03	10.76	12.78
Max	31.61	69.23	30.68	63.16
Min	6.50	2.91	0.00	32.17
Percent Chironomidae				
Avg	3.19	31.35	8.15	8.64
SD	2.62	20.51	5.85	6.63
Max	7.27	60.19	19.05	16.96
Min	0.00	8.28	2.32	0.35
HBI				
Avg	2.59	5.18	2.25	4.07
SD	0.88	0.16	0.62	0.46
Max	4.11	5.43	3.14	4.67
Min	1.56	4.99	1.76	3.39

TABLE 6a

Table 6. Summary of benthic macroinvertebrate analysis from samples collected in the Winter of 2000.

6.a. Mud River - Winter 2000							
	MT-2	MT-3	MT-13	MT-14	MT-15	MT-18	MT-23
	Unmined	Unmined	Unmined	Filled	Filled	Filled	Filled/Resid
Number (Abundance)							
Avg	98.00	49.17	102.67	14.67	52.50	299.83	175.17
SD	26.99	31.83	68.35	6.12	13.37	144.26	56.99
Max	132.00	95.00	171.00	23.00	70.00	537.00	266.00
Min	62.00	11.00	16.00	7.00	33.00	144.00	117.00
Taxa (Richness)							
Avg	18.17	10.50	13.17	6.00	6.33	8.50	8.50
SD	3.25	4.51	5.12	2.00	1.75	1.76	2.07
Max	23.00	19.00	21.00	9.00	9.00	11.00	12.00
Min	13.00	6.00	6.00	4.00	5.00	6.00	6.00
Percent 2 Dominant Taxa							
Avg	44.18	55.60	63.26	62.21	76.00	82.57	67.96
SD	7.14	7.65	15.34	14.66	11.36	11.77	8.67
Max	52.87	64.56	77.78	81.82	86.44	93.75	82.93
Min	31.40	44.83	39.18	43.48	60.61	64.16	61.54
EPT Abundance							
Avg	58.50	38.67	79.50	9.67	12.67	29.50	49.50
SD	15.11	29.76	44.85	6.15	7.58	23.73	19.45
Max	74.00	79.00	145.00	19.00	25.00	76.00	87.00
Min	35.00	7.00	13.00	3.00	6.00	11.00	31.00
EPT Richness							
Avg	11.33	5.67	8.00	3.83	3.67	2.17	3.50
SD	2.25	2.50	2.19	1.94	1.21	0.41	0.55
Max	15.00	10.00	11.00	7.00	5.00	3.00	4.00
Min	9.00	3.00	5.00	2.00	2.00	2.00	3.00
Percent EPT							
Avg	60.52	73.93	79.16	64.03	23.50	12.13	28.92
SD	11.28	13.37	11.64	22.59	9.97	11.44	7.89
Max	75.86	92.41	90.28	82.61	35.71	33.63	39.37
Min	48.39	56.52	64.49	23.08	13.56	3.44	16.92
Percent Plecoptera							
Avg	31.92	23.83	10.01	58.13	8.71	0.04	7.65
SD	12.74	18.17	8.82	23.36	3.87	0.10	2.01
Max	51.72	54.55	23.39	81.82	13.11	0.25	10.07
Min	21.51	4.35	1.87	15.38	4.17	0.00	4.27
Percent Ephemeroptera							
Avg	19.29	38.67	58.63	0.72	0.00	0.00	0.00
SD	5.15	17.49	19.86	1.77	0.00	0.00	0.00
Max	28.03	60.76	78.53	4.35	0.00	0.00	0.00
Min	12.64	9.09	32.16	0.00	0.00	0.00	0.00
Percent Trichoptera							
Avg	9.32	11.42	10.52	5.18	14.80	12.08	21.27
SD	3.63	9.02	5.58	5.36	7.05	11.48	8.24
Max	14.06	22.78	20.56	14.29	22.86	33.63	31.22
Min	5.30	0.00	4.29	0.00	5.08	3.19	7.89
Percent Chironomidae							
Avg	22.47	9.49	5.84	15.43	19.13	61.75	47.08
SD	7.97	7.73	5.13	16.02	8.89	19.27	8.56
Max	30.47	23.91	14.02	38.46	31.82	80.10	60.98
Min	9.30	3.45	0.00	0.00	6.56	30.53	36.75
HBI							
Avg	3.36	2.67	2.30	3.07	5.45	5.77	5.22
SD	0.58	1.20	1.05	0.84	0.27	0.22	0.25
Max	3.84	4.55	4.07	4.46	5.73	5.93	5.43
Min	2.47	1.52	1.27	2.29	5.01	5.33	4.77

TABLE 6b

6.b. Spruce Fork - Winter 2000						
	MT-25B	MT-32	MT-39	MT-40	MT-42	MT-48
	Filled	Filled	Unmined	Filled/Resid	Unmined	Filled/Resid
Number (Abundance)						
Avg	213.83	825.67	143.50	444.33	125.17	784.00
SD	109.54	303.36	36.05	300.66	28.74	427.05
Max	357.00	1225.00	172.00	960.00	162.00	1448.00
Min	75.00	553.00	75.00	191.00	79.00	445.00
Taxa (Richness)						
Avg	11.33	11.33	13.83	10.83	20.17	14.83
SD	2.80	1.03	1.94	1.17	2.56	3.19
Max	15.00	13.00	16.00	13.00	23.00	19.00
Min	8.00	10.00	11.00	10.00	17.00	11.00
Percent 2 Dominant Taxa						
Avg	75.55	64.92	47.10	69.92	33.01	68.65
SD	11.68	5.67	6.83	3.28	6.33	8.35
Max	88.89	72.57	58.23	75.73	44.30	82.29
Min	58.82	57.73	38.67	67.54	24.86	58.65
EPT Abundance						
Avg	95.67	218.67	68.00	99.83	84.67	80.67
SD	48.81	76.28	15.68	98.57	22.13	60.83
Max	149.00	351.00	84.00	248.00	107.00	202.00
Min	30.00	139.00	47.00	15.00	50.00	34.00
EPT Richness						
Avg	7.67	3.83	7.50	3.50	11.50	4.67
SD	1.86	0.98	1.05	0.84	1.64	1.03
Max	10.00	5.00	9.00	5.00	13.00	6.00
Min	5.00	3.00	6.00	3.00	9.00	3.00
Percent EPT						
Avg	44.94	27.94	49.13	18.70	67.24	10.39
SD	8.30	7.99	11.37	9.48	5.17	3.68
Max	56.00	36.77	62.67	31.42	75.20	13.95
Min	31.58	14.53	30.30	5.95	62.16	4.43
Percent Plecoptera						
Avg	33.22	21.35	11.00	0.22	16.69	4.36
SD	10.84	6.22	7.99	0.24	5.25	1.88
Max	44.40	29.48	25.56	0.48	23.97	6.68
Min	20.00	13.47	3.80	0.00	9.88	2.17
Percent Ephemeroptera						
Avg	1.64	0.02	16.89	2.29	29.69	0.45
SD	1.59	0.04	11.79	1.03	6.72	0.37
Max	4.00	0.10	34.67	3.96	40.61	1.18
Min	0.00	0.00	3.64	1.57	22.60	0.17
Percent Trichoptera						
Avg	10.08	6.57	21.24	16.19	20.86	5.58
SD	6.64	4.06	6.90	9.11	6.68	3.35
Max	21.01	10.94	29.75	29.67	26.56	9.60
Min	2.59	1.06	13.92	3.97	10.13	2.09
Percent Chironomidae						
Avg	50.41	18.92	25.68	49.72	12.29	46.73
SD	8.44	11.88	6.40	7.11	2.58	8.94
Max	64.21	31.79	32.12	56.59	16.67	56.89
Min	42.67	3.44	18.05	38.28	10.13	31.24
HBI						
Avg	4.56	4.14	4.47	5.41	3.65	5.22
SD	0.46	0.28	0.24	0.31	0.43	0.34
Max	5.28	4.40	4.66	5.82	4.04	5.44
Min	4.13	3.72	4.05	5.07	2.84	4.55

TABLE 6c

TABLE 7a

6.c. Island Creek - Winter 2000						
	MT-50	MT-51	MT-52	MT-55	MT-57B	MT-60
	Unmined	Unmined	Filled	Filled/Resid	Filled	Filled
Number (Abundance)						
Avg	106.80	80.17	127.33	469.17	81.00	259.67
SD	62.53	36.67	46.42	228.79	32.30	81.36
Max	174.00	145.00	189.00	754.00	133.00	402.00
Min	45.00	40.00	75.00	213.00	40.00	156.00
Taxa (Richness)						
Avg	14.80	10.83	13.50	9.50	11.17	16.83
SD	1.64	4.45	1.52	2.07	2.48	2.32
Max	17.00	19.00	15.00	12.00	16.00	20.00
Min	13.00	6.00	11.00	7.00	9.00	14.00
Percent 2 Dominant Taxa						
Avg	43.17	65.32	56.30	84.77	67.15	50.01
SD	4.21	21.02	10.40	4.74	13.67	9.24
Max	47.42	83.02	74.51	92.88	85.29	61.54
Min	37.28	32.41	44.00	79.71	52.50	34.27
EPT Abundance						
Avg	81.60	67.67	94.17	126.17	29.67	208.33
SD	53.23	28.25	36.30	161.62	7.61	72.17
Max	139.00	115.00	147.00	421.00	39.00	332.00
Min	31.00	33.00	50.00	24.00	20.00	128.00
EPT Richness						
Avg	9.20	7.00	7.50	3.33	7.00	10.50
SD	1.30	2.68	1.05	1.37	1.55	1.87
Max	11.00	12.00	9.00	5.00	9.00	13.00
Min	8.00	4.00	6.00	2.00	5.00	8.00
Percent EPT						
Avg	73.62	85.24	73.89	20.97	39.65	79.89
SD	7.07	3.95	7.89	19.01	12.03	7.07
Max	80.47	90.57	85.23	55.84	51.32	87.24
Min	63.27	79.31	63.31	5.62	26.32	69.76
Percent Plecoptera						
Avg	17.58	19.46	44.58	0.22	24.63	23.19
SD	11.48	12.01	12.66	0.37	6.67	10.81
Max	33.73	35.44	60.78	0.94	31.58	39.09
Min	5.15	6.59	29.55	0.00	14.93	7.52
Percent Ephemeroptera						
Avg	30.48	14.23	14.12	1.45	4.34	10.94
SD	11.39	12.11	10.19	0.89	2.87	3.51
Max	46.55	33.79	32.95	2.56	7.89	16.46
Min	15.56	2.74	5.88	0.42	1.47	7.21
Percent Trichoptera						
Avg	25.56	51.56	15.18	19.29	10.68	45.77
SD	10.33	24.29	5.88	19.66	6.08	8.08
Max	37.11	75.34	22.73	55.04	19.12	53.98
Min	11.83	22.76	8.82	4.12	3.76	31.69
Percent Chironomidae						
Avg	8.31	5.26	12.02	57.27	51.69	10.90
SD	2.83	3.28	4.38	17.34	16.63	3.05
Max	12.07	11.72	17.99	71.62	68.63	16.94
Min	4.12	2.50	5.82	24.67	34.21	8.23
HBI						
Avg	3.46	3.86	3.13	5.37	4.32	3.48
SD	0.21	1.19	0.48	0.22	0.56	0.17
Max	3.71	5.55	3.92	5.70	4.91	3.68
Min	3.20	2.65	2.45	5.03	3.71	3.28

Table 7. Summary of benthic macroinvertebrate analysis from samples collected in the Spring of 2000.

7.a. Mud River - Spring 2000							
	MT-2	MT-3	MT-13	MT-14	MT-15	MT-18	MT-23
	Unmined	Unmined	Unmined	Filled	Filled	Filled	Filled/Resid
Number (Abundance)							
Avg	172.00	149.50	178.17	146.00	315.50	141.33	119.17
SD	75.70	31.83	122.82	85.74	179.10	36.10	53.21
Max	308.00	196.00	414.00	252.00	655.00	203.00	212.00
Min	76.00	97.00	82.00	61.00	162.00	106.00	67.00
Taxa (Richness)							
Avg	16.67	15.50	14.83	12.67	9.00	9.50	8.50
SD	3.44	1.97	3.54	2.25	2.00	1.38	2.43
Max	21.00	18.00	20.00	16.00	12.00	11.00	13.00
Min	12.00	14.00	10.00	11.00	6.00	7.00	6.00
% 2 Dominant Taxa							
Avg	52.62	44.66	62.99	74.68	85.29	71.76	63.95
SD	11.68	7.92	7.90	3.53	10.99	7.45	15.17
Max	66.26	55.48	76.81	79.37	94.50	77.31	89.62
Min	34.21	35.14	53.17	70.89	67.28	57.05	49.18
EPT Abundance							
Avg	68.50	103.00	94.50	28.33	33.17	43.17	44.17
SD	30.98	15.91	23.31	18.57	20.15	15.64	11.77
Max	105.00	120.00	123.00	56.00	64.00	69.00	64.00
Min	28.00	74.00	65.00	7.00	6.00	28.00	31.00
EPT Richness							
Avg	7.67	8.67	8.50	5.67	4.33	4.33	4.17
SD	2.42	1.37	1.87	1.75	1.51	0.82	1.17
Max	11.00	10.00	11.00	7.00	6.00	5.00	6.00
Min	4.00	7.00	6.00	3.00	2.00	3.00	3.00
Percent EPT							
Avg	40.40	69.78	63.62	18.83	14.73	31.37	42.06
SD	11.62	6.12	19.00	4.45	14.21	11.67	17.07
Max	61.90	76.35	85.37	24.05	39.51	48.11	67.65
Min	28.16	61.22	29.71	11.48	2.02	21.48	19.81
Percent Plecoptera							
Avg	18.95	25.78	25.61	11.62	2.22	2.13	1.90
SD	12.65	6.55	19.55	3.04	4.38	2.10	1.37
Max	37.50	35.14	64.63	15.19	11.11	6.09	4.41
Min	1.23	17.12	12.32	6.56	0.00	0.00	0.76
Percent Ephemeroptera							
Avg	18.36	44.00	36.30	1.96	5.65	16.60	15.27
SD	11.96	8.56	15.15	2.38	6.71	9.39	15.87
Max	41.72	56.70	51.60	6.35	14.92	29.25	39.71
Min	8.33	32.65	16.18	0.00	0.00	5.04	0.47
Percent Trichoptera							
Avg	3.09	0.00	1.72	5.25	6.87	12.63	24.89
SD	6.39	0.00	0.97	1.56	7.43	7.99	4.97
Max	16.07	0.00	3.30	7.35	21.60	21.01	31.06
Min	0.00	0.00	0.60	2.78	1.90	0.67	17.92
Percent Chironomidae							
Avg	24.81	20.71	25.37	67.56	29.77	17.31	37.83
SD	6.81	6.25	22.47	4.27	29.13	16.25	18.89
Max	30.36	29.59	64.25	73.77	69.01	42.45	73.11
Min	13.16	14.09	0.00	63.29	0.00	4.70	23.53
HBI							
Avg	3.73	3.62	3.63	5.28	5.70	5.19	4.96
SD	0.40	0.32	1.02	0.20	0.28	0.51	0.46
Max	4.42	4.01	4.99	5.63	5.99	5.64	5.67
Min	3.20	3.25	1.99	5.05	5.24	4.28	4.51

TABLE 7b

7.b. Spruce Fork - Spring 2000							
	MT-25B	MT-32	MT-34B	MT-39	MT-40	MT-42	MT-48
	Filled	Filled	Filled	Unmined	Filled/Resid	Unmined	Filled/Resid
Number (Abundance)							
Avg	690.83	594.00	306.00	135.17	229.67	169.67	206.00
SD	558.80	334.28	218.19	43.92	124.02	72.23	152.19
Max	1626.00	876.00	619.00	187.00	375.00	279.00	490.00
Min	154.00	132.00	87.00	75.00	68.00	64.00	80.00
Taxa (Richness)							
Avg	13.83	11.33	8.83	12.17	9.17	16.00	12.50
SD	2.93	3.08	1.33	5.60	2.64	5.18	4.23
Max	18.00	16.00	10.00	20.00	13.00	22.00	20.00
Min	9.00	8.00	7.00	6.00	6.00	8.00	9.00
Percent 2 Dominant Taxa							
Avg	68.48	56.24	72.63	69.07	61.51	49.41	59.05
SD	5.74	9.01	6.16	12.46	4.56	12.01	15.77
Max	78.60	69.61	80.39	81.33	66.19	68.75	76.12
Min	62.91	45.85	62.07	53.11	53.60	36.36	40.69
EPT Abundance							
Avg	305.83	98.83	31.33	111.33	104.33	124.67	50.50
SD	171.46	43.64	22.66	26.56	63.01	47.93	23.55
Max	570.00	170.00	66.00	137.00	187.00	206.00	96.00
Min	119.00	50.00	4.00	68.00	33.00	62.00	27.00
EPT Richness							
Avg	6.50	4.17	2.67	7.33	4.17	10.00	5.83
SD	1.22	1.47	0.82	2.50	1.60	2.68	2.23
Max	8.00	6.00	4.00	10.00	7.00	13.00	8.00
Min	5.00	2.00	2.00	4.00	2.00	7.00	2.00
Percent EPT							
Avg	58.68	22.31	10.77	84.82	44.50	76.18	36.25
SD	22.34	12.55	6.37	11.22	9.51	10.73	24.97
Max	77.27	37.88	22.54	94.06	53.58	96.88	66.21
Min	16.61	9.47	3.92	65.24	27.50	66.99	9.80
Percent Plecoptera							
Avg	9.66	2.39	0.66	18.07	1.49	29.83	2.51
SD	4.48	3.57	0.62	5.01	1.39	6.62	2.83
Max	16.23	7.80	1.45	23.53	3.20	38.07	6.21
Min	3.32	0.00	0.00	9.33	0.00	18.83	0.00
Percent Ephemeroptera							
Avg	37.19	7.46	0.00	57.03	29.96	37.03	17.51
SD	20.91	7.55	0.00	13.55	11.12	13.59	12.35
Max	57.52	20.49	0.00	73.33	40.51	59.38	31.25
Min	0.06	1.06	0.00	35.29	13.33	19.62	4.49
Percent Trichoptera							
Avg	11.82	12.46	8.88	9.73	13.05	9.32	16.22
SD	5.96	6.26	4.00	3.93	7.64	5.58	12.22
Max	19.88	20.71	15.03	16.00	27.94	19.62	37.24
Min	5.19	5.82	3.92	5.66	7.30	3.13	4.56
Percent Chironomidae							
Avg	20.92	27.36	33.67	4.02	30.60	4.98	34.44
SD	9.14	15.22	9.89	2.24	10.96	3.53	23.42
Max	31.70	47.70	43.14	6.78	51.67	8.61	64.90
Min	9.16	9.85	16.64	0.00	22.40	0.00	7.59
HBI							
Avg	4.85	5.13	6.45	3.07	5.56	3.04	4.90
SD	0.68	0.50	0.55	0.11	0.20	0.31	0.59
Max	5.91	5.52	7.39	3.21	5.87	3.48	5.53
Min	3.85	4.41	5.81	2.89	5.31	2.74	3.86

TABLE 7c

7.c. Island Creek - Spring 2000						
	MT-50	MT-51	MT-52	MT-55	MT-57	MT-60
	Unmined	Unmined	Filled	Filled/Resid	Filled	Filled
Number (Abundance)						
Avg	118.83	118.83	141.33	683.50	244.33	221.83
SD	33.64	28.79	64.98	185.54	69.66	72.61
Max	172.00	142.00	258.00	865.00	346.00	341.00
Min	82.00	66.00	90.00	429.00	180.00	124.00
Taxa (Richness)						
Avg	15.67	13.50	16.50	13.17	14.67	15.17
SD	1.75	2.43	4.28	1.33	2.50	2.32
Max	19.00	17.00	23.00	15.00	18.00	18.00
Min	14.00	10.00	11.00	11.00	12.00	13.00
Percent 2 Dominant Taxa						
Avg	51.54	49.71	39.75	76.23	56.91	57.03
SD	6.69	7.31	6.21	9.82	7.46	7.23
Max	63.37	60.56	49.13	88.02	63.57	67.36
Min	44.25	40.00	34.07	65.60	42.78	50.47
EPT Abundance						
Avg	81.17	86.50	75.33	349.17	136.00	123.83
SD	26.54	25.20	36.77	160.97	46.11	32.15
Max	129.00	119.00	146.00	500.00	196.00	182.00
Min	57.00	47.00	45.00	65.00	70.00	95.00
EPT Richness						
Avg	9.33	8.17	8.50	6.00	6.83	7.50
SD	1.51	0.98	1.52	1.10	1.72	1.05
Max	12.00	10.00	11.00	8.00	10.00	9.00
Min	8.00	7.00	7.00	5.00	5.00	6.00
Percent EPT						
Avg	68.43	72.33	55.65	49.58	55.46	58.29
SD	10.00	7.14	16.19	20.03	10.94	14.69
Max	76.99	83.80	72.53	68.38	70.21	87.10
Min	53.27	62.73	26.01	15.15	37.84	44.81
Percent Plecoptera						
Avg	12.17	16.16	25.49	0.73	29.64	12.38
SD	5.39	9.53	8.77	0.52	8.84	9.23
Max	19.47	25.76	35.66	1.63	43.57	30.65
Min	5.81	4.17	16.48	0.23	18.21	6.60
Percent Ephemeroptera						
Avg	51.72	50.81	12.24	27.42	21.87	39.18
SD	8.40	9.59	7.84	21.92	15.47	5.42
Max	63.95	63.33	25.27	50.85	45.21	45.60
Min	40.19	37.88	4.62	1.04	5.95	31.60
Percent Trichoptera						
Avg	4.54	5.35	17.93	21.42	3.95	6.73
SD	4.15	2.54	10.09	10.87	2.50	5.42
Max	11.50	8.45	30.77	39.45	8.57	16.94
Min	0.00	2.26	2.89	8.86	2.13	1.48
Percent Chironomidae						
Avg	13.04	14.66	6.88	41.53	23.44	12.36
SD	6.61	4.95	4.51	21.78	9.60	6.47
Max	24.30	21.21	12.72	78.55	36.24	19.34
Min	3.66	7.75	2.20	17.52	7.98	1.61
HBI						
Avg	3.81	3.77	3.49	5.15	4.08	4.39
SD	0.35	0.49	0.26	0.38	0.39	0.47
Max	4.31	4.56	3.94	5.71	4.50	4.67
Min	3.40	3.21	3.16	4.63	3.42	3.45

TABLE 8

Table 8. Summary statistics for Winter 2000 benthic sampling event.

	Reference	Filled	Filled/Resid.
Abundance			
Avg	100	234	468
SD	48	273	346
Max	174	1225	1448
Min	11	7	117
Count	41	48	24
Taxa (Richness)			
Avg	14	11	11
SD	5	4	3
Max	23	20	19
Min	6	4	6
Count	41	48	24
Percent 2 Dominant Taxa			
Avg	50	67	73
SD	15	15	9
Max	83	94	93
Min	25	34	59
Count	41	48	24
EPT Abundance			
Avg	68	87	89
SD	33	90	97
Max	145	351	421
Min	7	3	15
Count	41	48	24
EPT Richness			
Avg	9	6	3.75
SD	3	3	1
Max	15	13	6
Min	3	2	2
Count	41	48	24
Percent EPT			
Avg	70	46	20
SD	15	26	13
Max	92	87	56
Min	30	3	4
Count	41	48	24
Percent Plecoptera			
Avg	19	27	3
SD	13	21	3
Max	55	82	10
Min	2	0	0
Count	41	48	24
Percent Ephmeroptera			
Avg	30	4	1
SD	19	6	1
Max	79	33	4
Min	3	0	0
Count	41	48	24
Percent Trichoptera			
Avg	21	15	16
SD	17	14	13
Max	75	54	55
Min	0	0	2
Count	41	48	24
Percent Chironimidae			
Avg	13	30	50
SD	9	23	11
Max	32	80	72
Min	0	0	25
Count	41	48	24
HBI			
Avg	3.4	4.2	5.3
SD	1	1	0.3
Max	5.6	5.9	5.8
Min	1.3	2.3	4.6
Count	41	48	24

TABLE 9

Table 9. Analysis utilized was ANOVA on ranked data followed by multiple comparison testing using Bonferroni t-tests. Degrees of freedom for all test are 2 and 16.				
	Degrees of Freedom	F-value	Probability Level	Significantly different from unmined
Abundance	16	4.50	0.0280	Filled/residential
Richness	16	2.16	0.1476	
Percent 2 Dominant Taxa	16	7.03	0.0064	Filled, Filled/residential
EPT Abundance	16	0.09	0.9160	
EPT Richness	16	6.01	0.0113	Filled/residential
Percent EPT	16	9.06	0.0023	Filled/residential
Percent Plecoptera	16	5.68	0.0137	Filled/residential
Percent Ephemeroptera	16	15.50	0.0002	Filled, Filled/residential
Percent Trichoptera	16	0.87	0.4380	
Percent Chironomidae	16	8.62	0.0029	Filled/residential
HBI	16	7.11	0.0062	Filled/residential

TABLE 10

Table 10. Significance testing of the Winter 2000 benthic macroinvertebrate functional feeding groups. Analysis utilized was ANOVA on ranked data followed by muntiple comparison testing using Bonferroni t-tests. Degrees of freedom for all tests are 2 and 16.

Percent of each Functional Feeding Group	Average Unmined	Average Filled	Average Filled/ Residentiial	Degrees of Freedom	F-value	Probability	Significantly different from unmined
Collector/gatherer	29.73	33.99	53.44	16	3.92	0.0411	Filled/Residential
Filterer	4.66	20.07	20.56	16	7.84	0.0042	Filled, Filled/Residential
Scraper	38.10	15.16	15.90	16	5.29	0.0173	Filled
Shredder	19.33	24.98	8.17	16	2.62	0.1040	
Predator	8.11	5.80	1.74	16	3.10	0.0729	
Piercer	0.06	0.00	0.18	16	4.59	0.0267	Filled/Residential

TABLE 11

Table 11. Summary statistics for Spring 2000 benthic sampling event.

	Reference	Filled	Filled/Resid.
Abundance			
Avg	149	311	310
SD	66	293	259
Max	414	1626	865
Min	64	61	67
Count	42	54	24
Richness			
Avg	15	12	11
SD	4	4	3
Max	22	23	20
Min	6	6	6
Count	42	54	24
Percent 2 Dominant Taxa			
Avg	54	65	65
SD	12	15	13
Max	81	95	90
Min	34	34	41
Count	42	54	24
EPT Abundance			
Avg	96	97	137
SD	33	103	151
Max	206	570	500
Min	28	4	27
Count	42	54	24
EPT Richness			
Avg	9	6	5
SD	2	2	2
Max	13	11	8
Min	4	2	2
Count	42	54	24
Percent EPT			
Avg	68	36	43
SD	17	23	18
Max	97	89	68
Min	28	2	10
Count	42	54	24
Percent Plecoptera			
Avg	21	11	2
SD	11	11	2
Max	65	44	6
Min	1	0	0
Count	42	54	24
Percent Ephemeroptera			
Avg	42	16	23
SD	16	17	16
Max	73	58	51
Min	8	0	0
Count	42	54	24
Percent Trichoptera			
Avg	5	10	19
SD	5	7	10
Max	20	31	39
Min	0	1	5
Count	42	54	24
Percent Chironomidae			
Avg	15	27	36
SD	12	21	19
Max	64	74	79
Min	2	0	8
Count	42	54	24
HBI			
Avg	4	5	5
SD	0.6	1	0.5
Max	5	7	6
Min	2	3	4
Count	42	54	24

TABLE 12

Table 12. Significance testing of the Spring 2000 benthic macroinvertebrate data. Analysis utilized was ANOVA on ranked data followed by multiple comparison testing using Bonferroni t-tests. Degrees of freedom of all tests are 2 and 17.

	Degrees of Freedom	F-value	Probability Level	Significantly different from unmined
Abundance	17	1.95	0.1720	
Richness	17	4.17	0.0335	Filled/residential
Percent 2 Dominant Taxa	17	2.09	0.1540	
EPT Abundance	17	0.35	0.7080	
EPT Richness	17	10.33	0.0012	Filled, Filled/residential
Percent EPT	17	7.58	0.0044	Filled
Percent Plecoptera	17	7.47	0.0047	Filled, Filled/residential
Percent Ephemeroptera	17	8.41	0.0029	Filled
Percent Trichoptera	17	13.28	0.0003	Filled/residential
Percent Chironomidae	17	3.31	0.0610	Filled/residential
HBI	17	12.08	0.0005	Filled, Filled/residential

TABLE 13

Table 13. Significance testing of the Winter 2000 benthic macroinvertebrate functional feeding groups. Analysis utilized was ANOVA on ranked data followed by muntiple comparison testing using Bonferroni t-tests. Degrees of freedom for all tests are 2 and 17.

Percent of each Functional Feeding Group	Average Unmined	Average Filled	Average Filled/ Residentiial	Degrees of Freedom	F-value	Probability	Significantly different from unmined
Collector/gatherer	55.64	46.32	61.65	17	2.13	0.1488	
Filterer	4.72	27.25	26.05	17	11.22	0.0008	Filled, Filled/Residential
Scraper	11.79	8.29	6.65	17	1.73	0.2074	
Shredder	21.73	11.22	4.22	17	6.03	0.0105	Filled, Filled/Residential
Predator	6.12	6.68	1.39	17	4.04	0.0368	Filled/Residential
Piercer	0	0.24	3.67	17	2.19	0.1424	

TABLE 14a

Table 14. Water chemistry collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds during the Winter 2000 sampling event.

14.a. Mud River - Winter 2000

		MT02 Unmined	MT03 Unmined	MT13 Unmined	MT14 Filled	MT15 Filled	MT18 Filled	MT23 Filled/Resid
ALKALINITY	mg/l	11.9	16	8.46	118	244	250	134
ALUMINUM, DISSOLVED	ug/l	265	255			396		263
ANTIMONY, TOTAL	ug/l	27	38	27	173	205	190	149
ARSENIC, TOTAL	ug/l	15	11	32	73	81	67	56
CALCIUM, TOTAL	mg/l	6560	4950	4430	119000	228000	252000	117000
CHLORIDE	mg/l	0.505	0.586	1.12	3.19	5.83	5.94	4.51
DOC	mg/l					5	3.3	1.4
Field Conductivity	Umhos/cm	18.4	67.8	66.6	1300	2094	1968	1160
Field DO	mg/l	14.13	12.23	12.5	13.47	13.51	12.1	13.37
Field pH	su	6.79	6.47	6.38	7.67	7.97	7.54	7.11
Field Temperature	C	-0.1	-0.13	0.01	-0.02	0.4	3.4	0.85
LEAD, TOTAL	ug/l	18	17	18	80	96	85	67
MAGNESIUM, TOTAL	mg/l	3480	2920	2590	119000	13400	146000	83200
MANGANESE, DISSOLVED	ug/l					146		
NITRATE	mg/l	0.46	0.332	0.369	1.57	3.05	10.33	2.385
POTASSIUM, TOTAL	mg/l	2.17	2.49	1.84	0.099	13.9	13.5	0.319
SELENIUM, TOTAL	ug/l	38	46	50	303	363	342	256
SODIUM, TOTAL	mg/l	4.62	3.96	4.18	8.91	9.9	11.5	11.5
THALLIUM, TOTAL	ug/l	21	32	18	333	433	370	299
TOTAL ORGANIC CARBON	mg/l		1.4		2.3	3.2	5.1	2.2

TABLE 14b, 14c

14.b. Spruce Fork								
		MT25B Filled	MT32 Filled	MT34B Filled	MT39 Unmined	MT40 Filled/Resid	MT42 Unmined	MT48 Filled/Resid
ALKALINITY	mg/l	130	513	142	30.5	193		174
ALUMINUM, DISSOLVED	ug/l							329.1
ARSENIC, TOTAL	ug/l	64	47	101	75	13		50
CALCIUM, TOTAL	mg/l	75100	73900	314000	10500	18900	5530	54800
CHLORIDE	mg/l	2.22	1.54	7.96	0.277	8.14	0.214	6.78
DOC	mg/l	1	2	1.6				1.5
Field Conductivity	Umhos/cm	874	769.8	2169	97	611	64.7	737.2
Field DO	mg/l	14.29	10.89	17.41	8.3	15.07	5.87	20
Field pH	su	8.11	8.28	7.83	7.97	8.4	7.53	8.2
Field Temperature	C	6.53	3.34	7.06	2.16	4.37	1.9	3.43
MAGNESIUM, TOTAL	mg/l	43300	53200	230000	5560	8420	3390	26500
NITRATE	mg/l	0.763	1.55	4.96	0.551	0.188	0.428	0.197
POTASSIUM, TOTAL	mg/l	7.16	5.41	15.8	1.45	3.09	1.37	4.79
SELENIUM, TOTAL	ug/l			405	352			
SILVER, TOTAL	ug/l						1.67	
SODIUM, TOTAL	mg/l	50.7	17.9	12.8	6.19	119		70.8
SULFATE	mg/l						18.9	
THALLIUM, TOTAL	ug/l	182	208	437	392		25	
TOTAL ORGANIC CARBON	mg/l	2.2	2	2.8	1.1	1.2		1.9

14.c. Island Creek							
		MT50 Unmined	MT51 Unmined	MT52 Filled	MT55 Filled/Resid	MT57B Filled	MT60 Filled
ALKALINITY	mg/l	6.78	6.44	11.3	37.8	54.4	103
ALUMINUM, DISSOLVED	ug/l			140		328	175
ANTIMONY, TOTAL	ug/l	21	18	69	102	175	85
ARSENIC, TOTAL	ug/l	57	25	50	42	69	44
CALCIUM, TOTAL	mg/l	3330	5430	50600	44100	57800	45600
CHLORIDE	mg/l	0.946	1.89	16.3	8.06	4.15	1.11
DOC	mg/l	0.59	0.58	2.5	1.1	1.7	1.7
Field Conductivity	Umhos/cm	54.2	73.4	595	539	1042	554.2
Field DO	mg/l	6.33	9.14	10.36	10.2	9.58	8.94
Field pH	su	7.57	7.52	6.7	8.02	8.01	8.08
Field Temperature	C	1.21	1.38	2.6	0.77	3.01	2.19
IRON, TOTAL	ug/l			118			
LEAD, TOTAL	ug/l	23	23	44	43	74	38
MAGNESIUM, TOTAL	mg/l	2240	2800	39700	35550	95400	28600
NITRATE	mg/l	0.244	0.273	1.34	1.2	3.37	0.183
POTASSIUM, TOTAL	mg/l	1.26	1.43	3.11	3.08	5.86	3.38
SELENIUM, TOTAL	ug/l	235	34	153	180	298	137
SODIUM, TOTAL	mg/l	1.89	3.7	9.6	13.3	5.8	24.2
THALLIUM, TOTAL	ug/l	30	24	184	157	321	144
TOTAL ORGANIC CARBON	mg/l	0.57	1.7	4.5	3.7	2.7	1.8

TABLE 15a

Table 15. Water chemistry collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds during the Spring 2000 sampling event.

15.a. Mud River - Spring 2000								
		MT02 Unmined	MT03 Unmined	MT13 Unmined	MT14 Filled	MT15 Filled	MT18 Filled	MT23 Filled/Resid
ALKALINITY	mg/l	13.44	6.78	6.8	118.4	254.62	234.42	109.4
ALUMINUM, DISSOLVED	ug/l							
ALUMINUM, TOTAL	ug/l				195.5	185.1	188.9	
ANTIMONY, TOTAL	ug/l	31.6	35.2	27.8	131.3	178.8	148.6	122.3
ARSENIC, TOTAL	ug/l	99	71.9	71.7	325.4	420.3	346.7	275.5
CALCIUM, TOTAL	mg/l	4355	3594	3649	109100	225800	184800	90670
CHLORIDE	mg/l	0.68	0.828	0.726	1.747	4.045	4.4	2.827
DOC	mg/l			1.4	1.6	2.9	2.1	
Field Conductivity	Umhos/c	69.1	58.2	59.9	1208	1002	1661	1090
Field DO	mg/l	10.36	10.73	9.89	10.59	10.61	10.68	10.39
Field pH	su	6.72	6.68	6.42	7.93	8.16	7.39	7.87
Field Temperature	C	16.84	16.7	16.77	18.42	19.03	18.07	20.66
IRON, DISSOLVED	ug/l	222.5						
IRON, TOTAL	ug/l	34.9	116.5	142.2	509.6	221.3	529.8	369.3
LEAD, TOTAL	ug/l				86.6	120.1	92.8	73.8
MAGNESIUM, TOTAL	mg/l	2745	2400	2299	98070	188400	117200	74480
NITRATE	mg/l		0.472					
PHOSPHORUS, TOTAL					0.2879			
POTASSIUM, TOTAL	mg/l	0.583	1.155	1.177	5.852	14.872	11.22	6.138
SELENIUM, TOTAL	ug/l	203	119	109	1260	1804	1566	1133
SODIUM, TOTAL	mg/l	1.76	0.99	1.65	6.05	8.69	7.81	5.94
SULFATE	mg/l	10.8	10.41	11.01	482.65	997.14	680.91	388.32
THALLIUM, TOTAL	ug/l	11.6	27.3	18.6	350.2	523	405	307
TOTAL ORGANIC CARBON	mg/l				2.2	3.2	2.3	

TABLE 15b, 15c

15.b. Spruce Fork								
		MT25B Filled	MT32 Filled	MT34B Filled	MT39 Unmined	MT40 Filled/Resid	MT42 Unmined	MT48 Filled/Resid
ALKALINITY	mg/l	174.4	143.38	430.62	37.28	201.74	16.74	157.96
CALCIUM, TOTAL	mg/l	72240	57450	187600	8332	18350	4884	44730
DOC	mg/l	1.8	1.9	2.5		1.5		1.5
Field Conductivity	Umhos/c	911.8	713.2	1840	115.7	682.9	73.9	721.9
Field DO	mg/l	12.23	11.3	10.36	12.52	11.34	11.61	10.99
Field pH	su	7.61	8.03	7.13	8	8.24	7.75	8.07
Field Temperature	C	14.43	15.19	16.86	14.63	18.13	15.68	18.86
MAGNESIUM, TOTAL	mg/l	49790	39970	134400	4424	8015	3336	26850
POTASSIUM, TOTAL	mg/l	7.601	5.819	14.11	0.1	3.531	1.452	5.5
SELENIUM, TOTAL	ug/l			21				
SODIUM, TOTAL	mg/l	30.03	11.11	6.38	3.96	115.5	0.88	50.82
SULFATE	mg/l	288.73	230	708.03	19.196	112	15.784	178
TOTAL ORGANIC CARBON		1.5	2.2	4.7	1.1	2.1		1.7
ZINC, TOTAL		16		23.3	12.2	12.8	13.1	17.2

15.c. Island Creek							
		MT50 Unmined	MT51 Unmined	MT52 Filled	MT55 Filled/Resid	MT57B Filled	MT60 Filled
ALKALINITY	mg/l	24.82	21.76	53.12	89.24	125.4	134.66
ALUMINUM, DISSOLVED	ug/l						111
ALUMINUM, TOTAL	ug/l	203.5	329.1			208.1	122.7
ANTIMONY, TOTAL	ug/l	56.2	36.9	88.8	83.2	145.6	78.5
ARSENIC, TOTAL	ug/l	100.2	71.8	210.6	217.1	321.5	171.1
CALCIUM, TOTAL	mg/l	3615	6757	43900	53160	80660	50480
DOC	mg/l	1.3	1	1.5	1.3	2.2	1.1
Field Conductivity	Umhos/c	55.1	90.8	551.4	639	1038	579.7
Field DO	mg/l	10.67	10.92	10.65	6.91	9.77	10.05
Field pH	su	6.79	6.94	7.38	7.92	7.95	8.18
Field Temperature	C	15.24	16.37	12.95	14.21	16.39	13.24
IRON, TOTAL	ug/l	255.7	254.6			218.5	143.6
LEAD, TOTAL	ug/l	50.3	30.1	56.9	60.4	82.3	47.1
MAGNESIUM, TOTAL	mg/l	2321	2969	33370	36890	89520	28410
PHOSPHORUS, TOTAL	mg/l	0.3479	0.1197	0.1883	0.2094	0.2563	0.1758
POTASSIUM, TOTAL	mg/l	0.517	0.308	1.496	1.639	3.355	1.298
SELENIUM, TOTAL	ug/l	154	156	663	689	1234	621
SODIUM, TOTAL	mg/l	1.1	2.97	7.92	16.72	3.74	29.04
THALLIUM, TOTAL	ug/l	62	59	199	208	373	184
TOTAL ORGANIC CARBON	mg/l	1.3	1.1	1.2	1.4	1.9	1.1
ZINC, TOTAL	ug/l				52.5	20.5	

TABLE 16

Table 16. Summary statistics and statistical comparisons between the unmined, filled and filled/residential sites for water chemistry collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds during the Winter 2000 sampling event. Where filled/residential sample size was low, comparisons were made between unmined and filled only. Parameters analyzed in this method are indicated with an asterisk.

		Sample size U/F/FR	Unmined	Filled	Filled/Resid	F-value	Probability	Significantly different from unmined
ALKALINITY	mg/l	6/9/4	13.35	173.97	134.70	10.69	0.0011	Filled, Filled/Residential
ANTIMONY, TOTAL*	ug/l	5/6/2	51.29	154.50		23.71	0.0009	Filled
ARSENIC, TOTAL	ug/l	6/9/4	35.80	66.22	40.25	3.51	0.0443	
CALCIUM, TOTAL	mg/l	7/9/4	5.80	138.44	58.70	25.49	<0.0001	Filled, Filled/Residential
CHLORIDE	mg/l	7/9/4	0.78	5.36	6.87	16.63	0.0001	Filled, Filled/Residential
Field Conductivity	Umhos/cm	7/9/4	63.16	1262.89	761.80	22.70	<0.0001	Filled, Filled/Residential
Field DO	mg/l	7/9/4	9.79	12.38	14.66	2.46	0.1155	
Field pH	su	7/9/4	6.30-7.97	6.70-8.28	7.11-8.40	4.77	0.0227	Filled, Filled/Residential
Field Temperature	C	7/9/4	8.92	3.17	2.35	3.19	0.0668	
LEAD, TOTAL*	ug/l	5/6/2	29.43	74.63		27.97	0.0005	Filled
MAGNESIUM, TOTAL	mg/l	7/9/4	3.28	85.40	38.42	28.68	<0.0001	Filled, Filled/Residential
NITRATE	mg/l	7/9/4	0.38	3.03	0.99	4.45	0.02798	Filled
POTASSIUM, TOTAL	mg/l	7/9/4	1.72	7.58	2.82	6.82	0.0067	Filled
SELENIUM, TOTAL*	ug/l	6/7/2	114.00	264.44		5.22	0.043	Filled
SODIUM, TOTAL	mg/l	7/9/4	3.7	16.81	53.65	21.48	<0.0001	Filled, Filled/Residential
SULFATE	mg/l		17.73	569.78	365.75	24.08	<0.0001	Filled, Filled/Residential
THALLIUM, TOTAL	ug/l	5/8/3	86.2	290.22	228	2.9	0.09	
TOTAL ORGANIC CARBON	mg/l	4/9/4	1.19	2.96	2.25	7.96	0.0049	Filled

Mean values presented in Table 16. Statistical analysis conducted using rank data which is not presented.

TABLE 17

Table 17. Summary statistics and statistical comparisons between the unmined, filled and filled/residential sites for water chemistry collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds during the Spring 2000 sampling event. Where filled/residential sample size was low, comparisons were made between unmined and filled only. Parameters analyzed in this method are indicated with an asterisk.

		Sample size U/F/FR	Unmined	Filled	Filled/Resid	F-value	Probability	Significantly different from unmined
ALKALINITY	mg/l	7/9/4	18.23	185.45	139.59	19.63	<0.0001	Filled, Filled/Residential
ANTIMONY*	ug/l	5/6/2	37.54	128.6		27.33	0.0005	Filled
ARSENIC*	ug/l	5/6/2	82.92	299.3		23.47	0.0009	Filled
CALCIUM, TOTAL	mg/l	7/9/4	5.03	112.45	51.73	24.01	<0.0001	Filled, Filled/Residential
DOC	mg/l	3/9/3	1.23	1.96	1.43	5.54	0.0198	Filled
Field Conductivity	Umhos/cm	7/9/4	74.67	1056.12	783.45	19.63	<0.0001	Filled, Filled/Residential
Field DO	mg/l	7/9/4	10.96	10.69	9.91	0.36	0.70	
Field pH	su	7/9/4	6.42-8.00	7.13-8.18	7.87-8.24	5.74	0.0124	Filled, Filled/Residential
Field Temperature	C	7/9/4	16.03	16.06	17.97	1.02	0.3815	
IRON, TOTAL	ug/l	5/5/1	198.3	324.5		0.7	0.43	
LEAD*	ug/l	3/6/2	38.4	80.97		7.66	0.0278	Filled
MAGNESIUM, TOTAL	mg/l	7/9/4	2.93	86.57	36.56	27.28	<0.0001	Filled, Filled/Residential
POTASSIUM, TOTAL	mg/l	7/9/4	0.76	7.29	4.20	16.98	0.0001	Filled, Filled/Residential
SELENIUM*	ug/l	5/7/2	148.2	1024.1		6.53	0.03	Filled
SODIUM, TOTAL	mg/l	7/9/4	1.90	12.31	47.25	19.09	<0.0001	Filled, Filled/Residential
SULFATE	mg/l	5/6/3	13.44	546.4	226.12	19.91	<0.0001	Filled, Filled/Residential
THALLIUM*	ug/l	5/6/2	35.7	339		23.47	0.0009	Filled
TOTAL ORGANIC CARBON	mg/l	9/9/3	1.17	2.26	1.73	3.38	0.068	Filled

Mean values presented in Table 17. Statistical analysis conducted using rank data which is not presented.

TABLE 18a, 18b, 18c

Table 18. Habitat and substrate information collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds.

18.a. Mud River

	MT-2 Unmined	MT-3 Unmined	MT-13 Unmined	MT-14 Filled	MT-15 Filled	MT-18 Filled	MT-23 Filled/Resid
Stream Order	2	2	1	2	3	2	4
Bank Stability	6	8.5	9	7	8	6.5	7.5
Bank Vegetation	7	8	8.5	8	8	6.5	5
Flows	18	18	18	18	18	18	18
Alteration	17	18	18	17	15	13	14
Embeddedness	14	13	16	12	14	12	14
Substrate	16	11	16	14	11	17	12
Frequency of Riffles	18	18	18	17	17	17	16
Riparian Vegetation	6	9	9	8	8	6	2.5
Sediment Depth	11	14	14	8	6	10	5
Velocity Depth Regime	17	10	10	16	16	13	16
Total Habitat Score	149	153	163	148	145	138	125
Mean Size Class	3.41	4.13	3.33	3.09	2.97	3.52	2.34
Diameter (mm)	31.1	152	25.9	15.4	11.9	39.6	2.7
% Sand and Fines	27.3	16.4	20	32.7	34.6	16.4	78.2

18.b. Spruce Fork

	MT-25B Filled	MT-32 Filled	MT-39 Unmined	MT-40 Filled/Resid	MT-42 Unmined	MT-48 Filled/Resid
Stream Order	2	3	2	4	1	5
Bank Stability	4.5	8	6.5	7.5	8.5	8
Bank Vegetation	7	6	8.5	6.5	8	9
Flows	19	20	17	17	17	16
Alteration	15	7	17	12	16	15
Embeddedness	16	13	16	14	16	14
Substrate	18	14	19	14	19	18
Frequency of Riffles	19	16	20	18	19	18
Riparian Vegetation	7.5	4	7.5	5	8	7.5
Sediment Depth	13	10	17	14	15	12
Velocity Depth Regime	14	17	10	17	14	18
Total Habitat Score	152	133	161	144	165	160
Mean Size Class	3.91	2.7	3.96	3.68	3.47	3.25
Diameter (mm)	93.9	6.5	105.9	56.8	35.8	22.1
% Sand and Fines	1.8	47.3	5.5	14.6	16.4	25.5

18.c. Island Creek

	MT-50 Unmined	MT-51 Unmined	MT-52 Filled	MT-55 Filled/Resid	MT-57B Filled	MT-60 Filled
Stream Order	2	2	1	3	1	2
Bank Stability	5.5	5.5	6.5	7.5		8.5
Bank Vegetation	7	5	7	5.5	0	8
Flows	17	19	18	20		17
Alteration	16	15	12	10		16
Embeddedness	11	12	12	15		16
Substrate	16	18	17	8		17
Frequency of Riffles	17	18	18	17		19
Riparian Vegetation	7	4.5	6.5	5		12.5
Sediment Depth	10	13	13	17		14
Velocity Depth Regime	16	16	16	15		10
Total Habitat Score	142	141	146	138		157
Mean Size Class	3.7	3.18	3.42	4.8		3.61
Diameter (mm)	59.1	18.8	31.7	672.3		48.4
% Sand and Fines	16.4	36.4	25.5	16.4		18.2

TABLE 19

Table 19. Summary statistics and statistical comparisons between the unmined, filled and filled/residential sites for habitat analysis data collected by the US EPA at the benthic macroinvertebrate sampling locations in the Mud River, Spruce Fork and Island Creek watersheds during the Spring 2000 sampling event.

	Unmined	Filled	Filled/Residential	F-value	Probability	Signigicantly different from unmined
Order	1.70	2.00	4.00	9.87	0.0016	Filled/Residential
Bank Stability	7.10	7.00	7.63	0.13	0.8761	
Bank Vegetation	7.43	7.21	6.50	0.75	0.4903	
Flows	17.70	18.30	17.75	0.70	0.5143	
Alteration	16.70	13.60	12.75	7.83	0.0047	Filled, Filled/Residential
Embeddedness	14.00	13.60	14.25	0.26	0.7771	
Substrate	16.40	15.40	13.00	1.09	0.3618	
Frequency of Riffles	18.30	17.60	17.30	1.37	0.2848	
Riparian Vegetation	7.50	7.50	5.00	1.82	0.1960	
Sediment Depth	13.40	10.60	12.00	1.61	0.2330	
Velocity/Depth Regimes	13.30	14.60	16.50	1.74	0.2085	
Total Habitat Score	153.40	145.60	141.80	1.87	0.1886	
Mean Standard Deviation	3.60	3.30	3.50	0.52	0.6040	
Estimated Geometric mean	61.20	35.30	188.50	0.52	0.6040	
Percent of Sand and Silt	19.80	25.20	33.70	0.25	0.7844	

APPENDIX C

Functional feeding group designations for families collected at the EIS monitoring stations

FAMILY	FAMFFG
Acari	Predator
Aeshnidae	Predator
Ameletidae	Scraper
Baetidae	Collector
Baetiscidae	Collector
Bivalvia	Filterer
Brachycentridae	Collector
Caenidae	Collector
Calopterygidae	Predator
Cambaridae	Collector
Canaceidae	Scraper
Capniidae	Shredder
Ceratopogonidae	Predator
Chironimidae	Collector
Chloroperlidae	Predator
Chrysomelidae	Shredder
Coenagrionidae	Predator
Collembola	Collector
Corbiculidae	Filterer
Cordulegastridae	Predator
Corydalidae	Predator
Cossidae	Shredder
Culicidae	Filterer
Dixidae	Filterer
Dolichopodidae	Predator
Dryopidae	Scraper
Elmidae	Scraper
Empididae	Predator
Entomobryidae	Collector
Ephemerellidae	Collector
Ephemeridae	Collector
Ephydridae	Collector
Gastropoda	Collector
Gerridae	Predator
Glossomatidae	Scraper
Gomphidae	Predator
Helophoridae	Shredder
Heptagenidae	Scraper
Hydracarina	Predator
Hydropsychidae	Filterer

Functional feeding group designations for families collected at the EIS monitoring stations

FAMILY	FAMFFG
Hydroptilidae	Piercer
Isonychiidae	Collector
Isopoda	Collector
Lepidostomatidae	Shredder
Leptophelebiidae	Collector
Leuctridae	Shredder
Leutridae	Shredder
Limnephilidae	Shredder
Lymnaeidae	Collector
Muscidae	Predator
Nemouridae	Shredder
Noctuidae	Shredder
Olgiochaeta	Collector
Optioservus	Scraper
Peltoperlidae	Shredder
Perlidae	Predator
Perlodidae	Predator
Philopotamidae	Filterer
Phoridae	Predator
Physidae	Scraper
Planorbellidae	Collector
Polycentropodidae	Filterer
Psephenidae	Scraper
Psychomyiidae	Collector
Pternarcyidae	Shredder
Ptilodactylidae	Shredder
Rhyacophilidae	Predator
Saldidae	Predator
Saldulidae	Predator
Salpingidae	Predator
Sialidae	Predator
Simulidae	Filterer
Staphylinidae	Predator
Stratiomyidae	Collector
Tabanidae	Predator
Taeniopterygidae	Shredder
Tanyderidae	Shredder
Tipulidae	Shredder
Turbellaria	Predator
Uenoidae	Scraper
Veliidae	Predator

---- Forwarded by David Rider/R3/USEPA/US on 01/08/2004 01:48 PM -----

FitzKRC@aol.com
To: R3 Mountaintop@EPA
01/07/2004 12:01 AM
cc:
Subject: Comments on Mountaintop/Valley Fill DEIS

January 6, 2004

Mr. John Forren
Project Manager
U.S. Environmental Protection Agency (3ES30)
1650 Arch Street
Philadelphia, PA 19103
Fax: 215-814-2783
Email: mountaintop.r3@epa.gov

Subject: Comments on the Draft Programmatic EIS on Mountaintop Removal/Valley Fills in Appalachia

Dear Mr. Forren:

The Kentucky Resources Council, Inc., a nonprofit environmental advocacy organization whose members include numerous individuals who live, work and recreate in areas adversely affected by the construction of valley and head-of-hollow fills, submit these comments concerning the draft EIS on valley fills and mountaintop mining.

KRC endorses and incorporates by reference as if fully set forth below the comments of the Citizens Coal Council, the Kentucky Waterways Alliance, the Friends of the Earth, the Ohio Valley Environmental Coalition, the Kentuckians for the Commonwealth, and Save Our Environment in opposition to the conclusions contained in the DEIS, and urges that the DEIS be withdrawn in order that a document properly reflecting the science contained in the numerous analysis, and consonant with the Clean Water Act and SMCRA, might be proposed. 4-2

Cordially,

Tom FitzGerald
Director
Kentucky Resources Council

Appalachian Sustainable Development

"Building Economy, Community and Environment in Northeast Tennessee and Southwest Virginia"

P.O. Box 791, Abingdon, Virginia 24212-0791
Phone: (276) 623-1121 • Fax: (276) 623-1353 • E-mail: asd@eva.org
www.appsusdev.org

January 2, 2004

Mr. John Forren
US Environmental Protection Agency
1650 Arch Street
Philadelphia, Pennsylvania 19103

REC'D JAN 0 5 2004

Dear Mr. Forren:

I was shocked to learn of the EPA's plan to allow mountaintop removal mining practices to be accelerated and expanded.

Many studies of the impacts of mountaintop removal, including President Bush's own Environmental Impact Statement, make clear how much damage is done to homes, streams, forests and fishing and wildlife through this practice. The proposed new rules will increase all of these problems by eliminating limits on the size of Valley fills and by reducing a 100 foot stream zone protection area. 1-10

Mr. Forren, I live in Appalachia where this mountaintop removal takes place. Since moving here in 1978, I've seen the scars which this kind of practice leaves. I have numerous friends who make their living in the coal industry and I am a strong supporter of economic development throughout the coalfields. But economic development need not and should not continue to occur at the expense of the environment, local farms and local communities.

I urge you to seek another alternative, one which places strong limits on this highly destructive practice and allows local communities to maintain and build upon the natural resource base which they have. 1-5

Thank you,

Anthony Flaccavento
Executive Director
Appalachian Sustainable Development

Printed on Post Consumer Recycled Paper

REC'D JAN 0 8 2004

FOLK
Friends of the Little Kanawha
P.O. Box14
Rock Cave, WV 26234

January 3, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren,

FOLK, Friends of the Little Kanawha, is a watershed organization dedicated to the preservation of the headwaters of the Little Kanawha River. We have been performing benthic monitoring and chemical water analysis on specific tributary sites on the headwaters for 25 years.

The EIS study on Mountain Top Removal confirms that this radical form of strip mining is harmful to streams, the forest and to communities.

There has already been 1200 miles of streams buried under mining waste in valley fills. Burying headwater streams under tons of rubble is instant death to the origin of a stream. These headwater streams are full of organisms that benefit the river downstream and provide the balance needed for stream health. Burying a headwaters alters the morphometry of the affected stream, permanently altering stream volume, flow and organic diversity downriver. 5-7-2

Our mixed mesophytic forests are the most diverse in the world. The operation of Mountain Top Removal has a predicted loss of over a million acres of timber. 7-5-2

Communities have disappeared, close neighborhood ties have been broken, people displaced, homesteads have been destroyed. 10-2-2

REC'D JAN 0 8 2004

FOLK requests:

1. Stop the cavalier burying of headwater streams.
2. Reduce the size of valley fills.
3. Establish limits on deforestation.
4. Do not weaken the 100 foot stream buffer zone.
5. Develop programs to assist those suffering from community displacement.

1-8

Thank you.

Sincerely,

FOLK

Friends of the Little Kanawha

ERRIS CO. LLC. A.M.D.G. **PHONE 304 522 3634**
724 OXFORD DR.
HUNTINGTON, WV 25705

8/18/2003

REC'D AUG 2 6 2003

John Farren
U.S. Environmental Protection Agency
1650 Arch St.
Philadelphia, PA 19103

Re: Mountaintop Removal Mining

Dear Mr. Farren,

I am a businessman whose enterprises depend on coal generated electricity in Eastern and Western locations of the U.S. I have seen mountaintop mining and it is insane. There are better ways of mining, and reasonably economical. 1-9

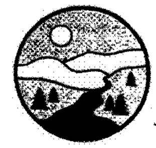
Please accept this letter as a protest against mountaintop removal mining, and as a plea to guide us to something better.

Mayor Bill Gorman of Hazard,Ky, says that flat land created by mining has allowed for the town to grow in a way it otherwise couldn't. I accept this for his town. Other locations more remote are not so fortunate. One such is in WV where thousands of people are permanently displaced, with no real possibility of development on the unstable desolate, flats created, since the location was not planned in conjunction with a town. On the contrary, needs of local residents are completely dismissed, schools lost, people harassed and displaced, state officials ignored. This is continual demonstration by the minning company that there are no long term plans or considerations for betterment after mining operations cease. As a result, the future economics of the area and once secure land values are destroyed for generations to come. The long term elimination of local heritage and future economics of natural resources is lost and affects lands far far beyond the ownership of the mining company. Other methods of mining offer more respect to neighbors, and allow natural resources to return. People currently have no effective recourse to redress. no real protection of law. We are watching our state and its fabulous natural resources get chewed up, and we are seeing our state government unable to cope with it or to offer any protection to citizens directly affected with extreme loss or indirectly affected. 10-2-2

Mountaintop removal seems to result in a negative employment situation. It appears to be the practice, to abandon the employees along with the land after mining. I do not live in close proximity to these operations, but this lack of principle reflects on me as a businessman. It takes the heart out of one who struggles to do what is correct, and my business suffers.

Please accept this letter as a plea to protect citizens and their environment involved in this unneccesary process.

Thank you for your kind attention
Wm Grattan Gannon



REC'D JAN 0 8 2004

WEST VIRGINIA RIVERS COALITION
801 N. Randolph Avenue • Elkins, West Virginia 26241 • (304) 637-7201 • www.wvrivers.org

January 6, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren,

The June 2003 Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic *Environmental Impact Statement* (DEIS) *requested public responses. As requested,* West Virginia Rivers Coalition (WVRC) submits the comments that follow.

WVRC represents nearly 3,000 members and 48 affiliate organizations who support our mission to seek "the conservation and restoration of West Virginia's exceptional rivers and streams". Mountaintop removal mining and it's associated practice of valley filling is in direct opposition to the interests and goals of WVRC and our membership.

Our members rely on healthy water. Our members are riparian landowners who consume West Virginia water for drinking and whose children play in our rivers. Our members utilize our water for manufacturing and waste assimilation. Our members recreate in the waters of West Virginia: fishing, hiking, exploring and white water boating. Our members appreciate the aesthetic quality of West Virginia's streams, the abundance and diversity of our fisheries and the riparian ecology of our headwater streams. Our members expect clean and plentiful water resources.

WVRC submits these comments to directly address the concerns of our membership and we join in comments submitted by Earthjustice (letter dated January 6, 2004). It would be simple to limit our comments to a single statement saying the practice of valley filling is an abomination, complete destruction of aquatic and hydrologic resources, and should be stopped. But the comments to follow will respond, as requested, to the voluminous DEIS. 1-9

To summarize, I will reiterate what has been said by Earthjustice and others: the purpose of the DEIS was to develop procedures, policies and guidelines to "minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States." Yet, the DEIS *abandons its purpose and provides no alternative with substantive recommendations to minimize* the environmental harm caused by mountaintop removal mining and valley filling. 4-2

The following specific observations drawn from the DEIS are of concern to WVRC:

- The language of the DEIS minimizes the significance of documented environmental harm caused by mountaintop removal mining and valley filling. Substantial environmental degradation is caused by these mining practices and the DEIS points to water quality impacts including nutrient imbalances and sedimentation and selenium increases. Yet, the DEIS takes no action to minimize the harm to what it documents as an ecologically important 9-2-2

Seeking the conservation and restoration of West Virginia's exceptional rivers and streams environment. In fact, the burying of more than a thousand miles of headwater streams, is presented as a statistic without comment about the magnitude of destruction. 5-7-2

- The DEIS does not support the Buffer Zone rule which was introduced 20 years ago to protect land within 100 feet of streams. The law protects these riparian corridors on all intermittent and perennial streams within areas of mining activity. It requires that water quantity, water quality and related environmental resources not be adversely impacted by mining. The Bush administration proposes effectively eliminating the buffer and allowing very adverse impacts to our rivers and their riparian corridors. 1-10
- The DEIS has downplayed its own seemingly obvious conclusions that smaller valley fills are significantly less destructive than larger valley fills. Permit applications which will bury longer lengths of headwater streams will result if the DEIS cannot recognize its own science and limit valley fills, thus minimizing, "to the maximum extent practicable, the adverse environmental effects to waters of the United States." 5-7-2
- The DEIS continues to support the use of general Nationwide Permit 21 which does not provide appropriate scrutiny to environmental impacts of mountaintop removal mining. The general permit is only to be used when discharges have minimal adverse impact, including cumulative impact. The direct and cumulative impacts of filling valleys with mountaintop removal mining waste are enormous. In fact the DEIS calls upon mitigation measures to offset the impacts at the same time it acknowledges that the destruction to headwater streams is not recoverable. 12-1-2
- Often, environmental harm is weighed against economic gain. The DEIS presents extensive economic summary data, none of which provides substantial economic argument for the practice of mountaintop removal, especially any argument to counter the environmental degradation of valley fills. Coal production is expected to be "panned out" in 49 years, according to the DEIS, a figure that is almost double other reports. In the last ten years, production levels of coal have remained consistent but jobs, a critical economic indicator in Appalachia have decreased. Where will the jobs be in 49 years? The question is especially important since the DEIS points to a loss from mining activity of sustainable agricultural land by over 20 percent in roughly the last 50 year period. 9-5-2

To conclude, *remember*, the goal of the DEIS is to minimize "the adverse environmental effects to the waters of the Untied States". The bullets of this letter point to the fact that the Bush administration is recommending the opposite by encouraging MTR and supporting the destruction of West Virginia's waters with the practice of valley filling.

Valley fills and the burying of headwater streams must be stopped. Mountaintop removal mining, and all mining practices, must protect the health of our water and surrounding environments. WVRC asks that the responsible agencies: U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Office of Surface Mining, U.S. Fish and Wildlife Service and WV Department of Environmental Protection, revisit the purpose of the DEIS and present sound practices and policies to minimize the environmental degradation of mountaintop removal mining and valley filling. In lieu of the agencies' ability to make sound and reasonable recommendations, WVRC would expect mountaintop removal mining and valley filling practices to be stopped. 1-5

Sincerely,

Liz Garland
Issues Coordinator

APPALACHIAN VOICES

05 JANUARY 2004

REC'D JAN 0 6 2004

Mr. John Forren
U.S. EPA (3EA30), 1650 Arch Street
Philadelphia, PA 19103
mountaintop.r3@epa.gov

RE: Comments on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement

Greetings:

Please be advised that the following comments regarding the above-referenced Environmental Impact Statement are submitted on behalf of Appalachian Voices, the Southern Appalachian Biodiversity Project and our members.

About Appalachian Voices. Based in Boone, North Carolina, Appalachian Voices is a nonprofit organization committed to protecting and restoring the ecological integrity, economic vitality and cultural heritage of the southern and central Appalachian Mountains. Appalachian Voices accomplishes these goals through our four primary campaigns: (1) Eliminating Air Pollution; (2) Defending Public Lands; (3) Ending Mountain Top Removal Coal Mining; and (4) Promoting Sustainable Forestry.

About the Southern Appalachian Biodiversity Project. Based in Asheville, North Carolina, the Southern Appalachian Biodiversity Project (SABP) is a nonprofit regional organization dedicated to empowering citizens to appreciate, defend and restore the native biodiversity of the Southeast. SABP accomplishes these goals by: (1) seeking permanent protection of public lands; and (2) enforcing the Endangered Species Act.

Request for a Moratorium or Additional Public Hearings. Appalachian Voices and SABP hereby request that EPA implement an immediate moratorium on mountaintop removal/valley fills in Appalachia until an adequate EIS is drafted and adopted. In the absence of such action, we request that EPA hold additional public hearings on this woefully inadequate document. 3-4

Scope of Comments. Recognizing the need for administrative efficiency, Appalachian Voices and SABP have, to the extent practicable, condensed our comments. As such, these comments are responsive only to the extent of information available through the date of submission (noted above) and do not concede the exclusivity of the issues hereafter addressed. Accordingly, Appalachian Voices and SABP retain the right to comment upon, or challenge through administrative or judicial means, any new information, issues, causes of action or other information related to the above-referenced EIS.

20 Battery Park Avenue, Suite 405 Asheville, North Carolina 28801
phone: 828-225-9685 fax: 828-258-0758 www.appvoices.org

OFFICE OF THE MAYOR
BILL GORMAN

Incorporation of Cited Documents and Attachments. Please be advised that any documents, whether hard-copy or electronic, cited in, or attached to, these comments are to be treated as if they were fully incorporated in the body of these comments. As such, it is our intention that these cited documents and attachments be considered part of the complete state and federal administrative records. If any of the agencies involved in reviewing comments would like copies of these documents, Appalachian Voices or SABP will furnish them upon request for a reasonable copying fee.

Request that Public Hearing(s) be Recorded and Transcipts of the Proceedings be Produced and Made Part of the Administrative Record. Appalachian Voices and SABP hereby request that any and all public hearings held relative to the above-referenced EIS be recorded and that transcripts of the proceedings be produced and made part of the complete state and federal administrative records. 3-4

Request that Written Comment Deadline be Extended for Two Weeks After the Public Hearing. It is obvious that the public will be best able to provide meaningful written comments only after they have been afforded an opportunity to hear from all interested parties (proponents and opponents alike) attending any public hearings. As such, Appalachian Voices and SABP hereby request that the deadline for written comments be extended for two weeks following any such hearings. 3-5

Request for Written Response to Comments. Appalachian Voices and SABP hereby request that EPA provide written responses to all public comments, including those of Appalachian Voices, prior to approving the above-referenced EIS. 3-6

Closing Comments. As the attached comments from Ms. Melinda Welton of the Ornithological Society indicate, we too are extremely troubled over the harmful environmental impacts that mountaintop/valley fill mining has had and will continue to have on a wide array of aquatic, terrestrial and avian organisms. Additionally, we are equally dismayed about the economic, cultural and environmental consequences that mountaintop/valley fill mining has, is and will continue to wreak on the good people residing in the coal-fields of Appalachia. These horrific and, far too often deadly, impacts should not be shunted aside in the bureaucratic shuffle simply to ease permitting requirements in an effort to accelerate the production of coal to feed America's voracious, and ever-increasing, appetite for cheap electricity. As such, we demand a truly comprehensive Environmental Impact Statement that adequately assesses meaningful alternatives and their environmental impacts in accordance with both the letter and spirit of the National Environmental Policy Act. 9-5-2

If you have any questions, please do not hesitate to contact our offices.

In peace,

Scott Gollwitzer
Staff Attorney
Appalachian Voices
20 Battery Park Avenue, Suite 405
Asheville, NC 28801
828.225.9685

Tracy Davids
Executive Director
SABP
P.O. Box 3141
Asheville, NC 28802
828.258.2667

2

GOOD AFTERNOON:

MY NAME IS BILL GORMAN. I AM THE MAYOR OF HAZARD. I AM IN MY 26th YEAR OF BEING MAYOR. I SERVED OVER THIRTEEN YEARS AS THE VICE-CHAIRMAN OF THE KY. ENVIRONMENTAL QUALITY COMMISSION.

EASTERN KENTUCKY HAS HAD MANY PROBLEMS HISTORICALLY, BUT IN HAZARD AND PERRY COUNTY, WE HAVE BEEN VERY FORTUNATE, BECAUSE WE HAVE BEEN ABLE TO GROW AND DEVELOP.

WE HAVE BEEN ABLE TO TAKE ADVANTAGE OF ROAD CUTS AND FILLS. THE HAZARD BY-PASS COST $31 MILLION DOLLARS, BUT THE BY-PRODUCT OF IT HAS BEEN OVER $100 MILLION IN DEVELOPMENT IN HOLLOW FILLS. 10-3-5

MOUNTAIN TOP REMOVAL AND STRIP JOBS HAVE PROVIDED MUCH NEEDED LAND FOR HOME SITES FOR OUR

PAGE 2

PEOPLE.

THEY HAVE PROVIDED OTHER SITES FOR THE APPALACHIAN REGIONAL HOSPITAL AND THE ARH PSYCHIATRIC HOSPITAL AND THE PHYSICIANS OFFICE BUILDING. THE EAST KY. VETERANS CENTER SITS ON A STRIP MINE BENCH.

WHAYNE SUPPLY, PERRY MANUFACTURING AND D.J. NYPRO ARE LOCATED ON MOUNTAIN TOP REMOVAL SITES RIGHT OFF DANIEL BOONE PARKWAY IN HAZARD. 10-3-5

APPROXIMATELY 300 HOMES IN HAZARD ARE ON MOUNTAIN TOP REMOVAL SITES.

THE COAL FIELDS INDUSTRIAL PARK IS A 500 ACRE MOUNTAIN TOP REMOVAL SITE. IT IS AN AUTHORITY OF PERRY, HARLAN, LESLIE AND BREATHITT COUNTIES &

PAGE 3

IS OPERATED BY THESE COUNTIES.

TRUS JOIST MACMILLAN IS A WOOD PRODUCTS COMPANY, EMPLOYS ABOUT 500 PEOPLE AND THEY HAVE OVER $130 MILLION INVESTED ON A MOUNTAIN TOP REMOVAL SITE.

AMERICAN WOODMARK IN COAL FIELDS INDUSTRIAL PARK (MOUNTAIN TOP REMOVAL SITE) JUST FINISHED A 200,000 SQ. FT. BUILDING AND CURRENTLY EMPLOYS OVER 300 PEOPLE. 10-3-5

EAST KY. CORPORATION JUST FINISHED A SPEC BUILDING (40,000 SQ. FT.) IN THE INDUSTRIAL PARK.

SYKES, IN THE INDUSTRIAL PARK, (MOUNTAIN TOP REMOVAL SITE) HAS BEEN IN OPERATION SINCE 1999 350 EMPLOYEES ARE CLOSING DOWN. HOWEVER, WE TALKED TO OTHER PEOPLE WHO ARE INTERESTED IN THIS SITE YESTERDAY.

PAGE 4

ADJACENT TO THE COAL FIELDS INDUSTRIAL PARK THE STATE GAVE THE CITY OF HAZARD A GRANT TO PLAN A PROPOSED 18 HOLE GOLF COURSE.

ACROSS THE ROAD FROM THE COAL FIELDS INDUSTRIAL PARK IS ANOTHER MOUNTAIN TOP REMOVAL SITE. THE WENDELL H. FORD REGIONAL AIRPORT. THE AIRPORT HAS TWO RUNWAYS - ONE IS 3200 FT. AND THE OTHER 5,000 FT. WE JUST RECEIVED 10-3-5 A $2 MILLION FEDERAL GRANT TO EXTEND THE RUNWAY. THIS $10 MILLION PROJECT INCLUDES A NEW TERMINAL, A V.O.R. SYSTEM AND OTHER STATE OF THE ART EQUIPMENT.

THERE IS A NEW WAL-MART LOCATION ON HIGHWAY 80. THIS DEVELOPMENT WILL BE COSTING APPROXIMATELY $50 MILLION DOLLARS DEVELOPED AROUND A HOLLOW FILL AND MOUNTAIN TOP REMOVAL SITE TO BE COM-

PAGE 5

PLETED NEXT YEAR.

PERRY COUNTY DETENTION CENTER, A $5.3 MILLION STRUCTURE AND KY. STATE POLICE, POST 13 ARE ALSO ON THE SITE.

THE MINING INDUSTRY IS DOING A GOOD JOB IN RECLAMATION. WE URGE YOU IN YOUR RECLAMATION POLICIES TO ENCOURAGE MINING COMPANIES TO RECLAIM THE LAND WHERE WE CAN GET THE MAXIMUM BENEFIT AFTER MINING FOR DEVELOPMENT AND LAND USE. 10-3-5

"Sandra K. Goss"
<skgoss@esper.com>
01/06/2004 02:13 PM

To: R3 Mountaintop@EPA
cc:
Subject: Draft EIS Comment

January 6, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren,

I write in regard to the Draft Programmatic Environmental Impact Statement on Mountain Top Mining/Valley Fill in the Appalachian region of the eastern United States, on behalf of Tennessee Citizens for Wilderness Planning, a state-wide organization with 500+ members.

There are several issues in the draft EIS that concern us. The primary one is water degradation. Data and accompanying studies confirm that the environmental harm caused by mountaintop removal and valley fill operations is significant and mostly irreversible. More that 1,000 miles of headwater streams have been destroyed or degraded due to valley fill from mountaintop removal mining, with great harm to aquatic life forms downstream. 5-5-2 The laws and regulations that protect clean water must not be weakened particularly the proposal to change the stream buffer zone rule that prohibits mining activity within 100 feet of streams. This rule should be strictly enforced for valley fills and in all other cases. 1-10

Another area of concern is loss of forests, an ongoing problem in the Appalachians. The draft EIS projects that Tennessee will issue permits causing the loss of 9,154 acres of forest between 2003 and 2012 based on permits issued between 1992 and 2002. However, between December 2002 and October 2003, over 5,000 acres of surface mining permits have already been 7-5-2 approved. This potential underestimate of future mining impacts is substantial and needs to be investigated and incorporated in the analysis of cumulative impacts in a revised draft EIS. 9-1-2

The only mitigation offered in the draft EIS for the destruction of large areas of hardwood forest habitat by mining operations is a suggestion that the mine sites could be reforested after operations cease. Convincing evidence that a hardwood forest, essentially the same as the one removed during mining, can be reestablished in a reasonable amount of time, needs to be presented before this method can be offered as mitigation for the loss of hundreds of thousands of acres of biologically diverse hardwood forest habitat. 7-5-3

The damage to water and habitat from mountaintop removal result in a loss of habitat for animals. The Appalachians are an international treasure of biodiversity, with a number of Birds of Conservation Concern. The draft EIS does not address Executive Order 13186, which instructs federal agencies to integrate bird conservation principles and practices into agency activities. The Executive Order needs to be implemented regarding the Mountaintop Removal Mining in the entire study area. 7-3-1

There have been numerous studies conducted in connection with the draft EIS. It seems that the studies with any hint of conservation were ignored. Economic studies prepared for the draft EIS indicate that significant restrictions on the size of valley fills would not cause serious economic harm. The environmental and economic studies prepared for the draft EIS do not lend any support to the administration's proposed "preferred alternative" that recommends weakening existing environmental laws that limit the size and location of valley fills. 1-10

We request a revision of the Draft EIS that will address some of the glaring gaps mentioned above. Thank you for the opportunity to comment.

Sincerely,

Sandra K. Goss
Executive Director
Tennessee Citizens for Wilderness Planning

Sandra K. Goss
4308 Thornwood Drive
Knoxville, Tennessee 37921
865.522-3809
skgoss@ esper.com

TLPJ

TRIAL LAWYERS FOR PUBLIC JUSTICE, P.C.

AUG -7 2003

--- RECD

August 5, 2003

John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Re: Request for Extension of the Public Comment Period on the May 29, 2003 Draft Environmental Impact Statement on Mountaintop Removal Coal Mining

Dear Mr. Forren:

Cindy Rank of the West Virginia Highlands Conservancy has sent you a letter requesting a 90-day extension of the August 29, 2003 deadline for submitting public comments on the May 29, 2003 Draft Environmental Impact Statement (DEIS) on mountaintop removal coal mining in Appalachia. On behalf of the Conservancy, I am sending this letter in further support of its request for an extension of time.

The Conservancy took the lead in negotiating and obtaining the 1998 settlement agreement that resulted in the preparation of this DEIS. It therefore has a special interest in determining that the DEIS fulfills the United States' obligations under that agreement. To carry out this task, the Conservancy sent FOIA requests in June 2003 to West Virginia, OSM, EPA, FWS, CEQ, and the Army Corps seeking records used in preparing the DEIS. 3-5

West Virginia has responded to this request by producing a CD-ROM with over 5,000 email messages and attachments. These files contain tens of thousands of pages. Most of these documents contain highly relevant communications by the Steering Committee members who were directly involved with preparing the EIS. The Conservancy cannot reasonably review and analyze all of this material, in addition to the voluminous materials in the DEIS itself, by August 29.

EPA and CEQ requested an extension of time until August 18, 2003 to produce a full response to the FOIA requests. The Conservancy agreed with that request, with the understanding that CEQ and EPA would produce documents prior to that date as soon as they became available. So far, no documents have been produced. Given the volume of the State's response, and the delay in these additional responses, the Conservancy cannot reasonably review EPA's and CEQ's responses and prepare comments by August 29.

Reply to:
National Headquarters
1717 Massachusetts Avenue, NW
Suite 800
Washington, DC 20036-2001
Phone: (202) 797-8600
Fax: (202) 232-7203

West Coast Office
One Kaiser Plaza
Suite 275
Oakland, CA 94612-3684
Phone: (510) 622-8150
Fax: (510) 622-8155

E-Mail: tlpj@tlpj.org
Web Site: www.tlpj.org

The DEIS is of exceptional public and environmental importance. It states that mountaintop mining causes "fundamental changes to the terrestrial environment," and "significantly affect[s] the landscape mosaic," with post-mining conditions "drastically different" from pre-mining conditions. According to the DEIS, mining impacts on the nutrient cycling function of headwater streams "are of great concern." Mining impacts to habitat of interior forest bird species have "extreme ecological significance." Mining could impact 244 terrestrial species. The loss of this genetic diversity "would have a disproportionately large impact on the total aquatic genetic diversity of the nation."

The DEIS is unusually lengthy and complex. It contains nearly 4,000 pages and encompasses over 30 technical studies. West Virginia's FOIA response indicates that Steering Committee members spent 14 weeks camped at the Interior Department in early 2003 rewriting the document. See May 27, 2003 Hostile Q&A Draft, p. 1. As a result, it differs tremendously from the preliminary draft that the Conservancy obtained in response to a prior FOIA request in 2002. West Virginia's FOIA response also contains a set of agency talking points in which the agencies admit that "mountaintop mining is a complex issue" and that the DEIS is "a very large and complicated document." See May 29, 2003 Communications Strategy, p. 2.

I therefore hope that you will agree that an extension of time is needed.

Sincerely,

Jim Hecker

Jim Hecker

2

REC'D JAN 0 7 2004

Comments of West Virginia Highlands Conservancy and Ohio Valley Environmental Coalition

on the

Draft Programmatic Environmental Impact Statement on
Mountaintop Removal Mining/Valley Fill Activities in Appalachia

Prepared by:

James M. Hecker
Benjamin Wakefield
Trial Lawyers for Public Justice
1717 Massachusetts Avenue, N.W.
Suite 800
Washington, D.C. 20036

Joseph M. Lovett
Appalachian Center for the Economy and the
Environment
P.O. Box 507
Lewisburg, WV 24901

Counsel for West Virginia Highlands Conservancy
and Ohio Valley Environmental Coalition

January 5, 2004

Table of Contents

The West Virginia Highlands Conservancy and the Ohio Valley Environmental Coalition submit the following comments on the Draft Environmental Impact Statement (DEIS) for mountaintop removal mining and valley fills in Appalachia.

I. The DEIS Violates the 1998 Bragg Settlement Agreement

A. The Agreement Required the U.S. to Develop Alternatives to Minimize Environmental Impacts

Under the 1998 Bragg Settlement Agreement, the United States agreed to prepare an EIS:

> on a proposal to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills.

Thus, the central, agreed purpose of that EIS was "to minimize ... the adverse environmental effects" of mountaintop mining operations and valley fills. The January 16, 2001 Executive Summary of the Mountaintop Mining/Valley Fill Status Report on the EIS confirmed that "[t]he agencies agreed to prepare an Environmental Impact Statement (EIS) to consider new guidance and policies to minimize the adverse impacts of mountaintop mining and valley fills." Ex. 4, p. 1.[1] The DEIS violates this agreement. The DEIS does not analyze a single action alternative that is designed to minimize environmental impacts. Instead, the DEIS only analyzes process alternatives that are designed to streamline agency decision making. 1-13

B. From 1998 Until Mid-2002, Preliminary Drafts Recognized that the DEIS Had to Include Action Alternatives to Minimize Environmental Impacts

The process alternatives in the May 2003 DEIS are a radical change from the action alternatives in earlier drafts of the DEIS. The January 16, 2001 Executive Summary of the Mountaintop Mining/Valley Fill Status Report on the EIS stated that "the agencies formulated alternatives for the draft EIS that evaluate changes to the current restrictions on mountaintop mining operations in varying degrees." Ex. 4, p. 5. This summary continued:

> The alternatives use watershed size as a frame of reference as described below. This is considered a definitive and practical basis for comparing the economic and environmental consequences among the respective alternatives. A preferred alternative will not be determined until after the draft EIS has been circulated for public review and public comments have been considered.

Id. (emphasis added). Thus, in January 2001, there was no doubt that the United States believed that the Settlement Agreement required consideration of alternatives to restrict valley fills. A

[1]References are to the exhibit list and exhibits accompanying this letter.

Preliminary Draft EIS was issued in January, 2001. It contained three action alternatives that restricted valley fills to ephemeral or intermittent streams, retained the 100-foot stream buffer zone (SBZ) rule, and required adequate soil practices and forestry PMLUs. Ex. 3, pp. ES-6, IV-1. Different versions of these same alternatives were present in later drafts until June 2002. For example, a March 2002 draft stated:

> The most significant distinction between the four alternatives is how each one addresses Issue 1, "Direct loss of streams and stream impairment." The question of what portions of a stream can be legally filled under SMCRA authority was central to the *Bragg v. Robertson* lawsuit. The District Court decision in that case established that the SMCRA stream buffer zone regulations at 30 CFR 816.57 and 817.57 do not allow mining activities (including valley fills) within 100 feet of intermittent or perennial streams. The Fourth Circuit Court of Appeals later vacated the District Court's decision, but on grounds unrelated to the applicability of the stream buffer zone rule. Because of the atmosphere of regulatory uncertainty surrounding this issue, and the importance of allowable valley fill size to mine viability and environmental impacts, the agencies developed the EIS alternatives around it. Each alternative proposes different changes to regulatory programs that determine the allowable extent of stream loss through valley filling. The amount of valley filling that is allowable will affect the amount of mining that can occur, which in turn will determine the environmental and economic consequences of selecting a given alternative. 1-13

Ex. 21, Att., p. 5 (emphasis added). *See also* Ex. 24, p. IV-2. The Proposed Agenda for a June 18, 2002 Steering Committee meeting describes the four alternatives as follows:

Table IV-1 Mountaintop Mining / Valley Fill EIS Alternative Summary	
Alternative A	No changes to the SMCRA and CWA programs in effect in 1998
Alternative B	Depending on the outcome of a detailed, permit-by-permit baseline data collection; thorough, site-specific, significant adverse impact analyses; and, consideration of alternatives for avoidance and minimization, valley fills could be allowed in ephemeral, intermittent, and perennial stream segments. Mitigation of unavoidable impacts would require in-kind replacement of aquatic functions and values within the watershed.
Alternative C	Valley fills could be located in ephemeral and intermittent streams. Permit-by-permit baseline data collection and site-specific alternatives analyses would be required (although not necessarily as rigorous as in Alternative B) to demonstrate that avoidance and minimization were considered. Mitigation options for unavoidable impacts would be somewhat more varied and thus more flexible than under Alternative B.
Alternative D	Valley fills could be located only in the ephemeral portion of streams. Permit-by-permit baseline data collection would be more limited than under Alternative B, and alternative analyses would demonstrate that minimization of downstream or indirect impacts were considered. Mitigation could include compensation in lieu of in-kind replacement of lost aquatic function and value.

2

Ex. 33, Proposed Agenda, p. 7.

C. In October 2001, the Deputy Secretary of Interior Ordered a Complete Change in the Direction and Purpose of the EIS

However, on October 5, 2001, J. Steven Griles, Deputy Secretary of the U.S. Department of the Interior, issued a letter to the CEQ, Office of Management and Budget (OMB), EPA, and COE, stating in pertinent part:

> We believe the [MTM/VF] EIS is the logical vehicle to address environmental protection and promote government efficiency, while meeting the nation's energy needs... We do not believe that the EIS, as currently drafted, focuses sufficiently on these goals. We must ensure that the EIS lay the groundwork for coordinating our respective regulatory jurisdiction in the most efficient manner. At a minimum, this would require that the EIS focus on centralizing and streamlining coal mine permitting, and minimizing or mitigating environmental impacts. 1-13

Ex. 7, p. 1 (emphasis added). In an October 11, 2001 e-mail, Mike Robinson (OSM) explained:

> OSM has received some executive direction from the Department of the Interior on a[n] overall theme for the EIS to embrace... It's ... in line with the President's desired direction for the energy policy. [T]he document was shared by Deputy Secretary Griles with many of the principals of our agencies this Monday at a meeting with the President's [CEQ].

Ex. 8, p. 2.

In response to the Griles letter, OSM developed a "Vision" statement.[2] *See* 10/19/01 Hoffman e-mail, Ex. 9 ("I've also included the 'vision' that OSM developed in response to the Griles letter"). In the heading of the OSM "vision statement" clearly appeared "the vision," as follows:

[2]Ex. 9, p.1: "I've also included the 'vision' that OSM developed in response to the Griles letter."

3

The Vision: ***Streamline the regulation of valley fills by creating a "one-stop" permitting authority to satisfy all pertinent statutory requirements.***

Ex. 9, Att., p. 2 (bold type, underlining, and italics in original). The "OSM vision" sought to address the "problem" that "[t]he Bragg settlement agreement increased COE and EPA involvement in the review of coal mining permit applications" by creating "a comprehensive 'one-stop' permitting authority within state government to satisfy CWA and SMCRA." Id., p. 2 (emphasis in original). The "OSM Vision" explained:

> **Refocusing of the EIS:** ... The EIS, as currently drafted, ... does not sufficiently consider options for centralizing and streamlining coal mine permitting. The scope of the EIS should be narrowed to focus on minimizing and mitigating impacts to the waters of the U.S. rather than the broad scope currently contained in the draft.

Id., p. 4 (bold type in original, underlining added). The new "OSM Vision" represented a dramatic departure from the policy and purposes underlying the preliminary DEIS. As observed by Dave Densmore (USFWS) in an October 11, 2001 e-mail to Mike Robinson (OSM):

> Needless to say, this is not a shining example of our Department having "spoken with one voice," since I can find no evidence of anyone at FWS having reviewed or concurred with this approach. Regardless, based on my initial review, I find I cannot support this approach, if for no other reason than the record having amply demonstrated that it has been the absence of federal oversight, not its confounding influence, that has gotten us in the fix we are in now.

1-13

Ex. 9, p. 1.

As the "OSM Vision" reshaped the EIS, it became clear that OSM was demanding to do away with the SBZ rule, not consider any requirement for reforestation, avoid regulation of "terrestrial impacts" altogether, and consolidate permitting authority in the OSM, the COE, and state SMCRA agencies (the development agencies) while diminishing the role of EPA and FWS (the environmental protection agencies). Ex. 10, 11, 12, 13, 19, 20.[3] These objectives were

[3]The drafters of the DEIS recognized that the "OSM Vision" represented a dramatic departure with "key changes" from the PDEIS – that is, that the DEIS gutted the substantive environmental restrictions contained in the PDEIS in favor of purely "process" alternatives. For example, a January 16, 2003 memorandum regarding "[MTM/VF] DEIS Background Information for Communications Team," identified a series of "key issues that we anticipate will be raised when the DEIS is published for public review," including the following: "In response to a 2001 FOIA request, an earlier version of the DEIS. . . [was] released to the public... The current draft is different in several important respects, including the characterization of alternative actions being considered in the DEIS. (The earlier version focused on evaluation of alternative restrictions for limiting the size of valley fills as a way to limit environmental impacts. The current version is focusing on alternative 'programmatic' improvements under CWA and SMCRA to ensure more effective environmental protection. Why were these key changes made?" Ex. 62, p. 2 (emphasis added).

embodied in what was called "Alternative B," which OSM had unilaterally[4] designated as the "preferred alternative." Id. Alternative B contained the process changes necessary to "streamline" the permitting process and consolidate authority in the development agencies, while setting no substantive limits on fill size, location, or impacts. Ex. 24, p. IV-1. EPA's William Hoffman summarized:

> ...OSM seems to be understating the "environmental criteria" aspects of the Section 404(b)(1) guidelines that must be satisfied before a decision to issue a permit can be made. OSM seems to be focusing solely on procedural aspects, which, if satisfied, will always lead to permit issuance ... even if the [environmental] impacts continue to be significant. If OSM focuses solely on incorporating the procedural aspects of the Section 404(b)(1) guidelines without including the "environmental criteria," the Section 404/SMCRA merger will be incomplete. The reason this is troubling to me is a statement made ... by an OSM attorney which suggested that ... [a] permit will not be denied based upon environmental effects... We must make sure that the SMCRA rule changes incorporate performance standards that look at both process and environmental effects (material damage in OSM lingo) if the one stop permitting process is to work.

2/13/02 Hoffman e-mail, Ex. 15 (emphasis added and removed). Mr. Hoffman further explained: 1-13

> OSM has been pushing hard to avoid requiring reforestation and PMLU controls, and to create a one-stop permitting process for mining with the State SMCRA agency as the regulatory agency for CWA 402 and 404 permitting... They [OSM] are going to propose rule changes at the same time the EIS goes out that would incorporate 404(b)(1) analyses into SMCRA regs and which would modify the stream buffer rule to permit fills under this "enhanced" State review process. As such, they are pushing for the selection of Alternative B in the EIS as the preferred alternative (fills would not be restricted to any particular watershed size or segment - but decisions would be made case-by-case under an improved regulatory scheme). Until the administration changed, we had agreed not to select any alterative as preferred, and wait to see how the public reacted to the different options. *That's all changed now under the current OSM regime.*

2/27/02 Hoffman e-mail, Ex. 17 (emphasis added).

The "OSM Vision" is, in effect, a blatant attempt by political appointees in the Interior

[4]An EPA official stated: "This came right out of the blue last night. There has been absolutely no agency coordination (to my knowledge), and it flys [sic] in the face of all of our previous agreements not to designate a preferred alternative." Ex. 10.

Department to unilaterally rewrite the Settlement Agreement without the consent of the parties to that litigation.[5] As a plaintiff in Bragg, the Conservancy never agreed to OSM's "Vision." Instead, it agreed to the plain language in the Agreement. That "Vision" has become the driving force in the DEIS process, in place of the Settlement Agreement.

D. Shortly After June 2002, Senior Agency Executives Overruled the DEIS Steering Committee and Directed Adoption of a Revised Alternative Framework that Eliminated Any Restrictions on Valley Fills and Substituted Only Process Alternatives

EPA continued to argue in April, 2002 that the SBZ rule should be strengthened rather than eviscerated, and that a NWP 21 minimum impact threshold should be established, particularly within "Alternative B" since that alternative relied on a "project-by-project" review. Ex. 23.[6] The draft of the EIS that existed in April, 2002, while setting forth "Alternative B" as the "preferred alternative," still contained Alternatives C and D, which did contemplate substantive restrictions on fill size and placement. Ex. 24.

Mr. Griles participated in a meeting on April 29, 2002 about the EIS. Ex. 75. On May 22, 2002, the key agency officials working on the DEIS had a conference call with Mr. Griles to receive further directions on the content of that document. 5/16/02 Robinson e-mail, Ex. 25 ("Inasmuch as our principals may be meeting next Wednesday at the Deputy Secretary of Interior's office..."); 5/17/02 Robinson e-mail, Ex. 26 ("I received word ... from Deputy Secretary Griles' office that the principals' meeting next Wednesday will be by a conference call... [T]hey said that Holly Hopkins, Steve Griles' assistant will be contacting WVDEP and the other agencies with the information."); 6/14/02 Robinson e-mail, Ex. 33, Proposed Agenda, p. 10 ("The draft letter from Mr. Griles (DOI) to the Principals of the Steering Committee focuses on the issue of whether or not the DEIS should identify a preferred alternative, and recommends that 'at a minimum, this requires identification of a preferred alternative.'"). On the day of the May 22, 2002 conference call to discuss the DEIS, Mr. Griles received a fax from Assistant Attorney General John Cruden that focused specifically on the text of the 1998 settlement agreement regarding that document. Ex. 27, 28. The clear implication of this fax is that Mr. Griles was 1-13

[5]OSM has suggested that "[n]o political appointees or coal industry representatives participated [in re-writing the EIS]," (6/2/03 Robinson e-mail, Ex. 73, Attachment, p. 1), and that "Mr. Griles was briefed early in 2001 on the status of the EIS by OSM career staff... [but] [o]ther than receiving routine briefing papers prepared by OSM for the Department, Mr. Griles has not been involved in finalizing the document." Id. at 2. Any suggestion that Mr. Griles was not directly involved in the re-writing of the DEIS is at best inaccurate and at worst disingenuous.

[6]*See also* Ex. 29, Attachment ("EPA Issues - MTM/VF EIS"), in which EPA advocated a minimum impact threshold for application of NWP 21, and "actions to ensure" that reforestation occurs after mining is completed.

6

worried that the new direction of the DEIS may violate that agreement.

At a June 18, 2002 meeting, Steering Committee members reconsidered the alternative framework. Ex. 33, Proposed Agenda. EPA and the U.S. Fish and Wildlife Service (FWS) members of the Steering Committee took the position that the DEIS must consider alternatives to reduce environmental impacts. Id. at 8. They believed that "the new framework does not meet the NEPA requirements by providing a contrasting choices [sic] among several clear and distinct alternatives." Id. at 2. As a result of this meeting, the Steering Committee changed the alternative framework, but still recommended inclusion of an alternative that "would represent the suite of actions that would result in the most environmentally-protective alternative (i.e., restricting fills to the ephemeral zone...)." Id. at 11. The Steering Committee approved that recommendation. 6/19/02 Hoffman e-mail, Ex. 34. These changes were incorporated into a new alternatives matrix table. 6/26/02 Robinson e-mail, Ex. 35.

However, shortly thereafter, the Steering Committee's decision was overruled by the DEIS Executive Committee. Unnamed higher-level agency "executives instructed the SC to attempt to construct the alternatives for the EIS in a framework based largely on coordinated decision making for SMCRA and CWA--with no alternative restricting fills." Ex. 41, 9/23/02 Agenda, p. 1. Minutes of a July 14, 2002 Executive Committee meeting show that a new three-alternative approach was adopted. 8/15/02 email, Ex. 38, Attachment: Executive Committee Discussion. As a result, the prior alternatives restricting valley fills were stripped from the DEIS. Instead, the new alternative framework considered only process alternatives. 1-13

E. The Revised Alternative Framework Violates the Settlement Agreement

In a devastating internal critique, the FWS explained why the revised alternative framework violates the Settlement Agreement:

> The Fish and Wildlife Service has reviewed the September 20 draft of Chapter IV for the MTM/VF EIS. We previously proposed a four-alternative scenario that included consideration (not selection) of at least one alternative to restrict, or otherwise constrain, most valley fills to ephemeral stream reaches by employing the significant degradation or advance identification (ADID) provisions of the 404(b)(1) Guidelines. **Our intent was to provide for consideration of at least one alternative that "developed agency policies, guidance, and coordinated decision-making processes" and minimized the impacts of mountaintop mining and valley filling on waters of the U.S. and fish and wildlife resources; a two-part goal established by the settlement agreement that we believe the three-alternative approach failed to accomplish.** Our proposed approach was subsequently voted down within the Executive Committee in part because a decision appears to have been made that even relatively minor modifications of current regulatory practices are now considered to be outside the scope of the EIS process. The current three-alternative framework was adopted, but incorporated only a very limited ADID concept that does not meet our objectives. The September 20 draft retains the

7

deficiencies contained in the previous three-alternative framework, and the full draft of Chapter IV confirms our concerns. Therefore, we continue to object to the use of this approach. However, since the agencies are proceeding based on adoption of this approach, we do not believe that elevating this issue for higher level review would be helpful or productive. The following general comments are intended to provide you only with our sense of how problematic the proposed alternatives framework has become.

Now that the basic concept has been more fully elaborated in the September 20 write-up, **it is painfully obvious to us that there are no differences between the three action alternatives that can be analyzed in a NEPA context.** Table IV-2 (Comparison of Alternatives) underscores this fundamental shortcoming: Each of the three action alternatives offers only meager environmental benefits (thus a "two-star rating," as with a budget hotel or B movie), and there is no difference between them -- even in their degree of meagerness. The relative economic effects of these alternatives are similarly indistinguishable. The reader is left wondering what genuine actions, if any, the agencies are actually proposing.

1-13

Table IV-1 states that the alternatives would "*minimize*" the adverse effects of mountaintop mining and valley fill construction; the "analysis of alternatives" section states that "all three alternatives will result in greater environmental protection that will fulfill the agencies EIS objectives." As we have stated repeatedly, **it is the Service's position that the three "action" alternatives, as currently written, cannot be interpreted as ensuring any improved environmental protection, as stipulated in the settlement agreement, let alone protection that can be quantified or even estimated in advance for purposes of a NEPA analysis.** Without providing clear indications of how the Corps would evaluate projects and reach decisions through either the nationwide permit or individual permit processes, and how the SMCRA agency would make its decisions under Alternative 3, the public will not be able to deduce whether impacts to waters under any of these alternatives would be any different than the no action alternative. Furthermore, the results of implementing individual action items whose "actions" do not produce an outcome ("will continue to evaluate," "will work with the states to establish," "will continue to assess," "will continue to refine"), and of developing "Best Management Practices" whose use will be voluntary, are not likely to effect quantifiable, or even recognizable, improvements in environmental protection.

As we have already discussed *ad nauseum*, NEPA regulations describe the Alternatives section as "the heart of the environmental impact statement" which, in combination with the Affected Environment and Environmental Consequences sections, should "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Even after considering the necessarily broad, programmatic nature of this document, **we have clearly failed to meet these standards.**

8

> The EIS technical studies carried out by the agencies -- at considerable taxpayer expense -- have documented adverse impacts to aquatic and terrestrial ecosystems, yet the proposed alternatives presented offer no substantive means of addressing these impacts. **The alternatives and actions, as currently written, belie four years of work and the accumulated evidence of environmental harm, and would substitute permit process tinkering for meaningful and measurable change.** Publication of a draft EIS with this approach, especially when the public has seen earlier drafts, will further damage the credibility of the agencies involved.

9/30/02 Densmore e-mail, Ex. 42, Attachment: FWS Comments (emphasis added). EPA's Steering Committee member made similar criticisms of this new alternative framework, stating that "[i]t will not be clear to the public that any concrete steps are being proposed among the alternatives that directly address the environmental impacts." 10/4/02 Forren email, Ex. 43, para. 3. The Steering Committee agreed that "additional efforts to better distinguish between the alternatives" were needed. 10/22/02 Peck email, Ex. 44, Discussion Summary, p. 2. Those efforts were minimal, because a week before the DEIS was issued, an EPA briefing statement anticipated that a major issue raised by the public would be: "Process v. Environmental Protection: Where's the meat? What is being proposed that will improve environmental protection? What proposals will place limits on MTM/VF?" 5/21/03 Forren e-mail, Ex. 72, Briefing Outline. 1-13

F. The Narrow Focus and Purpose of the DEIS Eviscerates Its Utility as a Guide for Future Decisions on How to Minimize Environmental Impacts

The narrow focus of the DEIS eviscerates its utility for resolving the MTM/VF controversy, as envisioned by the Settlement Agreement. The Corps itself stated that:

> The use of this document to Army and the Corps, if it does not include evaluations of all of the environmental impacts of Mountaintop Mining/Valley Fills, is minimal. We are proceeding with developing consistency within our agency on 1) waters of the U.S. jurisdictional extent, 2) a stream assessment protocol, 3) mitigation requirements and 4) minimal and cumulative impacts thresholds. Unless this document can serve as an umbrella document that can be tiered off of under NEPA, it does not serve a function for our agency.

Ex. 33, June 18, 2002 Proposed Agenda, p. 10. FWS also criticized the DEIS for its failure to articulate any substantive environmental protections:

> To belabor a point I know you're all sick of hearing, the "Why" in this case is supposed to be "to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills." In the case of the alternatives

9

framework that we're working with, "Why?" is instead going to be the public's response when they see that, to accomplish the EIS goal, **all we've proposed is alternative locations to house the rubber stamp that issues the permits**. Why on earth would we even prepare an EIS on such a non-event as tinkering with the permit issuance process, UNLESS we also fully develop and provide the details on HOW each one of the alternatives is really going to minimize environmental impacts? ...
Mike [Robinson (OSM)] said we don't need to go into details because it's a PROGRAMMATIC EIS... [W]here is it written that programmatic EIS's should offer only vague alternatives ...? Again, it seems that hiding behind the "programmatic" veil that we as agencies have unilaterally chosen and defined, really **violates the spirit of the settlement agreement.**

10/30/02 Tibbott e-mail, Ex. 45 (emphasis added).

As it now stands, the DEIS is simply an analysis of which agency takes the lead role in making the decisions. There is no guidance on how those decisions should be made. The unresolved decisions include what streams should be protected, how many streams should be protected, how the buffer zone rule should be applied, how much forest should be preserved, and how mitigation requirements should be applied. The agencies have not addressed any of these issues in the DEIS or in any other NEPA document. Nor have they explained whether the different alternatives would reach different conclusions about these issues. As a result, the DEIS is useless as a means of guiding future decisions on minimizing environmental impacts, and all of these issues will have to be addressed in additional EISs in the future. 1-13

In sum, early drafts of the DEIS considered alternatives that were designed to minimize environmental impacts, as the Settlement Agreement required. OSM then substituted its own "vision" of one-stop permitting that unilaterally amended the Settlement Agreement. To carry out that unilateral amendment, the DEIS substitutes purely process alternatives that eviscerate the utility of the document in deciding how to minimize environmental impacts. Consequently, the DEIS violates the Settlement Agreement.

II. In Addition to Violating the Settlement Agreement, the DEIS Violates NEPA in Numerous Respects.

A. The DEIS Violates NEPA Because It Does Not Contain a Reasonable Range of Alternatives; All of the Alternatives Are "Process Alternatives" Without Any Substantive Differences. 4-2

The three "action alternatives" considered in the DEIS do not represent a legally sufficient range of alternatives because they are merely "process alternatives" without any substantive differences between them, or any substantive difference from the "no action alternative." That is, the three "action alternatives" contemplate merely reshuffling the procedural responsibilities between the various agencies, and all three have the same or very

10

similar environmental impacts. None of the alternatives consider substantive restrictions or changes from the status quo.

The DEIS directly states that "[a]ll alternatives ... are based on process differences and not directly on measures that restrict the area of mining." DEIS IV.G-3 (emphasis added). The DEIS further admits that "[t]he environmental benefits of the three action alternatives are very similar," (DEIS II.B-13), and that "[t]he regulatory responsibilities ... are common to all the alternatives. However, the lead agency for each responsibility under the action could vary under each alternative." DEIS II.C-25. The DEIS further explains: "This programmatic EIS is necessarily broad given its purpose of addressing policies, guidance, and coordinated agency decision-making processes... The proposed action alternatives are largely administrative and as a result, accurately projecting their environmental consequences is difficult." DEIS IV.A-1. That the DEIS relies upon a fundamental misconception that it need not consider substantive environmental restrictions is evident also in the agenda for an Executive and Steering Committee meeting of November 21, 2002, which states:

-Lack of environmental contrast; *is a fill restriction component needed in Alternative 1 to provided [sic] most environmentally-protective alternative? ...*
-OFA states that NEPA compliance not satisfied; alternatives need not be limited to existing statutory authority — *Should a "no mining" or other restrictive alternative be included?;*
- Counter: current contrast is "administrative" and similar environmental consequences is ok for programmatic DEIS and consistent with 1999 Notice of Intent and 1998 settlement agreement. 4-2

11/18/02 Hodgkiss e-mail, Ex. 52, Attachment (underlining added). As argued throughout thes comments, a mere "administrative contrast" without distinguishable environmental restrictions or consequences between the alternatives is **not** consistent with the 1999 Notice of intent, the Bragg settlement agreement, or NEPA requirements to consider a reasonable range of alternatives.

Members of the Executive and Steering Committees criticized the DEIS for this same reason. FWS stated that it "is painfully obvious to us that there are no differences between the three action alternatives that can be analyzed in a NEPA context." Ex. 42, FWS Comments (emphasis added). The FWS further commented that "all we've proposed is alternative locations to house the rubber stamp that issues the permits." 10/30/02 Tibbott e-mail, Ex. 45. EPA's John Forren stated that: "On its face, the set of alternatives studied in detail in this DEIS do not represent the full range of alternatives . . ." 10/4/02 Forren email, Ex. 43. "[T]he principal distinction between the three proposed alternatives is which agency will take the lead role..." Id., Detailed Comments, para. 4. **"A question that will surely be posed by some in the public is 'They did an EIS to determine which federal agency should take the lead role?'"** Id. (emphasis added). Similarly, EPA's Wheeling Office commented:

The body of the report has excellent scientific information on the environmental impacts

11

of MTM/VF mining. Unfortunately, it appears that information was not used in developing the Alternatives. It is not clear why Alternative 2 is the preferred alternative when the only major difference among the three alternatives seems to be which agency leads the permit process. The summary of the alternatives ... states that cross-program actions minimizing adverse effects of mountaintop mining and valley fill construction on terrestrial resources and the public **are identical in Alternatives 1, 2 and 3**.

Ex. 55, Attachment: Comments, p. 1 (emphasis in original); *see also*, 12/29/02 George email, Ex. 56 (the DEIS' "science findings are not reflected in [its] conclusions/recommendations"). EPA's Greg Peck recommended consideration of a 50% restriction on first order streams in second order watersheds because it would "address our goal of sharply defining the differences among the alternatives and to address cumulative impacts, which he feels is lacking among the alternatives now." 11/15/02 Forren email, Ex. 51. FWS' Tibbott proposed applying the alternatives to a hypothetical mine project to understand what the consequences of each alternative were, but that proposal was rejected. 11/1/02 Robinson email, Ex. 46.

The CEQ's NEPA regulations provide that the Record of Decision on an EIS must "[i]dentify all alternatives considered by the agency in reaching its decision, specifying the alternative or alternatives which were considered to be environmentally preferable." 40 C.F.R. § 1505.2(b) (emphasis added). OSM has explained: "These actions (e.g., what may specifically be intended by the agencies in a record of decision following the final EIS – not some indefinite 'future' possible actions) will dictate the alternatives..." 6/10/02 Robinson e-mail, Ex. 29, p. 2. Any record of decision regarding MTM/VF operations in Appalachia will be unable to comply with this regulation because the DEIS does not identify or *consider* any alternative which is distinguishable from any other alternative in environmental consequences. 4-2

The court in Simmons v. United States Army Corps of Eng'rs, 120 F.3d 664, 666 (7th Cir.1997), stated the rule that "[t]he broader the purpose, the wider the range of alternatives." Despite the DEIS's admission that "[t]his programmatic EIS is necessarily broad," (DEIS IV.A-1), however, the range of alternatives considered in the DEIS is quite narrow, containing no analysis of how stream loss will differ under the three alternatives nor any analysis of how much stream loss will be avoided under any particular alternative. DEIS IV.B-1, *et seq*. Instead, the DEIS merely makes the conclusory statement that "SMCRA and CWA program improvements common to the action alternatives ... will serve to reduce future direct stream loss," (DEIS IV.B-3 (emphasis added)), and admits that "[t]he indirect impacts from MTM/VF will continue regardless of alternative selected by decision makers." DEIS IV.B-5 (emphasis added). The DEIS fails to satisfy the NEPA requirement to consider an adequate range of alternatives because the DEIS does not consider any substantive restrictions, considering only rearrangements of existing procedural responsibilities between the relevant agencies.

NEPA requires an EIS to "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public," and to "rigorously explore and

12

objectively evaluate all reasonable alternatives." 40 C.F.R. § 1502.14 (emphasis added). In Friends of Southeast's Future v. Morrison, 153 F.3d 1059 (9th Cir. 1998), the court summarized:

> An EIS must describe and analyze alternatives to the proposed action. *See* Alaska Wilderness Recreation & Tourism Ass'n v. Morrison, 67 F.3d 723, 729 (9th Cir.1995). Indeed, the alternatives analysis section is the "heart of the environmental impact statement." 40 C.F.R. § 1502.14. The agency must look at every reasonable alternative within the range dictated by the nature and scope of the proposal. *See* Idaho Conservation League, 956 F.2d at 1520. **The existence of reasonable but unexamined alternatives renders an EIS inadequate.** *See* Alaska Wilderness Recreation & Tourism Ass'n, 67 F.3d at 729.

Id. at 1065 (emphasis added). In Simmons v. U.S. Army Corps. of Engineers, 120 F.3d 664 (7th Cir. 1997), where the plaintiffs opposed a plan to build a water reservoir, the court stated:

> As a matter of logic, ... [a certain alternative] is not absurd – which it must be to justify the Corps' failure to examine the idea at all... "'The existence of a viable but unexamined alternative renders an environmental impact statement inadequate.'" (citation omitted)... If NEPA mandates anything, it mandates this: a federal agency cannot ram through a project before first weighing the pros and cons of the alternatives. In this case, the officials of the Army Corps of Engineers executed an end-run around NEPA's core requirement. By focusing on the single-source idea, the Corps never looked at an entire category of reasonable alternatives and thereby ruined its environmental impact statement. 4-2

Id. at 669-70 (emphasis added). *See also*, State of Cal. v. Block, 690 F.2d 753, 767 (9th Cir. 1982) (enjoining release by the U.S. Forest Service of public lands to multiple use management because the programmatic EIS prepared by the agency, which dealt with management category designations for 62 million acres of National Forest Service land, did not consider any alternative which allocated more than one-third of the land to "wilderness" designation, and the agency's selection of alternatives dictated an "end result" in which non-wilderness designations substantially exceeded wilderness designations, despite the fact that all of the land met the criteria for wilderness designation).

In contrast to the deficient EIS at issue in Simmons, the court in Northern Alaska Environmental Center v. Lujan, 961 F.2d 886 (9th Cir. 1992), found the EIS prepared by the U.S. Park Service for mining operations in the Yukon-Charley Rivers National Preserve ("Yukon") to be adequate under NEPA. That EIS, in contrast to the MTM/VF DEIS, *does* contain different alternatives with environmentally distinguishable substantive restrictions and consequences. For example, the Yukon EIS uses "Resource Protection Goals" (RPGs) to quantify stream loss due to future mining under different alternatives. Ex. 1, p. 149.

The three "action alternatives" in the MTM/VF DEIS are purely process alternatives and

13

provide no meaningful basis for analyzing or reducing environmental impacts. By failing to consider reasonable alternatives that would restrict the size, scope, and number of valley fills, the DEIS fails to consider a reasonable range of alternatives, as NEPA requires.

B. The DEIS Violates NEPA Because It Adopts OSM's "Vision" and Defines the DEIS's Purpose and Scope in an Unreasonably Narrow Manner.

The DEIS further violates NEPA in that it defines the purposes of its action to be so unreasonably narrow that only "process alternatives" can satisfy it, and therefore illegally rejects a broader range of ***substantive*** alternatives without analysis of their relative impacts. As we have shown, OSM redefined the purpose of the EIS from minimizing environmental impacts to streamlining permitting. The DEIS states that "[t]he proposed action alternatives are largely administrative and as a result, accurately projecting their environmental consequences is difficult." DEIS IV.A-1. The DEIS admits that "[all] alternatives ... are based on process differences and not directly on measures that restrict the area of mining." DEIS IV.G-3 (emphasis added). Although the DEIS states that "[o]ne of the principal goals of this EIS is to explore ways to minimize the adverse impacts on streams from [MTM/VF] construction," (DEIS II.C-30), the narrow "process" purposes of the DEIS only allow it to "focus[] on the existing regulatory controls and alternatives to these controls that have a bearing on the direct loss of streams..." (DEIS II.C-30 to C-31), and force the DEIS to eliminate from consideration any direct restrictions on stream loss.

The CEQ's NEPA regulations warn that a NEPA document is not to be used to justify a decision already made. 40 C.F.R. § 1502.2(g). Thus, "an agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative ... would accomplish the goals of the agency's action, and the EIS would become a foreordained formality." Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991), *cert. denied*, 502 U.S. 994 (1991). *See also*, Muckleshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, 812-14 (9th Cir. 1999). 4-2

In Simmons, 120 F.3d at 666, the court explained:

> When a federal agency prepares an [EIS], it must consider "all reasonable alternatives" in depth. 40 C.F.R. § 1502.14. No decision is more important than delimiting what these "reasonable alternatives" are. That choice, and the ensuing analysis, forms "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. To make that decision, the first thing an agency must define is the project's purpose. *See* Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 195-96 (D.C.Cir.1991). The broader the purpose, the wider the range of alternatives; and vice versa. The "purpose" of a project is a slippery concept, susceptible of no hard-and-fast definition. One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). The federal courts cannot condone an agency's frustration of Congressional will. If the

14

> agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy the Act. 42 U.S.C. § 4332(2)(E). [emphasis added]

In Davis v. Mineta, 302 F.3d 1104 (10th Cir. 2002), the plaintiffs sought to enjoin a highway project, including construction of a new bridge over the Jordan River in Utah, arguing that the defendants had violated NEPA by failing to consider reasonable alternatives. Citing, *inter alia*, Simmons, the Davis court held:

> While it is true that defendants could reject alternatives that did not meet the purpose and need of the project, ... they could not define the project so narrowly that it foreclosed a reasonable consideration of alternatives... Further, if the Project did narrowly express its purposes and needs as requiring a new crossing across the Jordan River at 11400 South, we would conclude that such a narrow definition of Project needs would violate NEPA given the more general overarching objective of improving traffic flow in the area.

302 F.3d at 1119 (citations omitted) (emphasis added).

Similarly, here, by focusing on the "OSM Vision" to "[s]treamline the regulation of valley fills by creating a 'one-stop' permitting authority to satisfy all pertinent statutory requirements" (Ex. 9), and eliminating an entire category (*i.e.*, substantive restrictions) of reasonable alternatives, the DEIS violates NEPA. *See, e.g.*, Simmons, 120 F.3d at 670 ("By focusing on the single-source idea, the Corps never looked at an entire category of reasonable alternatives and thereby ruined its environmental impact statement."). *See also*, Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1215 n.6 (9th Cir. 1998) (denouncing "[e]xpediency and prejudice in favor of logging over NEPA compliance and adequate concern for the environment."). 4-2

C. The Alternatives Considered in the DEIS Violate NEPA and Defeat the Purpose of a Programmatic EIS Because They All Defer Analysis to Future "Case-by-Case" Decisions on Mining Activities, and Are Not Designed to Address and Reduce the Cumulative Impacts of Those Decisions.

The alternatives considered in the DEIS fail to meet the requirements of NEPA because they all rely on future "case-by-case" analyses. This precludes effective analysis of cumulative impacts, impermissibly segments mining activities into individual mines, and defeats the purpose of a programmatic EIS. That is, any alternative which would have evaluated cumulative or regional impacts was not carried forward in the DEIS, while all of the alternatives which are considered in the DEIS are based on "site-specific" analyses only. *See* DEIS II.D-1, regarding "Alternatives Considered But Not Carried Forward in this EIS," stating: "Other alternatives evaluated [but not carried forward] used cumulative impact measures to limit the size, location, and number of valley fills in a given cumulative impact area." Specifically, the DEIS explains: "A number of alternatives with restrictions ... based on cumulative impacts ... were considered

15

and dismissed... The existing data do not show that an across-the-board cumulative impact threshold could replace case-specific evaluations of all MTM/VF and other disturbances within a defined CIA [(cumulative impact area)]/watershed." DEIS II.D-6.

NEPA requires an agency to consider the cumulative impact of the proposed action together with "other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.7. The CEQ has further explained in its 1997 guidance document on cumulative impact analysis that: "If ... significant cumulative effects would occur as a result of a proposed action, the project proponent should avoid, minimize, or mitigate adverse effects by modifying or adding alternatives." CEQ, "Considering Cumulative Effects Under the National Environmental Policy Act," Ex. 2, p. 45 (emphasis added).

"Cumulative impacts can result from individually minor but collectively significant actions..." 40 C.F.R. § 1508.7. A NEPA document must "catalogue adequately the relevant past projects in the area." City of Carmel-by-the-Sea v. U.S. Dep't of Trans., 123 F.3d 1142, 1160 (9th Cir. 1997). It must also include a "useful analysis of the cumulative impacts of past, present, and future projects [which] requires a discussion of how [future] projects together with the proposed ... project will affect the environment." Id. The NEPA document must analyze the combined effects of the actions in sufficient detail to be "useful to the decision-maker in deciding whether, or how, to alter the program to lessen cumulative impacts." Id. Detail is therefore required in describing the cumulative effects of a proposed action together with other proposed actions. Neighbors of Cuddy Mountain v. USFS, 137 F.3d 1372, 1379 (9th Cir. 1998). A meaningful cumulative impact analysis "must identify (1) the area in which the effects of the proposed project will be felt; (2) the impacts that are expected in that area from the proposed project; (3) other actions--past, present, and proposed, and reasonably foreseeable--that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate." Grand Canyon Trust v. FAA, 290 F.3d 339, 345 (D.C. Cir. 2002). *See also*, Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1214-1215 (9th Cir. 1998); City of Tenakee Springs v. Clough, 915 F.2d 1308, 1312 (9th Cir. 1990); Friends of the Earth v. U.S. Army Corps of Engineers, 109 F. Supp.2d 30, 41 (D.D.C. 2000). 4-2

Federal agencies cannot "evade their responsibilities" under NEPA by "artificially dividing a major federal action into smaller components, each without a 'significant' impact." Coalition on Sensible Transportation, Inc. v. Dole, 826 F.2d 60, 68 (D.C.Cir. 1987). That is, cumulative impacts analysis cannot be avoided by "segmenting" the project. NEPA requires "that an agency consider the effects of several related actions in a single EIS in appropriate circumstances. 'Not to require this would permit dividing a project into multiple 'actions,' each of which individually has an insignificant environmental impact, but which collectively have a substantial impact.'" Churchill County v. Norton, 276 F.3d 1060, 1076 (9th Cir. 2001), *quoting* Thomas v. Peterson, 753 F.2d 754, 758 (9th Cir. 1985). Valley fills fit the classic paradigm of cumulatively significant actions, where "[d]ozens of small operations of a single type incrementally contribute to deterioration of water quality in a common drainage stream." Sierra

Club v. Penfold, 664 F.Supp. 1299, 1303 (D.Alas. 1987), *aff'd.*, 857 F.2d 1307, 1320-22 (9th Cir. 1988). "While the operations are not functionally or economically interdependent, their impacts are interdependent and require common analysis." Id. at 1304. In Penfold, as here, a federal agency had granted numerous permits for mining in a watershed without considering their cumulatively significant effects. The court held that an EIS was required. Id. at 1305. Other courts have similarly held that the successive dumping of material into the same area requires analysis of cumulative impacts in an EIS. NRDC v. Callaway, 524 F.2d 79, 87-89 (2nd Cir. 1975); Manatee County v. Gorsuch, 554 F.Supp. 778, 793 (M.D. Fla. 1982); National Wildlife Federation v. Benn, 491 F.Supp. 1234, 1248-52 (S.D.N.Y. 1980).

The three action alternatives considered in the DEIS fail to meet the requirements of NEPA because they all rely on "case-by-case" analyses and therefore preclude effective analysis of cumulative impacts.[7] Any alternative which *would* have evaluated cumulative or regional impacts was not carried forward in the DEIS, while all of the alternatives which are considered in the DEIS are based on "site-specific" analyses only. *See* DEIS II.D-1, 6. Each of the alternatives considered in the DEIS, therefore, would impermissibly segment mining activities into individual mines covering a small area, even though it is highly likely that mining will continue over a much wider geographic area until coal reserves are exhausted.[8] The DEIS thus defeats the purpose of a programmatic EIS – consideration of alternatives for reducing cumulative impacts – by only considering alternatives that defy cumulative impacts analysis and rely entirely on case-by-case analyses.

Cumulative impact analysis is precisely the function of a programmatic EIS. "The CEQ regulations require that so-called 'connected' or 'cumulative' actions be considered in a single EIS. 40 C.F.R. § 1508.25(a)(1), (a)(2); ... 'Where there are large-scale plans for regional development, NEPA requires both a programmatic and a site-specific EIS...'" Churchill County, 276 F.3d at 1076 (citation omitted; emphasis added). The Second Circuit has stated: 4-2

[7]This NEPA "cumulative impacts" violation is distinct from the CWA "minimal cumulative impacts threshold" violation discussed below in which the "case-by-case" approach advocated in the DEIS for all alternatives is inherently inconsistent with the requirement in Section 404(e) of the CWA that activities permitted under NWPs cannot have more than minimal cumulative adverse effects on the environment.

[8]*See, e.g.,* DEIS IV.I-1 ("[T]he demand for central Appalachian coal will likely increase at some point in the future."); DEIS ES-2 ("The U.S. Department of Energy (DOE) estimated in 1998 that 28.5 billion tons of high quality coal ... remain in the study area. DOE reported about 280 million tons of coal were extracted by surface and underground mining from the study area in 1998. Coal produced from the study area continues to provide an important part of the energy needs of the nation. Regionally, coal mining is a key component of the economy[,] providing jobs and tax revenue. Almost all of the electricity generated in the area comes from coal-fired power plants... [C]oal production remains high...").

The purposes of NEPA are frustrated when consideration of alternatives and collateral effects is unreasonably constricted. This can result if proposed agency actions are evaluated in artificial isolation from one another. Accordingly, an agency is required to consider the full implications of each decision in light of other potential developments in the area, and to prepare a comprehensive impact statement if several projects are significantly interdependent.

Greene County Planning Bd. v. Federal Power Comm'n, 559 F.2d 1227, 1232 (2d Cir. 1976), *cert. denied*, 434 U.S. 1086 (1978) (emphasis added). In Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Com'n., 481 F.2d 1079, 1086-1088 (D.C. Cir. 1973), the court quoted from a 1972 CEQ memorandum on this issue and observed:

> [T]his section will focus on ... the [Commission's suggested] possibility of substituting an "environmental survey" for a NEPA statement... The Commission takes an unnecessarily crabbed approach to NEPA in assuming that the impact statement process was designed only for particular facilities rather than for analysis of the overall effects of broad agency programs. Indeed, quite the contrary is true.
>
> > "Individual actions that are related either geographically or as logical parts in a chain of contemplated actions may be more appropriately evaluated in a single, program statement. Such a statement also appears appropriate in connection with ... the development of a new program that contemplates a number of subsequent actions. ... [T]he program statement has a number of advantages. It provides an occasion for a more exhaustive consideration of effects and alternatives than would be practicable in a statement on an individual action. It ensures consideration of cumulative impacts that might be slighted in a case-by-case analysis."

4-2

See also, Tex. Committee on Natural Resources v. Bergland, 433 F.Supp. 1235, 1252 (E.D.Tex. 1977), *rev'd on other grounds*, 573 F.2d 201 (5th Cir. 1978), *citing* the 1972 CEQ Memorandum for the proposition that "[t]he CEQ has ... issued guidelines stating the advantages of a programmatic EIS."[9] These "advantages of a programmatic EIS" were noted also by the court in Ass'n. of Pub. Agency Customers v. Bonneville Power, 126 F.3d 1158, 1184 (9th Cir. 1997), where the court observed: "In many ways a programmatic EIS is superior to a limited, contract-specific EIS because it examines an entire policy initiative rather than performing a piecemeal analysis within the structure of a single agency action." (emphasis added).

The court in National Wildlife Fed. v. Appalachian Reg. Com'n., 677 F.2d 883, 887-88

[9] "CEQ's interpretation of NEPA is entitled to deference. Andrus v. Sierra Club, 442 U.S. 347, 358 (1979). The same is true of an opinion by CEQ's general counsel. *See* Defenders of Wildlife v. Andrus, 627 F.2d 1238, 1246-47 (D.C.Cir.1980)." Seattle Audubon Soc. v. Lyons, 871 F. Supp. 1291, 1319 (W.D. Wash. 1994).

(D.C.Cir. 1981), explained at length the function and role of a "programmatic EIS:"

> Two distinct tiers of environmental review may be applicable to some "major Federal actions." *Site-specific EISs constitute a second tier in the discussion and analysis of* impacts on the environment. ... "The first tier EIS should focus on broad issues such as mode choice, general location and areawide air quality and land use implications of alternative transportation systems." A programmatic EIS reflects the broad environmental consequences attendant upon a wide-ranging federal program. The thesis underlying programmatic EISs is that a systematic program is likely to generate disparate yet related impacts. This relationship is expressed in terms of "cumulation" of impacts or "synergy" among impacts that are caused by or associated with various aspects of one big Federal action. Whereas the programmatic EIS looks ahead and assimilates "broad issues" relevant to one program design, the site-specific EIS addresses more particularized considerations arising once the overall program reaches the "second tier," or implementation stage of its development. In evaluating a comprehensive program design an agency administrator benefits from a programmatic EIS which indubitably "promote(s) better decisionmaking." ... The Supreme Court has held that the environmental consequences of proposed actions must all be considered together in a single, programmatic EIS when their impacts will have a compounded effect on a region. "Cumulative environmental impacts are, indeed, what require a comprehensive impact statement." In other words, if the "major Federal action" at issue consists of a number of related enterprises associated within a single program and planned together, then their joint effects should probably also be considered together. This proceeds from the requirement that the scope of the federal action be accurately characterized to ensure that an EIS of equivalent scope is prepared.

4-2

(emphases added and removed). The court further explained, regarding "program segmentation:"

> Quite simply, "(s)egmentation of a large or cumulative project into smaller components in order to avoid designating the project a major federal action has been held to be unlawful." *We assume this same proscription would apply if an agency sought to evade* its NEPA responsibility to consider programmatic environmental impacts. The existence of a comprehensive program with cumulative environmental effects cannot be escaped by disingenuously describing it as only an amalgamation of unrelated smaller projects.

677 F.2d at 890 (citation and footnote omitted) (emphasis added).

Further, not only must cumulative "proposed action" impacts be considered together in a programmatic EIS, but so also must cumulative "foreseeable action" impacts. As explained in Texas Committee on Natural Resources v. Van Winkle, 197 F. Supp.2d 586, 617 (N.D.Tex. 2002): "[E]ven if a foreseeable, future action is not a proposed action such that it does not need to be analyzed and decided in the same EIS, the cumulative impacts of this foreseeable action nevertheless must be analyzed in the EIS." (citation omitted). Similarly, in Cady v. Morton, 527

F.2d 786, 795 (9th Cir. 1975), the court held that an EIS limited to studying the effects of a 770 acre 5-year plan for coal strip mining was inadequate, and that an EIS encompassing the entire 20-year project contemplated by coal leases approved by the Secretary of the Interior was required. The Cady court explained:

> While it is true that each mining plan prepared for tracts within the leased area is to a significant degree an independent project which requires a separate EIS with respect to each, it is no less true that the breadth and scope of the possible projects made possible by the Secretary's approval of the leases require the type of comprehensive study that NEPA mandates adequately to inform the Secretary of possible environmental consequences of his approval.

(emphasis added). *See also* Blue Mountains, 161 F.3d at 1215.

Finally, this programmatic DEIS cannot defer cumulative impacts analysis to future site-specific EISs, even if the cumulative impacts analysis necessitates some degree of "forecasting and speculation" at the programmatic level. In Kern v. U.S. Bureau of Land Management, 284 F.3d 1062 (9th Cir. 2002), plaintiffs challenged the adequacy of an EIS prepared by the BLM in connection with a resource management plan (RMP), under which site-specific timber sales would be governed. The BLM argued, *inter alia*, that detailed environmental analysis need not be undertaken by the EIS for the RMP because such analyses would be undertaken at the site-specific level. The court rejected this argument, holding:

> An agency may not avoid an obligation to analyze in an EIS environmental consequences that foreseeably arise from an RMP merely by saying that the consequences are unclear or will be analyzed later when an EA is prepared for a site-specific program proposed pursuant to the RMP. "[T]he purpose of an [EIS] is to evaluate the possibilities in light of current *and contemplated* plans and to produce an informed estimate of the environmental consequences.... Drafting an [EIS] necessarily involves some degree of forecasting." City of Davis v. Coleman, 521 F.2d 661, 676 (9th Cir.1975) (emphasis added). ... Once an agency has an obligation to prepare an EIS, the scope of its analysis of environmental consequences in that EIS must be appropriate to the action in question. NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment. Rather, it is designed to require such analysis as soon as it can reasonably be done. *See* Save Our Ecosystems v. Clark, 747 F.2d 1240, 1246 n. 9 (9th Cir.1984) ("Reasonable forecasting and speculation is ... implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry,'" *quoting* Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n, 481 F.2d 1079, 1092 (D.C.Cir.1973)). If it is reasonably possible to analyze the environmental consequences in an EIS for an RMP, the agency is required to perform that analysis. 4-2

284 F.3d at 1072 (emphasis added).

20

In the present case, the alternatives considered in the DEIS fail to meet the requirements of NEPA because they all rely on "case-by-case" analyses, precluding effective analysis of cumulative impacts, impermissibly segmenting mining activities into individual mines, and defeating the purposes of a programmatic EIS. "[C]umulative impact analysis must be timely. It is not appropriate to defer consideration of cumulative impacts to a future date when meaningful consideration can be given now." Id. at 1075. *See also*, Defenders of Wildlife v. Ballard, 73 F. Supp.2d 1094, 1112-1114 (D. Ariz. 1999).[10]

The FWS similarly criticized the MTM/VF DEIS, stating:

> Mike [Robinson (OSM)] and I argued ... over the need to provide details on how the programs would evaluate permits under each of the alternatives. Mike said we don't need to go into details because it's a PROGRAMMATIC EIS... [W]here is it written that programmatic EIS's should offer only vague alternatives – especially a programmatic EIS that involved four years of studies that documented environmental impacts that need to be dealt with? Again, it seems that hiding behind the "programmatic" veil that we as agencies have unilaterally chosen and defined, really violates the spirit of the settlement agreement.

10/30/02 Tibbott e-mail, Ex. 45.[11]

4-2

---

[10]In Ballard, the court held:

> At a minimum, this Court must order the Defendants to take a 'hard look' at the cumulative impact of the NWP program, specifically NWPs 13, 14, and 26, and determine that the use of these permits in this region has no significant impact. 'NEPA requires consideration of the potential impact of an action before the action takes place.' Cuddy, 137 F.3d at 1380 (*citing* City of Tenakee Springs, 915 F.2d at 1313). It was not appropriate to defer the cumulative impact assessment to a future date. Id. Defendants were fully aware of NEPA's obligations, as evidenced by their Final Decision, yet they have done nothing since 1996 to comply with the law. This Court cannot condone further violation of NEPA which would result if it allows Defendants to continue authorizing projects with NWPs 13, 14, and 26, when the proper impact analysis has not been performed. As a matter of law, authorizations under the challenged NWPs violate NEPA mandates until Defendants conduct a regionally based, programmatic impact analysis.

73 F. Supp.2d at 1114 (emphasis added). Here, the DEIS does not consider any alternatives based on cumulative impacts. Consequently, the Corps cannot issue any NWPs until it does so.

[11]That the DEIS relies upon a fundamental misconception that it need not consider substantive environmental restrictions - but only reshuffling of "administrative" tasks - due to the

21

D. None of the Three Alternatives Considered in the DEIS Should Be Adopted

All three of the alternatives considered in the DEIS are fatally flawed. They are purely process alternatives that should be discarded and replaced with alternatives that actually reduce the cumulative environmental impacts of mountaintop removal mining and valley fills.

Even if they could be adopted, there is no rational basis for choosing which of the three is the best alternative. First, the three alternatives are internally contradictory. Under Alternative 1, valley fills are presumed to have more than minimal adverse effects and need an individual 404 permit. DEIS II.B-3. Under Alternative 3, valley fills are presumed to have minimal effects and qualify for a NWP 21 authorization. Id. Under Alternative 2, valley fills may or may not have more than minimal adverse effects, depending on case-by-case determinations. Id. The DEIS does not explain why the effects of a valley fill, and the type of 404 permit used, should change depending on which alternative is selected. In reality, the impacts are fixed regardless of which alternative is selected.

Second, the DEIS never specifically explains why Alternative 2 is the preferred alternative and is better than the other two. It makes the general claim that it is "because of the improved efficiency, collaboration, division of labor, benefits to the public and applicants, and the recognition that some proposals will likely be suited for IPs, and others best processed as Nationwide Permit (NWP) 21." DEIS ES-5. These benefits are entirely procedural, and do not explain in any way why, or how, better procedures will lead to better decisions or better protection of the environment. 1-5

Third, it is impossible for the public to discern from the DEIS what difference any of the

---

"programmatic" nature of the EIS is evident also in the agenda for an Executive and Steering Committee meeting of November 21, 2002, which states:

> **Issues Raised During Preparation:**
> -Lack of environmental contrast; *is a fill restriction component needed in Alternative 1 to provided [sic] most environmentally-protective alternative?* ...
> -OFA states that NEPA compliance not satisfied; alternatives need not be limited to existing statutory authority — *Should a "no mining" or other restrictive alternative be included?*;
> - Counter: current contrast is "administrative" and similar environmental consequences is ok for programmatic DEIS and consistent with 1999 Notice of Intent and 1998 settlement agreement.

11/18/02 Hodgkiss e-mail, Ex. 52, Attachment (underlining added). A mere "administrative contrast" without distinguishable environmental restrictions or consequences between the alternatives is **not** consistent with the 1999 Notice of intent, the Bragg settlement agreement, or NEPA.

alternatives will make in terms of environmental impacts. On the contrary, the DEIS admits that the environmental benefits, if any, of the three alternatives are the same. *See, e.g.*, DEIS II.B-13, II.C-25, IV.A-1, IV.G-3. 1-5

E. The DEIS Violates NEPA By Not Analyzing Alternatives to Restrict Valley Fills, Stream Loss, Deforestation, and Use of NWPs

NEPA requires that an EIS "[r]igorously explore and objectively evaluate all reasonable alternatives" to the federal action. 40 C.F.R. § 1502.14(a); Bob Marshall Alliance v. Hodel, 852 F.2d 1223 (9th Cir. 1988), *cert. denied*, 489 U.S. 1066 (1988). The purpose of this "rigorous" analysis is to "provid[e] a clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14; *see also*, 42 U.S.C. § 4332(2)(E); 40 C.F.R. §§ 1507.2(d), 1508.9(b). The CEQ describes the alternatives requirement as the "heart" of the NEPA analysis. 40 C.F.R. § 1502.14. The CEQ has issued guidance explaining that: "If it is determined that significant cumulative effects would occur as a result of a proposed action, the project proponent should avoid, minimize, or mitigate adverse effects by modifying or adding alternatives." Ex. 2, p. 45 (emphasis added). As explained below in section II.G.1.b of these comments, the DEIS clearly demonstrates that the cumulative impacts of MTM/VF operations in Appalachia are significant. Reasonable alternatives that should have been considered are: restrictions on valley fill sizes, either individually or cumulatively; restrictions on deforestation, either individually or cumulatively; restrictions on stream loss, either individually or cumulatively; and individual and cumulative minimal impact thresholds for NWPs.[12]

1. Restrictions on Valley Fill Sizes Should Be Considered 4-2

Restrictions on valley fill sizes, either individually or cumulatively, should have been considered because the studies contained in the DEIS demonstrate that while the cumulative environmental harm caused by past and future valley fills is enormous, the economic impact of valley fill size restrictions is tiny.

Regarding the correlation between valley fill size and environmental harm, the DEIS states that: "[t]he size, number, and location of valley fills correlate with direct loss of streams and riparian and terrestrial habitats," (DEIS II.C-45), and case studies demonstrate that "direct impacts to streams may be greatly lessened" by "reducing the ... size of the excess spoil fill." DEIS IV.I-9. In fact, a March 2002 EPA options paper states that a "con" to "[s]election of Alternative B (unrestricted watershed, project by project review)" is that it: "Will appear inconsistent with findings of tech studies, including economics, and with stated purpose of EIS to reduce impacts." Ex. 18, Attachment, p. 1. Conversely, the same options paper explains that "[s]election of Alternative C (Restricts fills to intermittent zone 250 acre watersheds)" is: "Most consistent with findings of tech studies." Id. The options paper further states that

---

[12]Establishment of a minimal *cumulative* impact threshold does not preclude a finding that such threshold has *already* been exceeded, which has in fact occurred.

"[s]election of Alternative D (Restricts fills to ephemeral zone 75 acre watersheds)" has the "[l]east direct impact on the aquatic ecosystem." Id. at 2.

The record shows that OSM vetoed fill restrictions because they would reduce environmental impacts. The civilian head of the U.S. Army Corps of Engineers stated in a March 11, 2003 email that "OSM is very sensitive about the message that [valley fill] thresholds result in improved environmental quality. IF that were the case, then the real message is that [a] 200 [acre threshold] would be better, 100, better yet and 0 fills, best of all." March 11, 2003 email from George Dunlop to Chip Smith, Ex. 68, Attachment. "Instead, the focus needs to be on stream protocols and the relative quality for each stream." Id. The MTM/EIS Executive Committee admitted that this approach is counterintuitive: "Even without scientific data on the relationship of fill size to indirect impacts, it is intuitive to justify a minimal threshold based on the concept that 'smaller fills are better than larger fills' with respect to direct impacts on aquatic habitat buried by fills." Ex. 65, Agenda, p. 3.

The failure to consider fill restrictions also cannot be justified on economic grounds. The DEIS explains that "in most situations the restriction would change the price of coal to less than one dollar per ton," and that "[t]he price of electricity would continue to rise approximately 1 to 2 percent across the scenarios; the impacts due to restrictions will have little effect on price." DEIS App. G, p. 6 (summary of Phase II Economics study by Hill and Associates) (emphasis added). Even after adjusting the model inputs to be more favorable to the coal industry, the change in the price of coal rose to only two dollars a ton. Id. at 7. The DEIS also observes that "[t]he most restrictive scenario [limiting fills to 35-acre watersheds] would, under the worst condition, cause up to a 20 percent reduction in direct coal mining employment in the region." Id. at 6 (emphasis added). However, "[c]oal mining earnings within West Virginia are 5% of total state income (3% of employment); just over 1% of total earnings and employment in Kentucky, and less than 1% of employment and income in Virginia and Tennessee." DEIS IV.I-2.[13] 4-2

Further, a major theme of the alternatives considered is that mitigation will reduce

[13] *See also*, 1/10/03 Robinson e-mail, Ex. 60, Attachment: MWCI Analysis, p. 8: "As stated in the H&A Final Report, '...it is evident that the electricity prices are quite insensitive to the MTM/VF restrictions, showing differences of only 1%-2%, or 3% at the maximum.' ... Consistent with the results obtained with coal tonnage and direct employment, the anticipated 1.15% increase in the base case from $0.01971/KW-Hr in 2002 to $0.02276/KW-Hr in 2010 overshadows price changes induced by potential valley fill restrictions..." (emphasis added). *See also*, "Mountaintop Mining / Valley Fill DEIS Background Information for Communications Team, January 16, 2003," Ex. 62, p. 2: "As part of the studies conducted in conjunction with the DEIS were studies to assess the economic impacts that would result from implementing actions considering limits on the size of valley fills. Information from the economic studies ... suggest that limits on the size of fills will have only minimal economic consequences on coal and electricity prices." (emphasis added).

24

environmental impacts, although the amount of impact reduction cannot be known because the mitigation is site-specific. *See, e.g.*, DEIS IV.I-2 - I-4. Direct valley fill restrictions would similarly reduce impacts by an unknown but sizable amount and are therefore a valid alternative that should have been considered. The DEIS states:

> It is reasonable to presume that required mitigation costs (i.e., to offset valley fills) will result in future MTM designs with reduced valley fill sizes. The economic studies in Appendix G evaluated absolute fill restrictions to specific watershed sizes... [The studies] provide a logical and parallel inference for potential general economic effects of fill minimization. That is, since some of the economic studies show that absolute fill restrictions increase mining costs due to additional material handling and use of different equipment, it can be inferred that minimizing fills will to some degree also affect mining costs.

DEIS IV.I-3. The DEIS further explains: 4-2

> [M]itigation to replace and restore aquatic functions lost beneath valley fills can be a costly endeavor. Therefore, the cost of compensatory mitigation can serve as an incentive to minimize valley fills in aquatic habitats.

DEIS II.C-47 (emphasis added). In other words, fill restrictions are just a more stringent method of mitigation. (Or, conversely, mitigation costs are just a more clumsy way of achieving fill-size restrictions.) Indeed, *direct fill restrictions appear to achieve the goal of reduced fill size (and therefore less stream, forest and habitat loss) with greater accuracy than does imposing mitigation costs with the secondary effect of making larger fills less economically attractive.* Certainly, direct fill restrictions more effectively limit environmental impacts in light of the fact that technological factors often prohibit *actual* mitigation[14] and "result in greater consideration of in lieu fee arrangements." DEIS II.C-49. Therefore, direct fill restrictions should have been considered as feasible alternatives to mitigation and/or "in lieu fee arrangements."

2. Restrictions on Deforestation Should Be Considered

Restrictions on deforestation, either individually or cumulatively, should have been considered because, as explained in greater detail below in section G.1.b., MTM/VFs have already converted, and will continue to convert, huge portions of one of the most biologically diverse forest areas in the United States into grasslands. "When adding past, present and future 1-13

[14] "Stream creation on filled area is very difficult in general due to the inability to capture sufficient groundwater flows necessary to provide a source." DEIS III.D-18. "To date, no drainage structures observed appear to have successfully developed into a functional headwater stream (Appendix D)." DEIS III.D-19. "In summary, to date functioning headwater streams have not been re-created on mined or filled areas as part of mine restoration or planned stream mitigation." DEIS III.D-20.

25

terrestrial disturbance, the study area estimated forest impact is 1,408,372 acres which equates to 11.5% of the study area." DEIS IV.C-1. Further, "[h]abitat changes will occur ... [involving] a shift from a forest dominated landscape to a fragmented landscape with considerably more mining lands and eventually grassland habitat," (DEIS App. I, p. 93), and this "change in these habitats could put a number of species in peril." DEIS App. I., p. v. For example, "forest loss in the West Virginia portion of the study area has the potential of directly impacting as many as 244 vertebrate wildlife species." DEIS App. I, p. 86. These alterations of the ecosystem are profound and permanent. "Results from this study support the thesis that fundamental changes to the terrestrial environment of the study area may occur from mountaintop mining." DEIS App. I, p. v (emphasis added). "Mountaintop mining and valley fill activities significantly affect the landscape mosaic... The result is an area drastically different from its pre-mining condition." DEIS App. I, p. 23 (emphasis added). Further,

> [R]e-establishing native hardwood forests on reclaimed mines is still experimental. We don't know what the long-term success will be. Even if hardwood forests can be re-established, it should be intuitively obvious that they'll be a drastically different ecosystem from pre-mining forests for generations, if not thousands of years...

6/26/01 Tibbott e-mail, Ex. 5, p. 1 (emphasis added).[15] *See also* DEIS IV.A-4 (reforestation "may take hundreds of years").

In the face of this serious and enduring environmental destruction, the DEIS does not consider any restrictions on deforestation. Instead, the alternatives considered in the DEIS include only meager attempts to "encourage" *re*forestation, although forestry post mining land use (PMLU) would remain purely voluntary under all of the alternatives, and actual reforestation could take hundreds of years, if it can be achieved at all. Currently, disincentives and barriers to reforestation are the norm. "[T]he use of grasses and legumes serves as the low cost, low-risk option for bond release. Even when the reclamation plan calls for the planting of trees, excessive compaction of the rooting medium, which severely reduces tree growth, is the norm." DEIS III.B-9. "The predominant PMLU has included a bias towards salvaging ... soil materials that provide favorable chemical conditions for the growth of grasses and legumes, but have a negative impact on forest regeneration." DEIS III.B-11.[16] Current soil practices prevent reforestation and 1-13

[15]*See also*, DEIS IV.D-5: "[T]he permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems ... may constitute a[n] irreversible impact to this system in the study area." (emphasis added). *See also*, Ex. 6, p. 6: "Unless reclamation practices are changed drastically, it can be assumed that this forest to grassland conversion is, for all practical purposes, permanent. Even if reclamation practices are changed, we must still consider the recovery of a functional mesophytic forest ecosystem as a long-term ecological experiment with uncertain results." (emphasis added).

[16]*See also*, Ex. 6, p. 4 ("Current reclamation practices result in conditions that discourage the re-establishment of trees."); id., p. 5 ("The study found no evidence that native hardwood

26

violate OSM regulations, because the post-mining soil supports lower quality vegetation than did the existing pre-mining soil. 30 C.F.R. § 816.22. "Production of soils that will support commercial forestry as part of mountaintop mining requires selective overburden handling and replacement procedures on a scale that has never been carried out in Appalachia." DEIS III.B-15.

3. The Existing Alternatives in the DEIS Regarding Deforestation Are Inadequate and Ineffective

Despite this current lack of reforestation practices, the DEIS only considers one alternative–the compilation of a "Best Management Practices (BMP) manual" encouraging voluntary reforestation, and briefly ponders hypothetical legislation that might require reforestation. Regarding the "manual," the DEIS states: "A BMP manual emphasizing the latest cost-effective reforestation techniques could encourage forestry-related PMLUs." DEIS II.C-76. However, the DEIS admits that "the only difference between the No Action Alternative and the development and use of BMPs as part of Alternatives 1, 2, and 3 is that this action anticipates broader acceptance and use of the BMPs to improve reclamation to a forest land use." DEIS IV.C-8. Thus, the DEIS simply assumes that the "BMP manual" will effectively encourage reforestation, without any support for this assumption and without any requirement for forestry as a PMLU, and in the face of the acknowledged fact that reforestation is not currently practiced due to significant technological barriers and economic disincentives.[17] FWS's Tennessee office states that reforestation initiatives recently failed in Kentucky, and "we do not believe landowners or the mining industry will show significant support for anything more than is required." 1/02/03 Tibbott e-mail, Ex. 57, p. 1. 1-13

Regarding the "legislation," the DEIS states: "*If* legislative authority is established by Congress or the states, then SMCRA regulatory authorities will require reclamation with trees as the post mining land use." DEIS II.C-83 (emphases added); *see also*, DEIS IV.C-8 ("...this action, if implemented, would have legislative authorities enact changes to SMCRA..."). This "action" is no action at all. The DEIS contains no specific analysis or discussion of the hypothetical "legislation" or who, precisely, would "have legislative authorities" enact it. Further, the DEIS contains no explanation of why a forestry PMLU could not be implemented under existing authority.[18]

forests, including their herbaceous understory component, will eventually recolonize large mountaintop sites using current reclamation methods.").

[17]In fact, even "flat land" PMLUs are not being completed. "This investigation found that many sites are not being developed as envisioned when PMLU variances are granted, and that the supply of flat land seems to outweigh the demand." Ex. 6, p. 4.

[18]*See, e.g.*, DEIS III.B-15: "[T]he current regulations (which have been in place since May 16, 1983) require that selected overburden substitutes for soil be 'equal to, or more suitable

27

The consideration of alternatives addressing deforestation in the DEIS is insufficient to meet the requirements of NEPA because the environmental consequences of past, present, and foreseeable future deforestation are profound and permanent, and "BMP manual" suggestions that technologically infeasible and economically unattractive reforestation be voluntarily undertaken are insufficient to address this serious environmental harm. Restrictions on deforestation, either individually or cumulatively, should have been considered as feasible alternatives.

4. Restrictions on Stream Loss Should Be Considered

Restrictions on stream loss, either individually or cumulatively, should be considered because significant stream loss has occurred and will continue to occur, and the purpose of the EIS should be to minimize impacts on streams. The DEIS finds that "[d]irect impacts to 1,208 miles of streams is estimated based on the last 10 years of ... data ... [and] an additional thousand miles of direct impacts could occur in the next ten years." DEIS App. I, pp. 66-67.[19] "When streams are filled or mined all biota living in the footprint of the fill or in the mined area are lost." DEIS III.D-2. In addition, "[t]he projected potential adverse impacts [to riparian habitats] in ... West Virginia ... is 7,591 acres, or 3.2%. Approximately 55% of ... [such] impacts occur in first and second order streams which are important habitats to many species of ... wildlife." DEIS App. I, p. vi. Further, the DEIS admits that "[v]alley fills are not 'water dependent,'" and that "if a valley fill is proposed in a special aquatic site, upland alternatives ... are presumed to exist..." DEIS II.C-33. Moreover, the DEIS acknowledges that "[o]ne of the principal goals of this EIS is to explore ways to minimize the adverse impacts on streams from [MTM/VF] construction." DEIS II.C-30 (emphasis added). In fact, FWS argued in August, 2002 in favor of including an alternative that restricted stream loss, explaining: 1-13

The ... action proposed ... would identify intermittent and perennial stream reaches as

---

for sustaining vegetation than the existing topsoil, and the resulting soil medium is the best available in the permit area to support revegetation.' Also, soil materials are to be redistributed in a manner that prevents excessive compaction of the materials."

[19]These figures reflect only the "directly impacted" (*i.e.*, buried) streams, and not the streams which are significantly "indirectly" impacted (*e.g.*, by toxic selenium levels or other impacts on stream chemistry, temperature, flow, energy, sedimentation, or biota (DEIS III.D-1 - D-8)) downstream from MTM/VF operations, (DEIS App. I, pp. iii-iv), which "indirect impacts ... will continue regardless of alternative selected by decision makers." DEIS IV.B-5. Further, as the FWS has observed: "Even if EPA restricts consideration of impacts to the reach of stream below the filled reach, studies described in section III.D show that fills contribute to significant degradation to the overall chemical, physical, and biological integrity of adjacent waters. For example, below fills the ambient water quality criterion for selenium concentration is exceeded consistently, natural flow regimes are altered, and macroinvertebrate diversity is depressed." 1/02/03 Tibbott e-mail, Ex. 57, p. 2.

28

"generally unsuitable" for valley fills. In so doing, EPA and the Corps are signaling that, as a general matter, valley fills beyond the ephemeral reach are not likely to meet the requirements of the Guidelines. Given MTM/VF EIS findings on (previously little-understood) value of headwater streams; the degradation of aquatic life and water quality within and downstream of valley fills; the "persistence and permanence of the effects" (factors the Guidelines say should be given special emphasis); and the anticipated difficulty in developing meaningful compensatory mitigation for these impacts, the "unsuitable" designation is appropriate and logical.

8/21/02 Densmore e-mail, Ex. 39, Attachment, p. 1. However, this proposal "was subsequently voted down within the Executive Committee in part because a decision appears to have been made that even relatively minor modifications of current regulatory practices are now considered outside the scope of the EIS process." 9/30/02 Densmore e-mail, Ex. 42, Attachment, p. 1.

Further, as explained in detail in section II.H. of these comments, *all* of the alternatives considered in the DEIS – including the "no action alternative" – contemplate eliminating the stream buffer zone (SBZ) rule, which is the strongest current protection for intermittent and perennial streams, and which is, in some cases, the only protection for threatened or endangered species habitat.[20] No alternative contemplates keeping the SBZ rule in place as it currently exists. The failure of the DEIS to consider any alternative which incorporates restrictions on stream loss renders the DEIS's consideration of "all reasonable alternatives" insufficient to meet the requirements of NEPA, and restrictions on stream loss, either individually or cumulatively, should be considered as feasible alternatives. 1-13

5. Individual and Cumulative Minimal Impacts Thresholds for NWPs Should Be Considered

Finally, individual and cumulative minimal impact thresholds for NWPs should be considered because: (1) Section 404(e) of the CWA requires permitting agencies to determine whether individual and cumulative impacts are more than minimal, (2) MTM/VF activities do exceed the minimal impacts threshold on both an individual and cumulative basis, (3) the 250-acre individual threshold established in the Bragg agreement has reduced the size and number of valley fills, (4) the application of that threshold via the Bragg agreement *specifically contemplated* that *this EIS* would establish individual and cumulative minimal impact thresholds for NWPs, and (5) the DEIS illegally attempts to segment the required NEPA analysis by asserting that the establishment of minimum cumulative impact thresholds is "an independent

---

[20]For example, FWS has stated that: "Protection of some plants is secured through minimization of the disturbance of specific habitats. For example, riparian species such as Cumberland rosemary and Virginia spiraea require protection of streams and adjacent areas. Adherence to the 100-foot buffer zone regulation fulfills these plants' needs. Likewise, maintenance of a buffer zone along sandstone clifflines benefits the species that inhabit those areas ..." 12/20/02 FWS Letter, Ex. 54, p. 1 (emphasis added).

29

action from this EIS." DEIS II.B-16; II.C-5.

Section 404(e) of the CWA requires the Corps of Engineers to determine whether an individual activity will have more than minimal impacts both individually *and* cumulatively in conjunction with other past, present, and reasonably foreseeable future activities in the same category. Although the minimum cumulative impact threshold for permitting MTM/VF activities under NWPs has already been reached (as shown below in section II.G.1.b.), the Corps must nevertheless determine and establish where the individual and cumulative minimal impact thresholds lie.[21]

MTM/VF activities in Appalachia clearly have had, are having, and will continue to have significant *cumulative* adverse effects on the environment. Similarly, it is clear that the impacts of *individual* valley fills may be more than "minimal," because the DEIS itself states that "filling or mining stream areas <u>even in very small watersheds</u> has the potential to impact aquatic communities[,] some of which may be of high quality or potentially support unique aquatic species." DEIS III.D-4 (emphasis added).

The DEIS illegally attempts to segment the required NEPA analysis by asserting that establishment of minimal impact thresholds is "an independent action from this EIS," (*See, e.g.*, DEIS II.B-16, II.C-5), and that such determinations are best left to "case-by-case assessments." <u>Id</u>. The court in <u>Marble Mountain Audubon Society v. Rice</u>, 914 F.2d 179 (9th Cir. 1990), rejected a similar argument that the maintenance of a biological corridor need not be considered in a timber sale EIS because the corridor issue was "a forest-planning matter and therefore beyond the scope of [the EIS]." <u>Id</u>. at 182. Further, the "case-by-case" approach embraced by the alternatives in the DEIS is inherently inconsistent with the requirement in Section 404(e) of the CWA that activities permitted under NWPs cannot have more than minimal cumulative adverse effects. By segmenting each permit application and considering it in isolation from all other past, present, and reasonably foreseeable future applications, it is not possible to do a meaningful cumulative impact analysis. Rather, all of those other applications must be included in the cumulative impact analysis on a programmatic basis. The COE cannot restrict the cumulative impact analysis to a smaller subset of Appalachia, such as a discrete watershed.

1-13

The DEIS acknowledges that the 250-acre threshold established in <u>Bragg</u> is useful and effective in reducing the size and number of valley fills because "[t]he COE Huntington District found [that] this condition contributed to conscious attempts by the regulated coal industry to

---

[21]EPA stated in June, 2002, for example, that: "If Alternative B is to be selected, ... a minimum impact threshold must be developed for the purposes of triggering a more rigorous permit review process under CWA Section 404... The direct and indirect aquatic impacts from MTM/VF operations are arguably more than minimal, complicating the NWP 21 issue..." 6/10/02 Hoffman e-mail, Ex. 29, Attachment ("EPA Issues - MTM/VF EIS"). EPA further stated: "We believe NWP 21 minimal impact thresholds ... (individually and cumulatively) are required." 6/14/02 Rider and Hoffman e-mails, Ex. 31, 32.

30

avoid the IP process by keeping proposed fill sizes below the 250-acre threshold." DEIS II.C-5; *see also*, DEIS II.C-73 ("Based on the fact that there have been 5 individual permit applications compared to the 81 projects approved under NWP 21 in West Virginia, it appears [that] applicants are designing the majority of *MTM/VF* proposals to stay below the 250-acre minimal impact threshold and thereby avoid the IP process."). Thus, the DEIS shows that the need for a minimal impacts threshold, both individually and cumulatively, exists, and that the 250-acre threshold has been proven to be useful and effective in addressing this need.[22] Further, the FWS in January, 2003, proposed a 75-acre threshold "based on data specifically collected for this EIS." 1/28/03 Densmore e-mail, Ex. 66.[23] Therefore, the DEIS should have considered individual and cumulative minimal impact thresholds for NWPs.

Indeed, the DEIS acknowledges that "[t]he 250-acre general minimal impact threshold was intended as an interim threshold <u>based on the assumption that this EIS would find the basis for some other threshold for NWP 21 applicability</u>." DEIS II.C-73 (emphasis added). The DEIS is a bit schizophrenic, however, regarding whether it does, in fact, consider such a threshold. Although the DEIS repeatedly asserts that "[t]he extension of this [<u>Bragg</u> 250-acre] threshold through a regional permit condition by the COE is an independent action from this EIS," (DEIS II.B-16; II.C-5), the DEIS incongruously also asserts that the 250-acre threshold arising via <u>Bragg</u> would continue to apply on a "regional" basis under the "preferred" Alternative 2. *See, e.g.*, DEIS II.C-17 ("Action 1.2: The COE ... would make a case-by-case determination of the applicability of NWP 21, subject to a regional condition in certain geographic areas that valley fills proposed in watersheds larger than 250-acres would generally require IP processing"); DEIS IV.B-8 ("This [<u>Bragg</u> 250-acre threshold] would continue to apply to certain geographic 1-13

---

[22]The OSM has argued that "other factors" could account for the fact that there were fewer valley fills following the institution of the 250-acre threshold. However, the self-serving nature of that position is belied by a March 11, 2003 from the COE's George Dunlop, who explains: "[T]here should be discussion about the OSM perspective that there were other factors operating at the same time as thresholds and those other factors may have been the reasons that there were fewer valley fills after the thresholds were in place. OSM is very sensitive about the message that thresholds result in improved environmental quality. IF that were the case, then the real message is that 200 would be better, 100, better yet and 0 fills, best of all." 3/12/03 Hodgkiss e-mail, Ex. 68, Attachment, p. 1. Further, a January 16, 2003 memorandum identified a series of "key issues that we anticipate will be raised when the DEIS is published for public review," including the following: "Since smaller fills would seem to coincide with reduced environmental impacts, why is the current version of the DEIS not recommending such limits?" Ex. 62.

[23]That FWS proposal further notes that "OSM's fill inventory indicates that historically, most valley fills have been [less than] 75 acres (70% of permits in VA, 81% in KY, 59% in WV)," and that "[p]revious studies in developing areas in the mid-Atlantic have noted that impacts to stream ecosystems are identifiable when [more than] 10% of a watershed is developed." 1/28/03 Densmore e-mail, attachment at 2, n.1 and n.3 (A-167).

31

locations under the No Action and Preferred (Alternative 2) Alternatives and it is anticipated that the consequences to fill size would continue."). The DEIS muddies the waters even further by stating that under Action 12, applicable to *all three* action alternatives, "[t]he COE ... would compile data ... [to] be used to determine the extent of cumulative impact areas for appropriate resources and ascertain whether a "bright-line" cumulative impact threshold is feasible for CWA Section 404 MTM/VF permits." DEIS II.C-69.

Thus, the DEIS simultaneously asserts that the Bragg 250-acre threshold was based on an assumption that this EIS would determine a minimal impacts threshold; that establishment of a minimal impacts threshold is "an independent action from this EIS;" that the Bragg 250-acre threshold would continue to apply under Alternative 2, but only on an undefined "regional" basis; and that under all three action alternatives the COE and other agencies would "compile data" to be used in order to determine whether a minimal impacts threshold is "feasible." This is internally inconsistent on multiple levels. If the DEIS acknowledges that the Bragg agreement included an "assumption" that this EIS would establish a minimal impacts threshold, why does the DEIS also assert that such an action must be "independent from this EIS"? If such a determination is necessarily external to the EIS, why is the threshold applicable under Alternative 2? If the threshold is applicable under Alternative 2, why is it only applicable on a "regional" basis, rather than to the entire Appalachian region covered by the DEIS? What is the "region" to which the threshold would be applicable under Alternative 2? If this EIS determines that the threshold should be applicable on a "regional" basis under Alternative 2, why must the COE simultaneously "compile data" in order to determine whether such a threshold is "feasible" (since the "data compilation" under Action 12 is applicable to all three action alternatives)? If all three action alternatives under this EIS contemplate "data compilation" in order to determine whether a minimal impacts threshold is "feasible," why must the actual establishment of such a threshold be "an independent action from this EIS"?

1-13

In any event, the DEIS is internally inconsistent and should be clarified. Further, if the 250-acre *individual* threshold would continue to apply under Alternative 2, but only in West Virginia, then the DEIS fails to articulate any rationale for not applying the same threshold in the entire Appalachian region covered by the DEIS. Further, the alternatives considered in the DEIS illegally segment their consideration of the effects of MTM/VF operations, considering each such operation in isolation from all past, present, and reasonably foreseeable future MTM/VF operations, thereby failing to adequately consider the *cumulative* impacts of mountaintop removal mining and valley fills in Appalachia. This "case-by-case" approach fails to fulfill the fundamental purposes of NEPA and fails to satisfy the requirements of Section 404(e) of the CWA. For these reasons, any alternative selected should determine minimal impact thresholds, both individually and cumulatively.

6. The "No Fill" Alternative Should Be Considered

Federal case law discusses the NEPA requirement that agencies consider the alternative of "total abandonment of the project." Although the cases deal with public land, and

mountaintop removal mining would occur on private land, the *streams* which would be buried or damaged by the valley fills are "waters of the U.S." and are therefore analogous to the "public land" at issue in the "total project abandonment" cases. Therefore, the MTM/VF DEIS must consider a "no fill / no stream damage" alternative in order to present the decision-maker with the full spectrum of possibilities. Although "mountaintop removals" may not be logistically possible under the "no fill" alternative, that does not relieve the DEIS of the requirement to consider the "no fill" alternative. As the courts have stated: "This requirement ... seeks to ensure that each agency decision maker has before him and takes into proper account all possible approaches to a particular project... Only in that fashion is it likely that the most intelligent, optimally beneficial decision will ultimately be made." Calvert Cliffs' Coordinating Committee v. U.S. Atomic Energy Commission, 449 F.2d 1109, 1114 (D.C. Cir. 1971). Put another way, "[s]uch an alternative ... afford[s] the opportunity for scientific and public participation and debate regarding the delicate balance between preserving natural resources and ... [resource] management." Friends of Bitterroot, Inc. v. U.S. Forest Service, 900 F.Supp. 1368, 1374 (D.Mont. 1995). *See also*, All Indian Pueblo Council v. United States, 975 F.2d 1437, 1444 (10th Cir. 1992) ("NEPA requires a 'detailed' EIS '*to ensure that each agency decision maker has before him and takes into proper account all possible approaches to a particular project* (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance.'") (citation omitted, italics in original, underlining added).[24]

1-13

In Friends of Bitterroot, the court remanded an EIS to the U.S. Forest Service with instructions that the agency was *required to consider* the "less environmentally damaging" *alternative* of preserving roadless lands in order to provide wildlife corridors essential for maintaining biological diversity. There, the USFS had not included any alternative which would have excluded logging of roadless areas, arguing that such an alternative would not have satisfied the "purposes" of the forest plan. The court rejected this argument, holding that the failure to "consider all reasonable alternatives so as to ensure an EIS fosters informed decision making" by "address[ing] an alternative preserving existing roadless lands" compelled the court to remand to the agency. The court's decision was based in part on comments by the Montana Department of Fish, Wildlife & Parks that wildlife corridors were essential for maintaining biological diversity. The court in Friends of Bitterroot first observed that:

---

[24]*See also*, MTM/VF DEIS Agenda for Executive and Steering Committee Meeting of November 21, 2002, which states:

> -Lack of environmental contrast; *is a fill restriction component needed in Alternative 1 to provided [sic] most environmentally-protective alternative?* ...
> -OFA states that NEPA compliance not satisfied; alternatives need not be limited to existing statutory authority — *Should a "no mining" or other restrictive alternative be included?*

11/18/02 Hodgkiss e-mail, Ex. 52, Attachment (underlining added).

NEPA requires the preparation of an EIS ... to ensure each agency considers all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance.

Id. at 1371 (citation omitted) (emphasis added). The court continued:

[P]laintiffs contend the Trail Creek EIS fails to adequately analyze all reasonable alternatives, **including a less environmentally damaging alternative that would exclude logging and road building** activity in existing roadless areas within the Beaverhead National Forest ... **in order to preserve that area's value as secure wildlife habitat**. In response, defendants assert the alternative advanced by the plaintiffs would not have met the management goals ... of the Beaverhead National Forest Plan.

...

In the case *sub judice*, the Forest Service examined seven alternate courses of action... [T]he **action alternatives all called for varying degrees of timber harvesting in the Beaver Lakes roadless area.** ...

[T]o the extent defendants maintain an alternative aimed at preserving the Beaver Lakes roadless area would be "pointless," based upon the goals of the Beaverhead Forest Plan, ... [d]efendants position is contrary to NEPA's underlying tenet, *i.e.*, that agencies consider all reasonable alternatives so as to ensure an EIS fosters informed decision making. *See*, Idaho Conservation League v. Mumma, *supra*, 956 F.2d at 1519-20. 1-13

The Forest Service cannot deny there is some benefit to be derived from considering an alternative that preserves the Beaver Lakes roadless area. Plaintiffs, **as well as the Montana Department of Fish, Wildlife & Parks,** whose considerable expertise in the area of wildlife management is undisputed, **expressed concerns that preservation of the Beaver Lake's roadless area warranted full consideration in the Trail Creek NEPA process given the area's high security value for wildlife...**

[T]he NEPA process would have been properly served by development of an action alternative that preserved roadless lands in the Trail Creek area. Such an alternative would have afforded the opportunity for scientific and public participation and debate regarding the delicate balance between preserving natural resources and timber management.

Accordingly, **the EIS' failure to address an alternative preserving existing roadless lands in the Trail Creek area renders [sic] compels this court to REMAND this matter for further administrative proceedings**.

Id. at 1373-74 (footnote and citations omitted) (emphases added).

Friends of Bitterroot is directly applicable to the MTM/VF DEIS, where both EPA and FWS have expressed grave concerns about the lack of alternatives containing substantive environmental and wildlife habitat protections. The DEIS has failed to consider any "no fill" alternative, or, indeed, any alternative containing substantive restrictions on the number, size,

34

location, or impacts of valley fills, or substantive protections for forest ecosystems and riparian habitat. These failures render the DEIS inadequate so that it must be remanded for correction and reissued for public comment. 1-13

7. An "Environmentally Preferred" Alternative Should Be Considered

Similarly, an "environmentally preferred" alternative should be considered. 40 C.F.R. § 1505.2(b). At a June 18, 2002 Steering Committee meeting to reconsider the alternatives framework, EPA and FWS took the position that the DEIS must consider alternatives to reduce environmental impacts. Ex. 33, Proposed Agenda, p. 8. As a result of this meeting, the Steering Committee agreed on a revised framework which identified the "Environmentally Preferable Alternative" ("Alternative B"), which, among other things, "restrict[ed] fills to the ephemeral zone...." Id. at 11; 6/19/02 Hoffman email, Ex. 34, Proposed EIS Alternative Framework. A later draft further developed this into the "most environmentally protective alternative." 6/26/02 Robinson email, Ex. 35, Attachment.

Subsequently, FWS proposed another "'environmentally preferred' alternative," identified as "Alternative 4." 7/31/02 Tibbott e-mail, Ex. 36. FWS' Alternative 4 would have applied the SBZ rule as written and applied the antidegradation policy to prohibit filling in intermittent and perennial streams (thus allowing fills only in ephemeral streams). Id. The FWS explained that this "environmentally preferred alternative:"

- Avoids setting undesirable CWA precedents (weakening the application of the antidegradation policy and the spirit and intent of the CWA itself; allowing out-of-kind mitigation to buy down impacts that are clearly more than 'minimal'; allowing the issuance of NWPs for activities that are clearly more than 'minimal'; issuing individual permits for activities that clearly cause 'significant degradation'). 1-8
- Most closely responds to the adverse aquatic and terrestrial impacts documented by the EIS studies.
- Industry has demonstrated that it can still mine coal even if fills are restricted to the ephemeral zone...
- Allows the use of the 35-acre scenario in the EIS, giving us at least one alternative whose effects can actually be quantified in terms of environmental and economic consequences.

Id., Rationale, p. 1. "[T]he EPA and FWS Steering Committee members agree[d] that this version [of the alternatives which included this 'alternative 4'] represent[ed] an accurate portrayal of possible viable contrasting alternatives..." 8/13/02 Robinson e-mail, Ex. 37, p. 1.

However, shortly thereafter, the Steering Committee's decision was overruled by the DEIS Executive Committee. Unnamed higher-level agency "executives instructed the SC to attempt to construct the alternatives for the EIS in a framework based largely on coordinated decision making for SMCRA and CWA–with no alternative restricting fills." Ex. 41, 9/23/02

35

Agenda, p. 1. According to FWS, its alternative "was subsequently voted down within the Executive Committee in part because a decision appears to have been made that even relatively minor modifications of current regulatory practices are now considered outside the scope of the EIS process." 9/30/02 Densmore email, Ex. 42, FWS Comments, p. 1. Minutes of a July 14, 2002 Executive Committee meeting show that a new three-alternative approach was adopted. 8/15/02 e-mail, Ex. 38, Executive Committee Discussion. As a result, the prior alternatives restricting valley fills were stripped from the DEIS. Instead, the new alternative framework considered only process alternatives. 1-8

Thus, the DEIS irrationally dismissed every proposal for an "environmentally preferred" alternative. Any record of decision regarding MTM/VF operations in Appalachia will be unable to comply with 40 C.F.R. § 1505.2 because the DEIS does not identify any "environmentally preferred alternative" or consider any alternative which is distinguishable from any other alternative in terms of environmental consequences.

F. The DEIS Violates NEPA Because It Presents Irrational Reasons for Eliminating Reasonable Alternatives.

The DEIS violates NEPA because it does not present valid reasons for the elimination of reasonable alternatives from detailed analysis. The DEIS must present the reasons, in brief discussion, for the elimination of alternatives from detailed study. 40 C.F.R. § 1502.14. By failing to articulate valid reasons for the elimination of reasonable alternatives, the DEIS fails to satisfy this NEPA requirement.

The DEIS identifies eight "alternatives considered but not carried forward." DEIS II.D-1. These eliminated alternatives were: 1) restriction of individual valley fill size based on the type of stream segments buried (ephemeral, intermittent or perennial); 2) restriction of individual valley fill size based on watershed size (35, 75, 150, and 250 acres); 3) establishment of "minimal impact thresholds" based on watershed size (75 or 250 acres) below which MTM/VF 4-2 operations could be permitted under NWP 21 rather than individual CWA § 404 permits; 4) restricting individual valley fills based on maximum "cumulative impact thresholds;" 5) fill restrictions based on protecting high-value streams by designating all headwater streams as "generally unsuitable" for valley fills pursuant to the CWA Advanced Identification of Disposal Sites (ADID) process; 6) fill restrictions based on protecting high-value streams by designating all headwater streams as "special aquatic sites" pursuant to CWA § 404(b)(1); 7) fill restrictions based on protecting high-value streams by preserving all headwater streams with an EPA "advanced veto" pursuant to CWA § 404(c); and 8) prohibition of valley fills in waters of the U.S. based on the CWA's "antidegradation policy." DEIS II.D-1 - 9.

1. Even if There Were Insufficient Information to Draw a "Bright Line" Type of Restriction, __Some__ Type of Individual or Cumulative Restriction on Valley Filling Must Be Considered

As the DEIS recognizes, there are many potential alternatives for restricting valley fills. They include restrictions on fill size (35, 75, 150, or 250-acre watersheds), fill location in different types of streams (ephemeral, intermittent or perennial), the percentage of streams in a particular watershed that can be filled, or the amount of stream length that can be filled. The primary argument advanced in the DEIS for rejecting these alternatives is that there is insufficient information at this time to draw a "bright line" that works in every situation, and variations between streams and watersheds make it difficult to apply any "bright line" to differing individual situations. The DEIS states that "[s]cientific data collected for this EIS do not clearly identify a basis (i.e., a particular stream segment, fill or watershed size applicable in every situation) for establishing programmatic or absolute restrictions that could prevent 'significant degradation.'" DEIS II.D-8. The DEIS therefore posits that since one general rule does not apply in every situation, there is no basis for applying any general rule at all, and the only alternative is to apply a "case-by-case" analysis to every individual situation. DEIS II.D-1 to II.D-9.[25] The perfect is the enemy of the good, as the DEIS sets up each individual restriction like a straw man and then knocks it down by saying that one problem or another makes it inapplicable in certain situations. __Id.__

"[W]hile inconclusive evidence may serve as justification for not *choosing* an alternative, here it cannot serve as a justification for entirely failing to 'rigorously explore and objectively evaluate *all* reasonable alternatives." __The Fund for Animals v. Norton,__ Civil No. 02-2367 (D.D.C.), Dec. 16, 2003 Mem. Op., p. 37. Furthermore, even if there were insufficient information to draw a "bright line," there is sufficient information to develop a "rule of thumb" 4-2 that protects environmental resources in most situations and retains enough flexibility to adjust to individual situations.[26] That was the whole rationale behind the 250-acre limit on NWP 21 authorizations in the Settlement Agreement. No one knew enough to be sure that that was the right line to draw, but it was necessary to draw *some* line in the interim until more information was developed. Now, the government has much more information, but it is doing nothing to draw that line more accurately based on that new information. Instead, it is trying to use the lack of perfect information as the excuse for delay and for potentially eliminating the 250-acre limit altogether.

The DEIS does not clearly state whether the 250-acre limit will be retained. It suggests that, as one alternative, the existing limit could be retained "until such time as sufficient scientific data may be available to establish a specific threshold." DEIS II.D-6; II.C.60.

[25]However, FWS has observed that: "Designating all headwater streams as special aquatic sites is no different than designating all wetlands or all riffle-pool complexes as special aquatic sites as EPA has already done in the 404(b)(1) guidelines." 11/13/02 Tibbott e-mail, Ex. 49.

[26]EPA argued in November, 2002: "Whether or not the 'bright line' percentage threshold eventually becomes part of Alternative 1, we should still include in Alternatives 1 and 2 a commitment to develop a cumulative impact assessment protocol specific to headwater streams." 11/15/02 Forren e-mail, Ex. 51.

If that limit were abandoned, it would be an arbitrary and unreasonable action. In Heartwood, Inc. v. U.S. Forest Service, 73 F. Supp.2d 962 (S.D.Ill. 1999), *aff'd*, 230 F.3d 947 (7th Cir. 2000), the court enjoined the agency's departure from a similar "interim measure" threshold. There, the U.S. Forest Service increased its interim categorical exclusion from NEPA requirements, based on the magnitude of a timber harvest, by a factor of ten. The court found that this was a "classic example of an arbitrary decision," because it was not based on any scientific evidence. 73 F. Supp.2d at 975. Similarly, if the Corps abandoned the 250-acre threshold, in the face of overwhelming evidence that the cumulative effects of valley fills are more than minimal and that the Bragg 250-acre interim threshold has been useful and effective in limiting valley fill size,[27] it would similarly be arbitrary and capricious.[28]

If the 250-acre limit is retained and action to lower that limit is postponed, that would also be unreasonable.[29] The Corps itself has applied a lower limit with NWPs 39, 40, 42, and 43, providing that such authorizations do not apply to fills that exceed 300 linear feet of a perennial stream bed. 67 Fed. Reg. at 2060. In contrast, NWP 21 has been used to fill hundreds of miles of perennial streams. The Corps is applying less stringent rules to mining activities than to non-mining activities, without any rational basis for distinguishing between them.[30] Indeed, from the standpoint of stream destruction, mining activities pose greater risks than non-mining activities. As FWS has stated, "there is no other single industry or activity in the country that receives

[27]*See* section II.E.5 above.

[28]Further, the court in Arkansas Nature Alliance, Inc. v. U.S. Army Corps of Engineers, 266 F. Supp.2d 866, 887 (E.D. Ark. 2003), observed that: "It seems pretty plain that when there is not a bright line for whether a project can be handled by 'categorical exclusion' [*i.e.*, a 'significant impact' threshold], District Engineers should raise their 'environmental sensitivity' and err on the side of performing an EIS, particularly when the proposed action could have substantial environmental effects." Similarly, here, in the absence of a "bright line," the DEIS should err on the side of "environmental sensitivity" and rely on an interim "rule of thumb" such as the Bragg 250-acre threshold, rather than simply conclude that since the precise threshold is not yet clear, there should be no threshold at all.

[29]*See also*, Kern v. U.S. Bureau of Land Management, 284 F.3d 1062, 1072 (9th Cir. 2002): "NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment. Rather, it is designed to require such analysis as soon as it can reasonably be done."

[30]FWS has observed: "[T]he impacts of Walmart and even highway projects pale in comparison to the mining impacts. If the Corps starts issuing permits for the total destruction of miles of streams, what precedent does that set for the significant degradation test for the 'big box' stores and shopping malls and housing developments and all the other permit applicants that now have relatively minor impacts on streams? Would the Corps be still able to require them to avoid the streams?" 10/30/02 Tibbott e-mail, Ex. 45.

4-2

Section 404 authorization for the total elimination of waters of the United States on the scale that stream destruction occurs with mountaintop mining," (10/30/02 Tibbott e-mail, Ex. 45), and "there are no other activities in the country that routinely eliminate entire streams." 11/13/02 Tibbott e-mail.

There are ways to establish general rules, without bright lines, and with the opportunity to adjust the rule for individual situations. For example, the Corps could establish a rebuttable presumption that valley fills should not be placed in intermittent or perennial streams. FWS proposed such an alternative in August 2002, but it was summarily rejected without any analysis:

> EPA and COE issue regulatory guidance that, based on the factual determinations made in the EIS regarding direct impacts, downstream impairment, and the impracticablility of available mitigation, fills in intermittent and perennial stream reaches are presumed to cause or contribute to significant degradation, pursuant to the 404(b)(1) Guidelines. Permit applicants who can demonstrate that their fills will not significantly degrade intermittent or perennial streams would be eligible for an individual permit.
>
> Fills in ephemeral stream reaches would be eligible for NWP 21 authorization by the COE. If COE determines, through their stream protocol, that the values of affected ephemeral streams are high, and/or cannot be compensated, or if the cumulative effects are more than minimal, an individual permit will be required. COE will revise NWP regulations to reflect limits on authorization for NWP 21. 4-2

8/13/02 Robinson email, Ex. 37, 8/13/02 Alternatives Matrix, p. 3. FWS stated that this alternative "was subsequently voted down within the Executive Committee in part because a decision appears to have been made that even relatively minor modifications of current regulatory practices are now considered outside the scope of the EIS process." 9/30/02 Densmore e-mail, Ex. 42, FWS Comments. Thus, the DEIS irrationally dismissed every proposal for a fill restriction, regardless of the merit of the proposal.

2. The DEIS' Claim of Lack of Harm Is Erroneous and Is Not a Valid Basis for Rejecting Fill Restriction Alternatives

The DEIS claims that fill restriction alternatives were eliminated from consideration because MTM/VF operations do not contribute to significant degradation of U.S. waters. The DEIS states:

> The data indicate that impacts may (or may not) be linked to the presence of mining, and not necessarily related to the size of fills... Impacts could include several stressors, such as valley fills, residences, and/or roads. Therefore, a causal relationship between the impacts and particular stressors could not be established with the available data. Further, the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S. [40 C.F.R. 230.10(c)].

DEIS II.D-9.

This claim of no documented harm is flatly erroneous. First, this claim completely ignores the harm caused when streams are filled or mined, and instead considers only harm downstream from such fills or mining. The DEIS admits elsewhere that "[w]hen streams are filled or mined all biota living in the footprint of the fill or in the mined area are lost." DEIS III.D-2. Over twelve hundred miles of streams, or 2% of total streams, fall within this category. Id. "Headwater streams are destroyed by filling." DEIS, App. J, p. 70. This degradation must be deemed significant. There is no evidence showing that buried streams can be recreated successfully elsewhere on mined sites. Id. "Past efforts at compensatory mitigation have not achieved a condition of no-net loss of stream area or functions." DEIS III.D-17. Consequently, this loss is permanent and irreversible.

Second, there is no doubt that valley fills cause significant harm to downstream watersheds. "The fisheries and technical studies in support of the MTM/VF EIS support that the functions of these [headwater stream] systems may be impacted for considerable distances by upstream fills." DEIS, App. J, p. 70. "MTM/VF impacts of critical headwater stream systems constitute one of the most major threats to this system in the study area." Id. (emphasis added). "Impacts from MTM/VF activities to the ability of headwater streams to maintain their nutrient cycling function are of great concern." Id. at 74 (emphasis added).

The EPA and FWS scientists who commented on the draft DEIS agreed with these conclusions. "EPA's Cincinnati laboratory prepared the existing WV statistical evaluation that concluded [there is a] strong correlation between mining and downstream impacts." Ex. 41, 9/23/02 Executive Meeting Agenda, p. 2. An EPA scientist similarly commented that: 4-2

> EPA's studies and other studies have found that the strongest and most significant correlations are between biological condition and conductivity. We do know that the stream segments downstream of some of the fills are impaired, and we believe the impairments are due to water chemistry changes, based on the strong correlations.

Ex. 55, 12/20/02 Comments by EPA Wheeling Staff. An FWS scientist similarly objected to the "no significant degradation" statement, stating that "If impaired aquatic life, and selenium above water quality standards, resulting in streams being placed on the 303(d) list don't constitute significant degradation, what would?" 4/21/03 Rider email, Ex. 71, attached file: chIVcomments.wpd, p. 2.

The stream chemistry study cited by FWS found that:

> MTM/VF mining is associated with violations of the stream water quality criteria for total selenium. Selenium violations were detected in each of the five study watersheds and all were at sites in the category Filled, downstream from MTM/VF operations. No other site categories had violations of the selenium limit.

40

DEIS App. D, p. 2. It also found that "[t]he selenium data indicate numerous violations of the West Virginia stream water quality criterion related to MTM/VF mining," (id. at 47), and explains that selenium is "highly toxic" in amounts "slightly greater" than those found naturally, and is "strongly bioaccumulated in aquatic habitat." Id. at 73. *See generally* section II.G.2. of this letter. Consequently, the DEIS's claim of lack of harm is erroneous and is not a valid basis for eliminating alternatives to restrict fills.

3. Even if Sufficient Information Were Not Available Now to Develop Fill Restrictions, That Information Must Be Obtained, Because It Is Essential to Choosing Among Alternatives, and the DEIS Does Not Demonstrate that the Cost of Obtaining That Information is Exorbitant.

Even if sufficient information were not available now to develop fill restriction alternatives, that information is essential and therefore must be obtained prior to making a final decision. The CEQ regulations provide that "[i]f the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement." 40 C.F.R. § 1502.22(a). There is no doubt that information about the impacts of valley fills on headwater stream systems is of paramount importance to choosing between alternatives. Indeed, that was the whole reason for preparing this EIS. The Settlement Agreement created the interim 250-acre fill restriction until information and alternatives developed in this EIS could create a better one. As the DEIS itself admits, "[t]he 250-acre general minimal impact threshold was intended as an interim threshold based on the assumption that this EIS would find the basis for some other threshold for NWP 21 applicability." DEIS II.C-73 (emphasis added). Now, the DEIS says that, despite millions of dollars and four years of information-gathering devoted to the essential task of identifying this alternative, the DEIS cannot find it. 4-2

In evaluating whether the cost of obtaining this information is exorbitant, the cost must be measured in terms of what has already been spent. Obviously, the federal government believed that that cost was not exorbitant, or else it would not have spent it. The DEIS does not assign a specific figure to that cost, but as of February 13, 2002, the government had "spent or committed about 4.5 million" dollars to the DEIS. 2/13/02 Hoffman email, Ex. 14. It is hard to imagine that the cost of studies to resolve the stream issue will be more than a small fraction of that amount. The "stream impact" studies performed to date are only a few of the total of 30 studies that were performed for the DEIS. At a minimum, the DEIS must be revised to explain how much more it would cost to resolve the stream impact issue. If that cost is not more than the amount already invested and spent, the information must be obtained before a decision is made.

The federal courts have held that NEPA requires agencies to conduct research and provide information whenever the information is "important," "significant," or "essential" to a reasoned decision and the costs are not exorbitant in light of the size of the project and/or the

41

possible harm to the environment. For example, the court in Oregon Environmental Council v. Kunzman, 817 F.2d 484, 495 (9th Cir. 1987) (citation omitted), held: "In general, NEPA imposes a duty on federal agencies to gather information and do independent research when missing information is 'important,' 'significant,' or 'essential' to a reasoned choice among alternatives." The court in Save Our Ecosystems v. Clark, 747 F.2d 1240, 1244 n. 5 (9th Cir.1984), similarly explained:

> [T]he duty to gather information and do research under section 1502.22(a) should not turn on whether the information is "essential" or "important." ... [G]eneral NEPA law requires research whenever the information is "significant." As long as the information is "important," "significant," or "essential," it must be provided when the costs are not exorbitant in light of the size of the project and/or the possible harm to the environment.

The court continued:

> We recognized in SOCATS that an agency may be required to do independent research on the health effects of a herbicide. This is not a new requirement.
> In Foundation for North American Wild Sheep v. U.S. Dept. of Agriculture, 681 F.2d 1172 (9th Cir.1982), this court held an EIS inadequate because it failed to address the effect on bighorn sheep of opening a road when those effects were uncertain. We said, "the very purpose of NEPA's requirement that an EIS be prepared for all actions that may significantly affect the environment is to obviate the need for such speculation by insuring that available data is *gathered* and analyzed prior to the implementation of the proposed action." 681 F.2d at 1179 (emphasis added). Similarly, in Warm Springs Dam Task Force v. Gribble, 621 F.2d 1017 (9th Cir.1980), we held that an agency cured the defect in its EIS by *commissioning* a study about the effects of a newly discovered fault system on *that* dam. 621 F.2d at 1025-26. Other courts have imposed similar requirements on agencies. [citations omitted]
> Furthermore, in SOCATS and in Warm Springs we recognized that such a duty also flowed from the worst case analysis regulation:
>
> > If the information relevant to adverse impacts is essential to a reasoned choice among alternatives and is not known and the overall costs of obtaining it are not exorbitant, *the agency shall include the information* in the environmental impact statement.
>
> 40 C.F.R. § 1502.22(a) (emphasis added). Only if the costs are exorbitant or the means of obtaining the information is beyond the state of the art is the agency excused from compliance... 40 C.F.R. § 1502.22(b). The Forest Service presents no evidence and makes no argument that the costs are exorbitant or that research is impossible. Rather, it argues that it cannot be forced to do it. Section 1502.22 clearly contemplates original research if necessary.

4-2

42

747 F.2d at 1248- 49 (footnote omitted).[31] *See also*, The Fund for Animals v. Norton, Civil No. 02-2367 (D.D.C.), Dec. 16, 2003 Mem. Op., p. 38 ("this failure to even consider taking the steps necessary to gather relevant information results in an incomplete EIS analysis"). Regarding the MTM/VF DEIS, even if sufficient information is not available now to develop fill restriction alternatives, that information is essential and therefore must be obtained prior to making a final decision. 1/2/03 Forren email, Ex. 58, EPA OGC Comments, pp. 2, 6-7. 4-2

4. The DEIS Cannot Evade the Need to Consider Fill Restrictions on the Ground that Those Restrictions Are Prohibited by the CWA

The DEIS argues that applying the stream buffer zone rule under SMCRA to prohibit fills in intermittent and perennial streams would be inconsistent with existing CWA requirements allowing valley fills, and would therefore violate section 702 of SMCRA, 30 U.S.C. § 1292(a)(2), which provides that SMCRA does not supercede, amend or repeal the CWA. DEIS II.D-2.

EPA's Office of Water expressed concern in December, 2002 that the DEIS's legal position in this regard is incorrect, commenting that: 5-7-1

> There are fairly sweeping legal conclusions here that the stream buffer zone rule could not be used to determine allowable stream segments for filling because doing so would supercede the CWA, something [C]ongress precluded in SMCRA. The lawyers need to look at this more closely. I'm uncomfortable with the breadth of this argument...

1/7/03 Neugeboren e-mail, Ex. 59, OGC water law office comments, p. 1.[32]

Further, the DEIS's argument is directly inconsistent with the position taken by the United States in the Bragg litigation. In its brief in the 4th Circuit, the United States stated:

---

[31] Although Save Our Ecosystems applied 40 C.F.R. § 1502.22 when it still contained the "worst case analysis" requirement of then-Section 1502.22(b)(2), the holding and reasoning of the court pertains to the requirement of Section 1502.22(a) that "the agency shall include the information" if it is "essential" and the "costs of obtaining it are not exorbitant." That section is still applicable and remains unchanged by the amendment of the "worst case analysis" requirement.

[32] The position of the DEIS in this regard reflects the position of the OSM, with which the EPA and FWS disagreed during the development of the alternatives. *See, e.g.*, 8/13/02 Robinson e-mail, Ex. 37: "[T]he EPA and FWS Steering Committee members agree that this version [of the alternatives which includes the 'environmentally preferred alternative 4'] represents an accurate portrayal of possible viable contrasting alternatives... OSM agreed to disagree on Alternative 4... OSM disagreement stems from our belief ... that SMCRA must defer to the CWA standards regarding activities affecting waters of the U.S."

43

> WVDEP has argued that because SMCRA cannot supersede, amend, modify, or repeal the CWA, SMCRA cannot be construed to prohibit any activity that would be allowed by the CWA. That argument is without merit. ...
>
> SMCRA section 702 provides merely that SMCRA does not alter the existing regulatory schemes adopted by Congress in the CWA and other environmental statutes. ...
>
> When Congress has intended that one statute should take precedence over another statute in the regulation of a particular activity, it has done so with language very different and much clearer than SMCRA section 702. ...
>
> While WVDEP has asserted that it would create an impermissible statutory "conflict" to read the buffer zone rule to establish a stricter standard than that established by the 404(b)(1) guidelines, such a statutory construction does not create any such "conflict" as that term is understood in the law. As the Supreme Court has held, two statutes can be said to conflict only when it is impossible to comply with both. See Freightliner Corp. v. Myrick, 514 U.S. 280, 287 (1995). No such conflict arises if SMCRA is construed to prohibit some activities that would be authorized by the CWA, since it is possible to comply with both statutes by engaging in only those activities authorized by both statutes. 5-7-1
>
> Where an activity is regulated under the CWA and SMCRA – i.e., a surface mining activity that involves the discharge of pollutants from point sources into U.S. waters — regulation of the activity is governed by the usual principles that courts apply to reconcile overlapping statutes. Under those principles, "when two statutes are capable of co-existence, it is the duty of the courts, absent a clearly expressed congressional intention to the contrary, to regard each as effective. 'When there are two acts upon the same subject, the rule is to give effect to both if possible.'" Morton v. Mancari, 417 U.S. 535, 551 (1974) (quoting United States v. Borden Co., 308 U.S. 188, 198 (1939)). See also 2A Sutherland Statutory Construction § 51.05 (4th ed. 1984). An activity governed by both the CWA and SMCRA must therefore satisfy the requirements of both statutes.

Brief for the Federal Appellants, 4th Cir., No. 99-2683, April 17, 2000, pp. 45-49. Consequently, this reason for excluding consideration of fill restrictions is erroneous as a matter of law.

G. The DEIS Violates NEPA Because It Fails to Address or Remedy Continuing Violations of Federal Law. 4-2

1. The DEIS Violates the Clean Water Act Because It Assumes Continued Use of Nationwide Permits, Even Though the DEIS' Own Studies Demonstrate that the Minimal Cumulative Impact Ceiling for NWPs Has Already Been Exceeded.

a. The CWA Prohibits Use of NWPs Unless the Permitted Activities Have Minimal Environmental Effects Both Individually and Cumulatively.

In order to satisfy the requirements of Section 404 of the CWA, 33 U.S.C. § 1344, each of the four alternatives considered in the DEIS, including the "no action alternative" and the three "action alternatives," contemplate the permitting of MTM/VF activities under NWP 21 pursuant to CWA Section 404(e).[33] Section 404(e) of the CWA clearly requires the Corps to determine whether an activity will adversely affect the environment both individually *and* when considered cumulatively with other such activities. In other words, an activity that has only minimal impacts by itself nevertheless may *not* be permitted under a NWP if the activity has more than minimal impacts when considered cumulatively with other existing and foreseeable future activities in the same category. Section 404(e) states, in relevant part:

> [T]he Secretary may ... issue general permits on a State, regional, or nationwide basis for any category of activities involving discharges of dredged or fill material if the Secretary determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects *when performed separately, and* will have only minimal *cumulative* adverse effect on the environment.

33 U.S.C. § 1344(e) (emphases added). The plain meaning of this statutory provision is that NWPs cannot authorize an activity unless the activity has minimal impacts both individually *and* cumulatively. 4-2

The legislative history contains language identical to that of the statute. Subsection (e) was added to Section 404 of the CWA as part of the 1977 Amendments (Pub.L. 95-217, § 67(b), 91 Stat. 1600 (1977)). The House Conference Report makes clear that both the individual *and* cumulative impacts of an activity must be minimal in order to qualify for a NWP:

> Section 67 of the conference substitute ... adds a new subsection (e) to section 404 which gives the Secretary authority to issue general permits on a State, regional, or nationwide

---

[33] Under the "no action alternative," "Valley Fill impacts [are] assessed on [a] case-by-case basis to set NWP 21 or [individual permit (IP)] process; WV fills in less than 250-acre watershed[s] [are] generally eligible for NWP 21." DEIS II.B-19. The DEIS states that one "Proposal[] Common to Action Alternatives 1, 2, and 3" (DEIS II.B-10) is that "[t]he [U.S. Army Corps of Engineers (COE)] would ... evaluate whether programmatic 'bright-line' thresholds, rather than case-by-case minimal individual and cumulative impact determinations, are feasible for CWA Section 404 MTM/VF permits." DEIS II.B-11. The DEIS further explains that under "action alternative 1" "general permit NWP 21 authorization would be applicable ... in limited circumstances," and that "action alternative 2" recognizes that "some proposals will likely be suited for IPs, and others best processed as [NWP] 21," and that "action alternative 3" "is based on a procedural presumption by the COE that most MTM/VF applications would be processed as general permits under NWP 21..." DEIS ES-5.

basis for any category of activities involving discharges of dredged or fill material if the Secretary determines that the activities are similar in nature, and cause only minimal adverse environmental effects *when performed separately, and* will have only minimal *cumulative* adverse effect on the environment.

H. Conf. Rep. No. 830, 95th Cong., 1st Sess. 100 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4424, 4475 (emphases added). *See also*, Riverside Irr. Dist. v. Stipo, 658 F.2d 762, 764 (10th Cir. 1981): "[A] nationwide permit or authorization is one the Secretary issues covering a category of activities occurring throughout the country which involve discharges of dredged or fill material which he determines will cause only minimal adverse environmental effects when performed separately, **and** which will have only minimal **cumulative** adverse effect on the environment." (Emphases added). 4-2

Consequently, federal agencies cannot adopt any alternative that would allow the use of NWPs for any MTM/VF activities which have more than minimal cumulative environmental impacts. It is not enough that impacts of individual mines may not exceed the minimal impacts threshold, because the CWA requires minimal impacts both individually and cumulatively for any action to be permitted under a NWP.

b. The DEIS Demonstrates That the Cumulative Impacts of MTM/VF Activities in Appalachia Are More than Minimal.

Regarding stream and riparian habitat destruction ("cumulative aquatic impacts"), the DEIS states that "Direct impacts to 1,208 miles of streams is estimated based on the last 10 years of digital permit data. If mining, permitting and mitigation trends stay the same, an additional thousand miles of direct impacts could occur in the next ten years... The majority of the streams directly impacted are headwater streams." DEIS App. I, pp. 66-67; *see also*, DEIS App. I, p. v. Further, these numbers understate the total cumulative impacts because they reflect *only* the "directly impacted" (*i.e.*, buried) streams, and do not account for the streams which are significantly "indirectly" impacted (*e.g.*, by toxic selenium levels or other impacts on stream chemistry, temperature, flow, energy, sedimentation, or biota (DEIS III.D-1 to D-8)[34]) downstream from MTM/VF operations. DEIS App. I, pp. iii-iv. 9-2-2

Regarding deforestation ("cumulative terrestrial impacts"), the DEIS demonstrates that MTM/VFs have already converted, and will continue to convert, huge portions of one of the most biologically diverse forest areas in the United States into grasslands. "When adding past, present and future terrestrial disturbance, the study area estimated forest impact is 1,408,372 acres which equates to 11.5% of the study area." DEIS IV.C-1. The destruction of these nearly 1.5 million acres of forest is profound and permanent because "unlike traditional logging activities associated with management of hardwood forest, when mining occurs, the tree, stump, root, and

[34] "The indirect impacts from MTM/VF will continue regardless of alternative selected by decision makers." DEIS IV.B-5.

46

growth medium supporting the forest are disrupted and removed in their entirety." DEIS IV.C-1. The FWS has similarly commented: "Most biologists would probably argue that the loss of the natural forest IS probably irreversible, as the unique combination of flowing streams, species diversity, organic matter, etc., has been lost. At the very least it is FAR LESS REVERSIBLE than timbering, which at least leaves seed sources and native soils in place." 4/21/03 Rider e-mail, Ex. 71, attached file: chIVcomments.wpd, p. 1 (emphasis in original). Appendix I to the DEIS – the "Cumulative Impact Study" prepared by EPA itself – states that "fundamental changes to the terrestrial environment of the study area may occur from mountaintop mining," (DEIS App. I, p. v (emphasis added)), explaining:

> Habitat changes will occur in the study area and these changes will involve a shift from a forest dominated landscape to a fragmented landscape with considerably more mining lands and eventually grassland habitat.

DEIS App. I, p. 93.

> Mountaintop mining and valley fill activities significantly affect the landscape mosaic. Landcover changes occur as forests are removed, the topography and hydrology is altered, and vegetation is eventually re-established. The result is an area drastically different from its pre-mining condition. Soil qualities are different, the vegetative community has a different structure and composition, and habitats are altered.

Id., p. 23 (emphasis added). Further, FWS' Cindy Tibbott has stated, and EPA's William Hoffman has agreed, that: 9-2-2

> [R]e-establishing native hardwood forests on reclaimed mines is still experimental. We don't know what the long-term success will be. Even if hardwood forests can be re-established, it should be intuitively obvious that they'll be a drastically different ecosystem from pre-mining forests for generations, if not thousands of years...

Ex. 5 (emphasis added).[35]

[35] *See also*, DEIS IV.D-5: "[T]he permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems ... may constitute a[n] irreversible impact to this system in the study area." (emphasis added). *See also*, "Problems Identified/Confirmed/Inferred by Technical Studies, Ex. 6, p. 6: "Large-scale surface coal mining will result in the conversion of large portions of one of the most heavily forested areas of the country, also considered one of the most biologically diverse, to grassland habitat. Unless reclamation practices are changed drastically, it can be assumed that this forest to grassland conversion is, for all practical purposes, permanent. Even if reclamation practices are changed, we must still consider the recovery of a functional mesophytic forest ecosystem as a long-term ecological experiment with uncertain results." *See also*, 6/10/02 Hoffman e-mail, Ex. 29, EPA Issues - MTM/VF EIS: "Cumulative terrestrial impacts from MTM/VF activities are considered

47

Regarding wildlife destruction, the DEIS states that mountaintop removal mining engenders a "change in ... habitats [that] could put a number of species in peril." DEIS App I. p. v. EPA's "Cumulative Impact Study" finds that:

> The southern Appalachians have been identified by the Nature Conservancy as one of the hot spot areas in the United States for rarity and richness (Stein et al., 2000). This region is known to have the highest regional concentration of aquatic biodiversity in the nation. For this reason, it is hypothesized that impacts which result in decreases in genetic diversity, as measured by loss of species, loss of populations or loss of genetic variants, would have a disproportionately large impact on the total aquatic genetic diversity of the nation.

DEIS App. I, p. 78 (emphasis added). The DEIS further explains:

> Riparian habitats are generally ecologically diverse and they often provide habitat for unique, or ecologically important species... The projected potential adverse impacts in the West Virginia study area is 7,591 acres, or 3.2%. Approximately 55% of the projected riparian habitat impacts occur in first and second order streams which are important habitats to many species of ... wildlife.

DEIS App. I, p. vi. For example, "forest loss in the West Virginia portion of the study area has the potential of directly impacting as many as 244 vertebrate wildlife species." Id. at 86 (emphasis added). "The potential adverse impact of loss of habitat for [three forest interior bird species - Louisiana Waterthrush, Worm-eating Warbler, and Cerulean Warbler] has extreme ecological significance in that habitats required by these species for successful breeding are limited in the eastern United States." Id. at 90 (emphasis added).[36] "Loss of these species has more ecological importance than providing habitat for grassland species considered rare in the state because it suggests possible future endangerment of some forest interior species..." Id. at 9-2-2

to be significant..."

[36]*See also*, Ex. 6, p. 5: "Populations of forest birds will be detrimentally impacted by the loss and fragmentation of mature forest habitat in the mixed mesophytic forest region, which has the highest bird diversity in forested habitats in the eastern United States. Fragmentation-sensitive species such as the cerulean warbler, Louisiana waterthrush, worm-eating warbler, black-and-white warbler, and yellow-throated vireo will likely be negatively impacted as forested habitat is lost and fragmented from MTM/VF." (emphasis added). *See also*, id.: "The forests of this particular geographic area are the core breeding area for a number of forest interior bird species that have extremely limited breeding ranges, including the cerulean warbler, which is currently under review by the Fish and Wildlife Service for endangered species listing."

91.[37] Further, "[s]alamanders are an important ecological component in the mesic forests of the study area... [and] are intimately associated with forest ecosystems..." Id. (citations omitted). "Assuming that 80% of the salamanders are lost in the projected forest impact areas, approximately 1,232,972,280 have the potential of being adversely impacted." Id. at 92-93 (citation omitted) (emphasis added). Further,

> [T]his EIS describes biotic interactions common in headwater streams and various vertebrate species including birds, salamanders (including newts), and mammals which require interactions with the aquatic environment in order to maintain their life cycle... Filling would eliminate all aquatic and aquatic-dependant interactions that would formerly have occurred in the filled area... [T]he permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems ... may constitute a[n] irreversible impact to this system in the study area.

DEIS IV.D-4 - 5 (emphasis added).[38]

In addition, the DEIS demonstrates that future mountaintop removal mining of the remaining recoverable reserves of coal in Appalachia is likely. Indeed, the DEIS projects that "the demand for central Appalachian coal will likely increase at some point in the future," (DEIS IV.I-1), explaining:

> The U.S. Department of Energy (DOE) estimated in 1998 that 28.5 billion tons of high quality coal ... remain in the study area. DOE reported about 280 million tons of coal were extracted by surface and underground mining from the study area in 1998. Coal produced from the study area continues to provide an important part of the energy needs of the nation. Regionally, coal mining is a key component of the economy[,] providing jobs and tax revenue. Almost all of the electricity generated in the area comes from coal-fired power plants... [C]oal production remains high... 9-2-2

DEIS ES-2.

All such future mining is reasonably foreseeable and must be included in the cumulative impact analysis for each mine. *See, e.g.*, Defenders of Wildlife v. Ballard, 73 F. Supp.2d 1094, 1113-14 (D. Ariz. 1999), holding that the COE was required to consider the cumulative impacts

[37]Further, "[e]ven if the grassland habitat created by reclamation is optimal habitat for grassland bird species (which may not be the case), this region is outside of the primary breeding range of these widely-distributed grassland species." Ex. 6, p. 5.

[38]The FWS has also commented that "[d]isplaced wildlife will move into adjacent habitats and likely find that they are already occupied by more fortunate members of their species, and competition for food and nesting locations will simply mean that the displaced ones die or fail to reproduce..." 4/21/03 Rider e-mail, Ex. 71, attached file: chIVcomments.wpd, p. 1.

of NWP programs under the CWA with respect to an endangered species of owl, and to determine that use of such NWPs had no significant impact before authorizing projects under those permits:

> ... Defendants' scope of analysis ... is inadequate to measure the impact of implementing the NWP program under which thousands of projects will be authorized. The kind of impact statement required depends upon the kind of federal action being taken.

The court concluded: "At a minimum, this Court must order the Defendants to take a 'hard look' at the cumulative impact of the NWP program, ... and determine that the use of these permits in this region has no significant impact." Id. at 1114 (emphasis added). Similarly, here, the drafters of the DEIS must consider the cumulative impact of all past, present, and reasonably foreseeable future MTM/VF operations to be authorized under NWP 21. When all such cumulative impacts are considered, the inescapable conclusion is that such impacts exceed the "minimal impact" threshold for authorization under NWP 21 for any MTM/VF operation.

Thus, the DEIS itself, relying on EPA's own study, clearly demonstrates that the cumulative adverse environmental impacts of mountaintop removal mining in Appalachia are more than "minimal." The riparian and forest ecosystems which have already been and will continue to be destroyed are among the most biologically rich and genetically diverse in the nation. The magnitude of the destruction in terms of forest acreage, stream-miles, and lost wildlife populations, habitat, and species is enormous. The destruction is permanent, causing a "fundamental" shift from a forest ecosystem to a "grassland habitat." Such mining is likely to continue or increase in the future. The evidence in this DEIS that MTM/VF impacts are more than minimal on a cumulative basis is simply overwhelming. Section 404(e) of the CWA prohibits the use of NWPs unless the activity "will have only minimal cumulative adverse effect on the environment." The DEIS proves that mountaintop removal mining activities cannot satisfy this requirement in any case. The FWS has similarly observed: 9-2-2

> [H]ow will the Corps justify a "significant degradation" determination? Corps issuance of any permit means that the Corps has determined that the project will not result in "significant degradation" as defined by the 404(b)(1) guidelines; the significant degradation test trumps even the public interest review and the practicable alternatives test. To our knowledge, there is no other single industry or activity in the country that receives Section 404 authorization for the total elimination of waters of the United States on the scale that stream destruction occurs with mountaintop mining... Are we seriously going to propose that some sort of "compensatory mitigation" can be fabricated that would truly replace the lost functions and values of the destroyed miles of streams, to the degree that we could consider impacts to be less than minimal? How many miles of stream loss a year are we going to be willing to accept under the cumulative impact test required for nationwide permits? What precedents do these decisions set for attempts to limit the loss of streams resulting from other types of activities authorized by other nationwides?

10/30/02 Tibbott e-mail, Ex. 45.

Individual permits must be used for every mine because every mine will contribute to deforestation and stream destruction. Therefore, no MTM/VF activities are eligible for NWPs, and all of the alternatives considered by the DEIS are illegal because they all contemplate permitting future MTM/VF activities under NWP 21. 9-2-2

2. The DEIS Violates the Clean Water Act, Because Its Studies Show that MTM/VF Activities Cause Violations of the WV Water Quality Standard for Selenium, But the DEIS Does Nothing to Address Those Violations.

The DEIS shows that MTM/VF activities cause violations of WQSs for selenium in West Virginia. The DEIS fails to propose any remedies for those violations. Federal agencies cannot take any action that would violate WQSs. Therefore, all of the proposed alternatives in the DEIS are illegal because they would permit activities which violate WQSs.

The DEIS states:

> The data from this report indicate that MTM/VFs increase concentrations of several chemical parameters in streams. Sites in the Filled category had increased concentrations of ... total selenium... Comparisons to [Ambient Water Quality Criteria (AWQC)] were performed with a subset of the total data set as explained in USEPA (2002a). Selenium concentrations from the Filled category sites were found to exceed AWQC for selenium at most (13 of 15) sites in this category. No other site categories had violations of the selenium limit. 5-5-1

DEIS III.D-6. The DEIS therefore concludes: "The existence of selenium at concentrations in excess of AWQC at most of the filled sites indicates a potential for impacts to the aquatic environment and possibly to higher order organisms that feed on aquatic organisms." DEIS III.D-7.[39]

The "West Virginia Stream Chemistry Study," dated April 8, 2002 and set forth in Appendix D to the DEIS (*hereinafter* "DEIS Chem. Study"), puts the matter more bluntly, explaining that "...MTM/VF mining is associated with violations of the stream water quality criteria for total selenium. Selenium violations were detected in each of the five study watersheds and all were at sites in the category Filled, downstream from MTM/VF operations. No other site categories had violations of the selenium limit." DEIS Chem. Study 2. This study

[39] *See also*, DEIS III.D-18: "As discussed in the USEPA Stream Chemistry Report, several chemical parameters have been found to be elevated in stream surface water downstream from filled/mined area (USEPA 2002a). Chemical parameters elevated in excess of ambient water quality criteria may impair the aquatic productive [sic] of constructed streams."

also finds that "[t]he selenium data indicate numerous violations of the West Virginia stream water quality criterion related to MTM/VF mining." Id. at 47.[40] Indeed, the EPA-recommended and West Virginia-adopted stream water quality criterion for selenium is no more than 5 ug/L (DEIS Chem. Study 73), and selenium levels downstream from "Filled sites" were up to 10 times that amount. Id. at 75. The study elaborates that selenium is "highly toxic" in amounts "slightly greater" than those found naturally, and is "strongly bioaccumulated in aquatic habitat." Id. at 73.

The CEQ regulations provide that each EIS "shall state how . . . decisions based on it will or will not achieve the requirements of . . . other environmental laws and policies." 40 C.F.R. § 1502.2(d). Under NEPA, "each agency must mesh the requirements of NEPA with its own governing statute as far as possible." Sierra Club v. Sigler, 695 F.2d 957, 967 (5th Cir. 1983); Calvert Cliffs, 449 F.2d at 1115 & n.12. Here, the CWA governs the establishment and enforcement of state water quality standards. It contains "statutory commands the Corps must integrate with the requirements of NEPA." Sigler, 695 F.2d at 967. Thus, the DEIS in this case must be reviewed not only for adherence to NEPA, but for adherence to the CWA's commands. Id.

All federal agencies have an obligation under the Clean Water Act to comply with state water quality standards. National Wildlife Federation (NWF) v. U.S. Army Corps of Engineers (COE), 132 F. Supp.2d 876, 889 (D.Or. 2001). It is arbitrary and capricious for a federal agency to acknowledge that such standards are being violated and that its facility is partly responsible for such violations, but fail to take action to comply with those standards. Id. at 895. As the court held in NWF v. COE: "The compliance of the Corps with its legal obligations under the [CWA] *is a relevant factor in determining whether the final agency actions taken by the Corps in the* [Records of Decision (RODs)] were arbitrary and capricious... [under the APA]." Id. at 890. While that case involved a dam operated by the COE, the same principle should apply to permits issued by the COE for valley fills, since those fills are directly connected to violations of state water quality standards for selenium. 5-5-1

Further, pursuant to 40 C.F.R. § 1502.25(b), the EIS is required to identify all federal permits that the project requires in order to comply with federal law. Therefore, a court reviewing the Final EIS would be obligated to decide, under NEPA, whether the selenium

[40] *See also*, 3/27/02 Bryant e-mail, Ex. 22: "The selenium data clearly show 'hot spots' with higher concentrations of selenium in each of the five watersheds and located downstream of "Filled" sites ONLY. There are 66 violations of the stream water quality criteria identified and each is at a Filled site. No other category of site had violations of selenium! I don't believe anyone needs a statistician to prove that MTM/VF mining causes violations of stream criteria for selenium. On top of that, the WV Geologic Survey data indicate that the coals in that region are high in selenium." (capitalization in original). *See also*, 1/02/03 Tibbott e-mail, Ex. 57: "[B]elow fills the ambient water quality criterion for selenium concentration is exceeded consistently..."

discharges are properly permitted under the CWA, including the state water quality certification under Section 401 of the CWA. As the court in Dubois v. U.S. Dept. of Agriculture, 102 F.3d 1273, 1295-1296 (1st Cir. 1996), explained:

> Regardless of whether any of the remedies provided in the CWA would be available to Dubois in light of his asserted failure to provide proper notice of his intent to sue, this court would still have the authority and the obligation to decide, under NEPA, whether an NPDES permit is required in this case. This is because ... NEPA requires the Forest Service to identify in its EIS all federal permits that the project needed in order to comply with applicable federal law.

(emphasis added).

Given the serious impacts of mining on water quality, an EPA official stated in November 2002 that "I am confident that the EIS will recommend further studies; and recommend *monitoring at a minimum for selenium, sufates and conductivity . . . everywhere in Appalachia.*" Rider 11/7/02 e-mail, Ex. 47. In fact, however, the DEIS does not recommend any further studies or monitoring for these chemicals. DEIS IV.B-5 to IV.B-6. 5-5-1

It is arbitrary and capricious for the DEIS to acknowledge that the MTM/VF operations under any of the alternatives would violate state water quality standards for selenium, but fail to consider any remedies for these contemplated violations or any alternatives which do not violate state water quality standards for selenium. All of the alternatives contemplate the illegal federal permitting of actions which violate state water quality standards. Under NEPA, the DEIS must mesh the requirements of NEPA with those of the CWA as far as possible. The compliance of the state and federal agencies with their legal obligations under the CWA is a relevant factor in determining whether issuance of the EIS without addressing acknowledged violations of state water quality standards by conduct which is the subject of the EIS is arbitrary and capricious under the APA. Further, it is a violation of NEPA to issue an EIS which fails to identify all federal permits necessary to comply with federal law.

3. The DEIS Violates SMCRA, Because It Admits that MTM/VF Activities Violate OSM Regulations Regarding Soil Practices, But Does Nothing to Address Those Violations.

The DEIS acknowledges that current soil practices violate OSM regulations, because the post-mining soil supports lower quality vegetation than did the existing pre-mining soil. The DEIS fails to propose any remedies for those violations. Therefore, all of the proposed alternatives in the DEIS are illegal because they would permit activities which violate OSM regulations promulgated pursuant to SMCRA. *See* 30 C.F.R. § 816.22(b) (requiring soil medium to support revegetation); §§ 816.22(c)(2)(ii), 816.22(d)(1)(ii) (prohibiting excessive compaction that interferes with revegetation). 19-3-1

The DEIS states:

> The information in Table III.B-2 is corroborated by the experience of reclamation personnel and is reflected in West Virginia's recently proposed commercial forestry regulations. In estimating the likely quality of reclamation to be obtained under these regulations, we must recognize the fact that the current regulations (which have been in place since May 16, 1983) require that selected overburden substitutes for soil be "equal to, or more suitable for sustaining vegetation than the existing topsoil, and the resulting soil medium is the best available in the permit area to support revegetation." Also, soil materials are to be redistributed in a manner that prevents excessive compaction of the materials. Be this as it may, the reality of reclamation in Appalachia is that selective overburden handling is rarely practiced beyond that required to keep highly toxic material out of the rooting zone; excessive compaction is commonplace... Production of soils that will support commercial forestry as part of mountaintop mining requires selective overburden handling and replacement procedures on a scale that has **never been carried out in Appalachia**. 19-3-1

DEIS III.B-15 (citation omitted) (emphases added).

Although the DEIS proposes a "mitigation measure" of producing a "best management practices" manual which would "encourage" reforestation, the practices suggested by this manual would be purely voluntary and the DEIS points to nothing to suggest that such practices would be followed (as addressed more fully in section II.I.2. of these comments). The DEIS proposes no remedies for this acknowledged, ongoing, systemic violation of the OSM regulations. Therefore, for the same reasons discussed above regarding violations of WQSs for selenium, it is arbitrary and capricious for the DEIS to acknowledge that the MTM/VF operations under any of the alternatives would violate OSM soil practice regulations, but fail to consider any remedies for these violations or any alternatives which do not contemplate violations of the regulations.

H. The DEIS Violates NEPA and SMCRA by Assuming that *Changing* the Stream Buffer Zone Rule Is Part of the "No Action" Alternative.

All four of the alternatives considered in the DEIS, including the "no action alternative" and the three "action alternatives," contemplate *changing* the SBZ rule so that the rule is weakened or eviscerated. No alternative contemplates keeping the SBZ rule in place as it currently exists. This failure to consider any alternative which includes the option of *not* changing the SBZ rule violates NEPA, under which the EIS must "[i]nclude the alternative of no action." 40 C.F.R. § 1502.14(d). That is, by illegally including a rule *change* in the "no action alternative," the DEIS illegally side-steps the fundamental requirement of NEPA to consider the benefits of leaving the rule unchanged. Rather, the DEIS assumes that under all alternatives spoil can be placed in streams and contains no analysis of the benefits of maintaining the current level of protection afforded by the SBZ rule. Further, the DEIS's assumption that changing the SBZ rule is part of the "no action alternative" violates SMCRA, which requires OSM to prepare an 4-2

54

EIS on significant changes to the SMCRA regulations. *See, e.g.*, DEIS II.C-63 ("SMCRA Section 702(d) states that SMCRA rulemaking is a major Federal action requiring NEPA compliance." (emphasis in original)).[41]

The DEIS describes the SBZ rule as it currently exists as follows:

> SMCRA regulations at 30 CFR 816.57, known as the stream buffer zone (SBZ) rule, preclude impacts within 100 feet of intermittent and perennial streams absent a finding that 1) mining activities will not cause or contribute to a violation of applicable state or Federal water quality standards, and will not adversely affect the water quantity and quality or other environmental resources of the stream; and 2) if there will be a temporary or permanent stream-channel diversion, it will comply with specific requirements applicable to the construction of diversions.

DEIS II.C-10.[42] However, in describing the "No Action Alternative," the DEIS states:

> Historically, OSM has not viewed, applied, or enforced the buffer zone regulation to prohibit mining activities within the buffer zone if those activities would have less than a significant effect on the overall chemistry and biology of streams, i.e., the overall watershed or stream below the activity. Therefore, excess spoil fill construction within the buffer zone has been allowed if a demonstration of no significant effect on downstream water quality was made by the permit applicant to the satisfaction of the SMCRA regulatory authority. This interpretation resulted because to interpret the SBZ rule as an absolute prohibition for constructing valley fills in streams would counter other statutory provisions. SMCRA recognized the necessity of excess spoil fills in SMCRA Section 515(b)(22), and the only available location for excess spoil placement in steep slope mining is in valleys adjacent to the mining area. These valleys may contain headwater streams... 4-2

[41] The OSM "Vision" statement states: "The NEPA compliance requirements for proposed SMCRA regulation would be satisfied by concurrent publication of the draft EIS with similar alternatives to the proposed regulations." Ex. 9, p. 3. While publication in the DEIS of alternatives "similar to" proposed rule changes would *not* satisfy NEPA, the DEIS does not even do that. Rather, it merely states that "OSM is currently preparing a draft proposed rule that would amend the rules at 30 CFR 816.57 and 817.57 to clarify the SBZ requirements," (DEIS II.C-34), and articulates a very general description of the contemplated forthcoming proposal. This description of the contemplated SBZ rule change falls far short of NEPA compliance for SMCRA rule changes.

[42] *See also*, DEIS II.D-2: "The existing SBZ rule provides that no land within 100 feet of a perennial or intermittent stream be disturbed by surface mining activities unless the SMCRA regulatory authority specifically allows mining activities closer to, or through, such a stream."

55

OSM is currently preparing a draft proposed rule that would amend the rules at 30 CFR 816.57 and 817.57 to clarify the SBZ requirements. These amended rules would more closely align with the principal statutory basis for the rule [30 U.S.C. 1265(b)(10) and (b)(24)]. Exemptions to the SBZ requirements would only be granted upon a demonstration by the coal operator, to the satisfaction of the SMCRA regulatory authority, that encroachment into the SBZ is necessary and that disturbances to the prevailing hydrologic balance at the mine-site and in associated offsite areas have been minimized.

DEIS II.C-34 to C-35 (emphases added).[43]

OSM's interpretation of the existing SBZ rule is incorrect, and is directly inconsistent with the interpretation given by the United States before the 4th Circuit in Bragg. In its brief, the United States stated:

> By specifying that mining activities must seek to protect water resources "at the mine site and in associated offsite areas," Congress made clear that water resources must be protected where mining activities occur and not only at downstream portions away from the mining sites. ...
>
> By expressly and unambiguously applying to the stream segments where mining activities are proposed, the buffer zone cannot be satisfied by a finding that the stream's environmental resources are protected at some downstream point. ... 4-2
>
> [V]alley fills that disturb intermittent or perennial streams may be approved only if there is a finding that activity will not adversely affect the environmental resources of the filled stream segment. ...
>
> [T]he district court correctly held that findings made in applying the CWA 404(b)(1) guidelines cannot be used as a substitute for the findings required by the stream buffer zone rule.

Brief for the Federal Appellants, 4th Cir., No. 99-2683, April 17, 2000, pp. 40-43. OSM's interpretation of the SBZ rule is therefore erroneous as a matter of law, and is an arbitrary

[43] *See also*, DEIS II.B-7, regarding the "No Action Alternative" ("OSM initiated a SMCRA regulatory program enhancement to amend and clarify the stream buffer zone (SBZ) rules at 30 CFR 816.57 and 817.57."); DEIS II.B-19, regarding the "No Action Alternative" ("SMCRA buffer zone (SBZ) subject to interpretation."); DEIS II.C-1, regarding the "No Action Alternative" ("Current SBZ rule-making (OSM)"); DEIS II.D-2, regarding "Alternatives Considered but Not Carried Forward in this EIS," ("Use of the [existing] OSM SBZ rule was considered to implement the alternatives establishing valley fill restrictions for certain stream segments [but not carried forward].).

reversal of its prior position.

All three of the "action alternatives" also contemplate weakening or eviscerating the SBZ rule. Regarding Alternative 1, the DEIS states: "SMCRA SBZ rule inapplicable to excess spoil in waters of the U.S. due to CWA Section 404 analysis." DEIS II.B-19. Regarding Alternatives 2 and 3, the DEIS states: "The No Action Alternative discusses ongoing rule-making to amend and clarify the SBZ rule. This action could also include later OSM consideration of additional amendment to the SBZ rule to increase consistency with the CWA Section 404 program, if appropriate and supported by SMCRA." DEIS II.C-36.[44]

Thus, all four of the alternatives considered in the DEIS, including the "no action alternative," contemplate changes to the existing SBZ rule that would either weaken ("no action alternative") or explicitly (alternative 1) or implicitly (alternatives 2 and 3) eviscerate the rule. The DEIS therefore frustrates Congressional will and illegally evades the requirements of NEPA to consider "the alternative of no action" and compare the benefits of stream protection as it exists with any contemplated changes. The DEIS also illegally evades the SMCRA requirement that OSM prepare an EIS regarding significant changes to the SMCRA regulations. Finally, the DEIS's interpretation of the existing SBZ rule is incorrect and directly inconsistent with the interpretation adopted by the United States in Bragg.

I. The DEIS Violates NEPA Because it Fails to Adequately Analyze the Effectiveness of Mitigation Measures. 4-2

The DEIS violates NEPA by failing to adequately analyze the effectiveness of proposed mitigation measures. Specifically, first, the DEIS relies on the effectiveness of in-kind mitigation while admitting that on-site stream reconstruction has never been successfully accomplished. Second, the DEIS relies solely on a BMP manual to "encourage" mine operators to reforest their lands, without showing that the manual, by itself, will have any meaningful impact on adoption of PMLUs that involve reforestation.

"Implicit in NEPA's demand that an agency prepare a detailed statement on 'any adverse environmental effects which cannot be avoided should the proposal be implemented,' 42 U.S.C. § 4332(2)(C)(ii), is an understanding that an EIS will discuss the extent to which adverse effects can be avoided." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 351-52 (1989) (citation omitted). "A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA." Northwest Indian Cemetery Protective Assoc. v. Peterson, 795 F.2d 688, 697 (9th Cir. 1986) (citation omitted). "Without analytical detail to

[44] While it is not clear what "additional amendment" might be considered under Alternatives 2 and 3, it appears that such amendment would be similar to that considered under Alternative 1 to make the SBZ rule "inapplicable to excess spoil in waters of the U.S. due to CWA Section 404 analysis," since the "addition amendment" would have the same purpose to "increase [SBZ rule] consistency with the CWA Section 404 program."

support the proposed mitigation measures, we are not persuaded that they amount to anything more than a 'mere listing' of good management practices." Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1151 (9th Cir. 1998).

In the present case, the DEIS itself demonstrates that its own reliance on in-kind mitigation is not justified or supported by the history of such mitigation attempts or its own findings regarding the likelihood of success, and the proposed BLM manual is the epitome of a "mere listing of good management practices" because its suggested practices are non-mandatory and unenforceable and the DEIS points to nothing to suggest that the manual's existence will increase forestry PMLUs.

1. The DEIS Relies on the Effectiveness of In-kind Mitigation While Admitting That On-site Stream Reconstruction Has Never Been Successfully Accomplished.

The DEIS relies heavily on the future effectiveness of in-kind[45] mitigation to reduce environmental impacts. "The alternatives proposed, including the No Action Alternative, assume successful mitigation through on-site reclamation and on-site and off-site mitigation." DEIS IV.B-8. "In-kind mitigation must restore or create headwater stream habitat on the reclaimed mine area to replicate the functions lost from direct stream loss." DEIS IV.B-9. "In most situations, under all alternatives, some type of on-site restoration, as a component of reclamation, would be included as part of or all of the mitigation needed to replace lost functions from headwater streams." Id. "The functions of streams lost through filling can require substantial mitigation as compensation." DEIS II.C-47. "Mitigation for lost stream functions is important to ensure that significant degradation to waters of the U.S. does not occur." DEIS II.C-49. "Both on-site and off-site mitigation are likely necessary to insure that only minimal individual and cumulative impacts occur under all of the alternatives considered..." DEIS IV.I-12. 4-2

FWS' reviewer of the DEIS commented that "...the ability of compensatory mitigation to reduce impacts to minimal levels is the linchpin of each of the alternatives." 11/13/02 Tibbott e-mail, Ex. 49, Comments, p. 1. But she stated that this mitigation "is an untested, unproven concept, and many believe it can't be accomplished." Id. This is a "fatal flaw in our alternatives framework." Id. The FWS reviewer further commented: "[I]t is difficult if not impossible to reconstruct free flowing streams on or adjacent to mined sites ... [due to] the inability to capture sufficient groundwater flows necessary to provide a constant source of flow for the new stream." 11/15/02 Tibbott e-mail, Ex. 50, Comments, p. 1. *See also*, 1/02/03 Tibbott e-mail, Ex. 57, p. 2: "It is unlikely that streams and the ecological functions they contribute to the watershed can be replaced through mitigation..."

The DEIS' reliance on effective in-kind mitigation is wildly irrational and directly

---

[45] "[T]here is a preference for onsite (on the same site as the habitat being impacted) and in-kind (same habitat as that being impacted) compensation." DEIS II.C-50.

58

contradicted by the DEIS's own findings regarding the history of such mitigation attempts and the state of the existing technology. That is, functioning headwater streams have never been successfully created in MTM/VF areas, and the technology to create them does not exist. Rather, attempts to create flowing streams have resulted only in creating standing ponds and "linear groin ditches" (DEIS III.D-20) which cannot replace the important functions of headwater streams,[46] so that mining companies often resort to simply paying fees to bury the headwaters and destroy the stream ecosystems. The DEIS explains:

> [R]ecreating headwater streams onsite to functionally replace those directly lost from filling operations is difficult and not often undertaken as compensatory mitigation. Experience with the technology required to create streams that match those directly lost through valley fills is very limited. To recreate intermittent or perennial streams onsite, the channel must intercept local groundwater. The potential channel locations and elevations may not coincide with prevailing geologic structure (dip or hydraulic gradient) making local groundwater horizons difficult to capture for establishing stream flow. While proven methods exist for larger stream channel restoration and creation, the state of the art in creating smaller headwater streams onsite has not reached the level of reproducible success required for these efforts to be reasonably relied upon programmatically as an option for full compensatory mitigation. Consequently, other forms of compensatory mitigation are employed and other sites outside the footprint of the fill are often utilized to offset unavoidable aquatic impacts of valley fill operations. Mitigation sites (on- or offsite) require a conservation easement so that protection of the aquatic resources is assured in perpetuity. Because mining companies often lease mine sites and may not own or control offsite areas, this easement requirement can sometimes pose a significant barrier to the location of suitable mitigation opportunities–either onsite or offsite. These factors can also result in greater consideration of in lieu fee arrangements whereby mitigation is accomplished through monetary payment for aquatic conservation/restoration projects identified by government resource agencies. 4-2

DEIS II.C-50 (citation omitted) (emphasis added). The DEIS further explains:

> Stream creation on filled areas is very difficult in general due to the inability to capture sufficient groundwater flows necessary to provide a source. There is some suggestion that perennial flow could be established on a contour between the fill and the native rock

---

[46] The DEIS acknowledges the important and unique functions of flowing headwater streams: "When energy source is altered or removed in the upstream reaches, downstream biological communities are also affected. The value of headwater streams to the river ecosystem is emphasized by Doppelt, et al. (1993): 'Even where inaccessible to fish, these small streams provide high levels of water quality and quantity, sediment control, nutrients and wood debris for downstream reaches of the watershed. Intermittent and ephemeral headwater streams are, therefore, often largely responsible for maintaining the quality of downstream riverine processes and habitat for considerable distances.'" DEIS III.C-12. *See generally*, DEIS II.C-1 to C-12.

59

by the use of some type of impermeable liner. However, no demonstration projects have yet been performed to validate this hypothetical design... [A]t best, streams recreated on mined lands would be expected to have only intermittent flow... [S]everal chemical parameters have been found to be elevated in stream surface water downstream from filled/mined areas. Chemical parameters elevated in excess of ambient water quality criteria may impair the aquatic productive [sic] of constructed streams... During the development of this EIS, technical representatives from OSM and from West Virginia have suggested that groin ditches constructed along the edges of fills may represent an opportunity for in-kind replacement of streams with an intermittent or ephemeral flow regime. To date, no drainage structures observed appear to have successfully developed into a functional headwater stream.

DEIS III.D-18 to D-19 (citations omitted) (emphasis added). The DEIS continues:

> [T]o date functioning headwater streams have not been re-created on mined or filled areas as part of mine restoration or planned stream mitigation efforts. Most on-site mitigation construction projects have resulted in the creation of palustrine wetlands that resembled ponds. Some of these created wetlands are isolated from other surface water systems while others occur in drainage channels which connect to the original stream system at some point. On some fills, linear-shaped wetlands may develop in groin ditches... Functions not restored include habitat for aquatic organisms that require lotic or flowing-water conditions.

4-2

DEIS III.D-20 (emphasis added). The DEIS further observes: "If future mitigation mirrors past ... reclamation practices ..., successful restoration of habitat for organisms requiring lotic (flowing) conditions may be very limited." DEIS IV.B-9.[47]

Thus, the DEIS's reliance on the effectiveness of in-kind mitigation is arbitrary and capricious given its simultaneous admission that on-site stream reconstruction has never been successfully accomplished and is not likely to be accomplished, and may in fact be impossible, under any alternative. Where, as here, an agency fails to support its conclusion that its proposed mitigation measures will perform as expected in the specific environment contemplated in the EIS, the agency's consideration of mitigation measures is inadequate to meet the requirements of NEPA. Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1214 (9th Cir. 1998).

2. The DEIS Relies Solely on a BMP Manual to "Encourage" Reforestation Without Any Analysis of Whether It Is Likely to Do So.

[47]Furthermore, the Corps has no authority under the Clean Water Act to use mitigation to offset the loss of jurisdictional waters of the United States, especially where the effect of this mitigation offset is to convert jurisdictional waters such as perennial streams to potentially non-jurisdictional waters such as "groin ditches" or "wetlands isolated from other surface water systems." DEIS III.D-20.

60

In addition to stream reconstruction, the other mitigation tool envisioned by the DEIS is a BMP manual, which would attempt to "encourage" reforestation, although forestry PMLUs would remain purely voluntary under all of the alternatives. This proposed "mitigation measure" is the epitome of a "mere listing of good management practices" (Idaho Sporting Congress, 137 F.3d at 1151) which violates NEPA. Specifically, it fails to satisfy the NEPA requirement that an EIS adequately analyze the effectiveness of proposed mitigation measures. The DEIS contains no analysis of whether the manual will actually increase reforestation.

In the absence of such analysis, there is good reason to believe that it would not. The DEIS finds that reforestation is currently not the usual practice due to economic disincentives and technological barriers.[48] As the FWS has observed:

> The EIS indicates that landowners would be expected to support reforestation because of its long-term benefits. Because of the lack of success of the reforestation initiative that was begun several years ago in Kentucky, we do not believe landowners or the mining industry will show significant support for anything more than is required. The EIS should only provide realistic potential solutions.

1/02/03 Tibbott e-mail, Ex. 57, pp. 1-2. The EPA similarly stated in June, 2002:

> [PMLU] studies suggest that, in general, post-mining development has not occurred as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned ... must be included as commitments within the EIS. 19-2-2

6/10/02 Hoffman e-mail, Ex. 29, EPA Issues - MTM/VF EIS; 6/14/02 Rider e-mail, Ex. 31. As a result, the DEIS's reliance upon the supposed willingness of the mining industry to voluntarily undertake costly reforestation is unrealistic and unsupported.

Currently, disincentives and barriers to reforestation are the norm. "[T]he use of grasses and legumes serves as the low cost, low-risk option for bond release. Even when the reclamation plan calls for the planting of trees, excessive compaction of the rooting medium, which severely reduces tree growth, is the norm." DEIS III.B-9. "The predominant PMLU has included a bias towards salvaging ... soil materials that provide favorable chemical conditions for the growth of grasses and legumes, but have a negative impact on forest regeneration." DEIS III.B-11. "Production of soils that will support commercial forestry as part of mountaintop mining requires selective overburden handling and replacement procedures on a scale that has never been carried

[48]In fact, even "flat land" PMLUs are not being completed. "This investigation found that many sites are not being developed as envisioned when PMLU variances are granted, and that the supply of flat land seems to outweigh the demand." Ex. 6, p. 4.

61

out in Appalachia."[49] DEIS III.B-15 (emphasis added). Cindy Tibbott (USFWS) has stated, and William Hoffman (USEPA) has agreed, that:

> I am very concerned about running all of the Alternatives without a 0% forest recovery scenario ... [because] re-establishing native hardwood forests on reclaimed mines is still experimental. We don't know what the long-term success will be. Even if hardwood forests can be re-established, it should be intuitively obvious that they'll be a drastically different ecosystem from pre-mining forests for generations, if not thousands of years...

Ex. 5 (emphasis added).[50]

Despite this lack of current reforestation, the DEIS insists: "A BMP manual emphasizing the latest cost-effective reforestation techniques could encourage forestry-related PMLUs." DEIS II.C-76. However, the DEIS admits that "the only difference between the No Action Alternative and the development and use of BMPs as part of Alternatives 1, 2, and 3 is that this action anticipates broader acceptance and use of the BMPs to improve reclamation to a forest land use." DEIS IV.C-8. Thus, the DEIS simply assumes that the BMP manual will effectively encourage reforestation, without any support for this assumption and without any requirement for forestry as a PMLU, and in the face of the acknowledged fact that reforestation is not currently practiced due to significant technological barriers and economic disincentives. The DEIS's analysis of the BMP manual as a proposed mitigation measure is therefore insufficient to meet the requirements of NEPA. 19-2-2

J. The DEIS' Analysis of the Economic Impacts of Mining Restrictions Is Inadequate

The DEIS does not contain any substantial analysis of the economic impacts of different fill restriction alternatives. The United States spent large amounts of money on a two-phase economic study. The Phase 1 study by Resources Technology Corporation (RTC) analyzed the impact of proposed regulatory changes on the amount of mineable coal reserves. That study cost about $200,000. The Phase 2 study by Hill & Associates (H&A) used the RTC results to estimate the market impacts on coal prices, coal production, electricity generation and electricity pricing. That study cost over $300,000. 11-9-2

[49] *See also*, Ex. 6, p. 4 ("Current reclamation practices result in conditions that discourage the re-establishment of trees."); Id., p. 5 ("The study found no evidence that native hardwood forests, including their herbaceous understory component, will eventually recolonize large mountaintop sites using current reclamation methods.").

[50] *See also*, Ex. 6, p. 6: "Even if reclamation practices are changed, we must still consider the recovery of a functional mesophytic forest ecosystem as a long-term ecological experiment with uncertain results."

62

However, the Steering Committee rejected those studies, thereby throwing away an investment of over one-half million dollars, purportedly because they "are no longer essential for portraying the differences between the alternatives being analyzed in the EIS. The committee agreed that the studies would have been relevant had the original restriction alternatives proven to be viable alternatives, but since they are not viable, revising the studies is not essential for completion of the EIS." 9/10/02 Hoffman e-mail, Ex. 40, Attachment. The Steering Committee also believed that the findings in those studies "can be dismissed by credible agency qualifications statements" in the DEIS. Ex. 41, Agenda, p. 2.

In fact, what really happened is that the development agencies on the Committee rejected these studies because they did not like the results, which showed that fill restrictions would not have serious economic impacts. The DEIS explains that the studies found that "in most situations the restriction would change the price of coal to less than one dollar per ton," and that "[t]he price of electricity would continue to rise approximately 1 to 2 percent across the scenarios; the impacts due to restrictions will have little effect on price." DEIS App. G, p. 6 (*summary of Phase II Economics study by Hill and Associates*) (*emphasis added*). Even after adjusting the model inputs to be more favorable to the coal industry, the change in the price of coal rose to only two dollars a ton. Id. at 7. Morgan Worldwide Consultants, Inc. (MWCI) conducted an analysis of the RTC Phase I and H&A Phase II economic reports. Ex. 60, Attachment. The MWCI analysis stated:

> This letter report prepared by [MWCI] is an analysis focused on work completed sine 1999 regarding the economic impacts of restriction on [MTM/VF] operations in Appalachia. It also addresses the current attempt to essentially disregard this work and replace it with unsubstantiated data to produce different results within the next two months... 11-9-2
>
> RTC ... endeavored to estimate the effect of various valley fill restrictions on the quantity of coal potentially available from mining as objectively as possible, going to great lengths to prevent human bias... The results of this unbiased approach[] are being questioned, and OSM proposes to solicit input from coal industry representatives. MWCI has reviewed the Phase 1 work and determined that it is premature to dismiss the results portrayed in the Final Phase 1 Report...
>
> The methodologies and results of the H&A Phase 2 work are not in question, but H&A has been requested by OSM to conduct a sensitivity analysis using input solicited from coal industry representatives. MWCI ...questions the validity of information supplied by coal industry representatives on such short notice...

Id., p. 1. The MWCI analysis continued:

> As stated in the H&A Final Report, "...it is evident that the electricity prices are quite insensitive to the MTM/VF restrictions, showing differences of only 1%-2%, or 3% at the maximum." ... Consistent with the results obtained with coal tonnage and direct employment, the anticipated 1.15% increase in the base case from $0.01971/KW-Hr in

63

2002 to $0.02276/KW-Hr in 2010 overshadows price changes induced by potential valley fill restrictions...

Both [RTC and H&A] acted under the direction and guidance of the EIS Steering Committee..., and there is no reason to question the integrity of the results obtained... The EIS work has already spanned years, and RTC and H&A have had the benefit of input from many qualified professionals during the preparation of their Phase 1 and Phase 2 reports, respectively. Rather than replacing these years of effort with a couple of harried months to produce a different answer, spend the time and money understanding and qualifying the results produced to date.

Id. at 8. OSM summarily dismissed the MWCI Report, stating: "We just don't have sufficient time to deal with this report – particularly when you consider all the comments on the EIS Chapters that must be addressed in the next two weeks. I don't see that finalizing [the MWCI] report is a high priority task." 1/10/03 Robinson e-mail, Ex. 60.

A January 16, 2003 memorandum identified a series of "key issues that we anticipate will be raised when the DEIS is published for public review," including the following: "As part of the studies conducted in conjunction with the DEIS were studies to assess the economic impacts that would result from implementing actions considering limits on the size of valley fills. Information from the economic studies ... suggest that limits on the size of fills will have only minimal economic consequences on coal and electricity prices. Since smaller fills would seem to coincide with reduced environmental impacts, why is the current version of the DEIS not recommending such limits?" Ex. 62 (emphasis added). That is an excellent question, for which the DEIS provides no adequate answer. The DEIS Executive and Steering Committees, at the insistence of OSM, summarily rejected *the findings of the detailed economic studies* – commissioned by the Steering Committee itself and conducted over years of study at a cost of over half a million dollars – because the results of the study did not support the OSM's "Vision" of "streamlining" the MTM/VF permitting process. The CEQ regulations warn that a NEPA document is not to be used to justify a decision already made. 40 C.F.R. § 1502.2(g). Thus, "an agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative ... would accomplish the goals of the agency's action, and the EIS would become a foreordained formality." Citizens Against Burlington, 938 F.2d at 196; Muckleshoot, 177 F.3d at 812-14. Because the Phase I and II economic studies contradicted the decision already made by the OSM, the studies were summarily rejected. This rejection violates the requirements of NEPA. 11-9-2

K. The DEIS Underestimates Cumulative Impacts by Ignoring Valley Fills Prior to 1985 and Failing to Include All Watershed Impacts

The valley fill inventory in the DEIS is limited to the years 1985 to 2001, even though states in the study area began permitting valley fills under SMCRA in 1981 and 1982. DEIS III.K-14. The basis for the 1985 cutoff date is that "data from years immediately following approval of a permanent program in a state shows a high level of permitting activity representing 9-2-2

a 'repermitting' requirement rather than useful information on the trends of permitting new mines." Id. Thus, the DEIS assumes that it is not possible to filter out "repermitted" mines prior to 1985, and therefore had to exclude all mines permitted before 1985. However, the DEIS filtered out "repermitted" mines after 1985. Id. No reason is given why the same filtering could not have been done for repermitted mines before 1985. As a result of this error, cumulative fill impacts were underestimated.

In addition, those impacts were underestimated because the DEIS defined the watershed impacted by a valley fill to include only "the upland area above each fill toe." DEIS III.K-38. This does not include the areas downstream or in other watersheds that are impacted by a valley fill. 11/12/02 Tibbott email, Ex. 48. Furthermore, in measuring those impacts, the DEIS only considered actual stream loss, and excluded ephemeral stream areas. DEIS App. I, pp. iii-iv. FWS commented that: 9-2-2

> [I]t is painfully clear that they are looking only at the fill footprint. First, I would say that we must look at much more than the acres of stream lost or buried by fill. Stream loss and other impacts can extend well upstream and downstream of the footprint of valley fills and sometimes even outside the drainage that is directly impacted. This type of trend analysis does not provide a comprehensive or "final measurement for evaluating impacts from valley fill construction" and can predict only a fraction of "the overall impact on the environment."
>
> –In summary, this "fill inventory" will grossly underestimate the acreage impacted by valley fills and does nothing to consider how areas upstream and downstream will be impacted.

Ex. 48.

L. The DEIS' Summary Dismissal of Blasting Impacts as Insignificant Is Erroneous, and Its Suggestion that Citizens File Nuisance Actions Is Outrageous

The DEIS finds that "blasting is not considered a 'significant issue' and no actions are considered in this EIS" to address it. DEIS II.A-6. The DEIS claims that existing regulations are adequate to protect coalfield residents from blasting impacts. Id. It states that "when blasting complaints occur, the complaints are investigated and responded to as required." DEIS III.W-6. 16-3-2
At the same time, the DEIS admits that blasting, even within regulatory limits, "will continue to have periodic adverse effects on the quality of life of residents living in close proximity to the mine sites." Id. However, rather than consider changes to the regulations to eliminate these adverse effects, the DEIS instead advises coalfield residents to file lawsuits to abate the nuisance. Id.

The DEIS is simply wrong that blasting complaints are being adequately investigated and resolved. A report by West Virginia's Legislative Auditor found that WVDEP's blasting office was not doing its job. West Virginia Legislative Auditor, Preliminary Performance Review, "The Office of Explosives and Blasting Is Not Meeting All Required Mandates," PE02-36-268 (December 2002). At the time of the audit, 39 of 202 complaints filed with the blasting office had not yet been assigned to an inspector. Id., p. 13. Fifty-four of the 202 claims were resolved. Id. But of the 148 open claims, only five had been sent to a claims administrator for resolution, the audit found. Id. More than one-third of the open claims were more than a year old, the audit said. Id. at 14. "Citizens with open claims could be living in hazardous conditions due to damage sustained in a blasting incident," the audit concluded. Id. at 15-16. "In addition, the property values of individuals waiting for the resolution of claims could be affected until the damage of the property is corrected." Id.

Furthermore, the DEIS' suggestion that citizens should take their blasting claims to court rather than try to resolve them through the NEPA process or SMCRA is outrageous. OSM's preliminary report in February 2002 on blasting-related citizen complaints stated:

> The performance standards in the blasting regulations were established to provide protection against damage to typical homes that are located in the coal producing regions. Both SMCRA and the regulations make it clear that all private property must be protected from damage. ...
>
> The regulations allow the regulatory authority to require any and all blasts be monitored using a blasting seismograph which monitors both ground vibrations and airblast. Often the monitoring of blasts is only required as a reaction to citizen complaints. The survey also indicates that there is little proactive monitoring by either the regulatory authority or the operator. In areas where there will be continued blasting activity over a long period of time and where there is a population concentration there should also be frequent monitoring of blasts in order to establish a record of the intensity of ground vibrations and airblast that is generated by the mine and extends into the area around surrounding [sic] the mine.

3-5

2/15/02 Robinson email, Ex. 16, Citizen Complaint Study for EIS, pp. 5-6 (emphasis added). Thus, here is a practical, sensible measure for reducing blasting complaints by monitoring their magnitude and frequency. This information should then be made publicly available to coalfield residents. Monitoring and disclosure can serve the valuable function of exposing excessive blasting and thereby create an incentive for companies to reduce these impacts, in the same way that public disclosure of the use of hazardous chemicals under the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001 *et seq.*, has reduced use of those chemicals. It is unjust to force citizens to go to court to obtain a judicial remedy when administrative remedies are already available that could achieve the same goal of reducing nuisance impacts.

M. The DEIS Underestimates Impacts on the Cerulean Warbler by Ignoring A Recent Study

66

In January 2003, the FWS notified the Steering Committee that there was a new December 2002 peer-reviewed study by Weakland and Wood on cerulean warblers:

> The issue of MTM/VF effects on cerulean warbler habitat is more important now than it appeared to be at the time of earlier drafts of the EIS. The Southern Environmental Law Center has petitioned the Fish and Wildlife Service to list the cerulean warbler as threatened and to designate critical habitat. The Service's 90-day finding on the petition listed mountaintop mining as one of the threats to this species, and noted that "unfortunately, the area of the country with the highest density of ceruleans is also in a coal-mining region where mountaintop removal mining is practiced."

1/22/03 Tibbott e-mail, Ex. 63. FWS stated that "the methods used in the new study allow a more accurate and precise estimate of bird abundance than were used in the EIS study, and facilitate evaluating the relationship between bird density and habitat and landscape variables." Id. FWS offered to write a new section for the DEIS to describe this new report. Id.

> The abstract of the new study concludes that:
>
> Generally, our data indicate that Cerulean Warblers are negatively affected by mountaintop mining from loss of forested habitat, particularly ridgetops, and from degradation of remaining forests (as evidenced by lower territory density in fragmented forests and lower territory density closer to mine edges.)

8-1-2

1/22/03 Tibbott e-mail, Ex. 64, Weakland and Wood, "Cerulean Warbler (*Dendroica Cerulea*) Microhabitat and Landscape-level Habitat Characteristics in Southern West Virginia in Relation to Mountaintop Mining/Valley Fills," Final Project Report (December 2002). FWS proposed inserts to the DEIS, including material on the cerulean warbler in this new study. 2/18/03 Tibbott e-mail, Ex. 67, Attachment. However, this material was not included in the DEIS. The new study is not listed in the References in Part V of the DEIS, and the section of the DEIS that discusses the cerulean warbler makes no mention of the findings from the new study. *See* DEIS III.F-8.

The DEIS's failure to explicitly consider the Weakland and Wood study clearly renders the DEIS inadequate and in violation of NEPA. In Sierra Club v. Bosworth, 199 F. Supp.2d 971 (N.D.Cal. 2002), the court held that an EIS prepared by the USFS for a post-fire salvage logging project violated NEPA by failing to disclose a scientific study opposing post-fire logging. That case is directly on point. In Sierra Club v. Bosworth, the court explained:

> It is not ... adequate ... to merely include scientific information in the administrative record. NEPA requires that the EIS itself "make explicit reference ... to the scientific and other sources relied upon for conclusions in the statement." ...
> Nor does the fact that the Forest Service's scientists may have considered contrary opinions, such as the Beschta report, constitute sufficient compliance with NEPA where

67

the EIS fails to disclose or analyze such opinions. ...
Accordingly, the Court concludes that the ... EIS violates NEPA by failing to disclose and analyze scientific opinion in support of and in opposition to the conclusion that the ... project will reduce the intensity of future wildfires in the project area...
Plaintiffs also assert that the EIS fails to disclose and analyze scientific opinion that is directly opposed to post-fire logging.... such as the Beschta report... Although the Forest Service is not required to adopt the recommendations contained within the Beschta report and may rely on other expert opinion instead, the ... EIS fails, "not because experts disagree, but because the FEIS lacks reasoned discussion of major scientific objections." *See* Moseley, 798 F.Supp. 1473, 1482.
Accordingly, the Court concludes that the EIS violates NEPA by failing to disclose scientific opinion that opposes post-fire logging.

199 F. Supp.2d at 980-81 (citations and footnote omitted). Similarly, the MTM/VF DEIS violates NEPA by failing to discuss the Weakland and Wood study of Cerulean Warblers.

N. The DEIS Underestimates Impacts on Threatened and Endangered Species

The DEIS mentions the September 24, 1996 FWS programmatic biological opinion on MTM/VF operations, which found that state and federal regulatory programs under SMCRA would not jeopardize endangered species if those programs were "properly implemented." DEIS, p. IV.D-5. However, the DEIS fails to analyze whether, in fact, those programs have been properly implemented. Indeed, preparers of the DEIS deleted the following passage from the final document: 8-1-2

> In reviewing the field-level coordination, consultation, and reporting procedures carried out by SMCRA and CWA regulatory authorities in authorizing mountaintop mining activities in Appalachia, the agencies have identified a number of the procedures specified in SMCRA regulations and the 1996 programmatic biological opinion that have not been followed. Of particular concern is the inconsistent interpretation of the requirements of the biological opinion by State regulatory agencies and some OSM offices. For example, in many cases these State agencies have not provided sufficient site-specific information to enable timely FWS review of project proposals, and they are often unwilling to incorporate FWS recommendations for the protection of listed and proposed species, particularly when those recommendations pertain to indirect or cumulative effects. In many instances, explanations and concurrence procedures have also not occurred. Consequently, the level of protection for listed and proposed species envisioned in the programmatic biological opinion, or that would have been obtained through project by project section 7 consultations with the federal regulatory authority, does not appear to have been achieved.

4/21/03 Rider email, Ex. 71, attached file: chivrewrite.wpd. Thus, this passage indicates that the 1996 biological opinion is not working as intended, and therefore that the non-jeopardy of

68

protected species is not being assured. No reason is given for deleting this passage. At a minimum, such analysis of the adequacy of the implementation of the 1996 biological opinion must appear in the EIS. Otherwise, the EIS is misrepresenting the actual level of protection being provided to protected species. 8-1-2

O. The DEIS' Discussion of Antidegradation Requirements Is Erroneous

The DEIS' discussion of antidegradation requirements is erroneous in two respects. First, the DEIS fails to acknowledge that Tier 2 antidegradation reviews must be performed for each individual authorization pursuant to a NWP 21 general permit. OVEC v. Horinko, 279 F. Supp.2d 732, 757-62 (S.D. W.Va. 2003). This means that each valley fill must undergo antidegradation review prior to issuance of a 404 individual permit or a NWP 21 authorization. The DEIS fails to acknowledge this requirement. DEIS II.C-38, 42.

Second, the DEIS fails to acknowledge that valley fills cause significant degradation of downstream waters. Those waters comprise two segments. The first segment is between the toe of the valley fill and the outlet of the downstream sedimentation basin. Valley fills cause a violation of water quality standards in this segment. This segment contains high levels of sediment from valley fill runoff, and is being used illegally for in-stream treatment. The stream flowing from the toe of the valley fill is a conduit for pollution to the sedimentation basin, which is constructed in the stream. The Clean Water Act "was not intended to license dischargers to freely use waters of the United States as waste treatment systems..." 45 Fed. Reg. 33298 (May 19, 1980). In-stream impoundments remain waters of the United States. 40 C.F.R. § 122.2; West Virginia Coal Ass'n v. Reilly, 728 F. Supp. 1276, 1290 (S.D. W.Va. 1989), aff'd, 932 F.2d 964 (4th Cir. 1991). 5-8-1

The second segment is downstream from the outlet of the sedimentation basin. As we have shown above, this segment will likely contain high levels of selenium that violate water quality standards. As Brian Evans in the FWS' Southwest Virginia Field Office stated:

> Even if EPA restricts consideration of impacts to the reach of stream below the filled reach, studies described in section III.D show that fills contribute to significant degradation to the overall chemical, physical, and biological integrity of adjacent waters. For example, below fills the ambient water quality criterion for selenium concentration is exceeded consistently, natural flow regimes are altered, and macroinvertebrate diversity is depressed.

1/2/03 Tibbott e-mail, Ex. 57, p. 2).

This violates the letter and spirit of the Clean Water Act. Section 301(b)(1)(B) requires compliance with state water quality standards, including antidegradation requirements. 33 U.S.C. § 1311(b)(1)(B). The Senate Report stated that "this legislation would clearly establish that no one has the right to pollute and that pollution continues because of technological limits,

69

not because of any inherent rights to use the nation's waterways for the purpose of disposing of wastes." S. Rep. No. 414, 92nd Cong., 1st Sess., p. 42 (1971). "The use of any river, lake, stream or ocean as a waste treatment system is unacceptable." Id. at 7. This section "simply mean[s] that streams and rivers are no longer to be considered part of the waste treatment process." 118 Cong. Rec. 33693-94 (1972) (remarks of Sen. Muskie). 5-8-1

P. The DEIS Contains Several Serious Misstatements of Fact.

First, the DEIS incorrectly states that "[w]atershed impacts directly attributable to mining and fills could not be distinguished from impacts due to other types of human activity," (DEIS II.C-74),[51] and that "the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S." DEIS II.D-9. However, as we have shown above, excess selenium was only found downstream from valley fills, and selenium causes significant degradation. Further, as FWS has observed:

> [S]tudies described in section III.D show that fills contribute to significant degradation to the overall chemical, physical, and biological integrity of adjacent waters. For example, below fills the ambient water quality criterion for selenium concentration is exceeded consistently, natural flow regimes are altered, and macroinvertebrate diversity is depressed.

1/02/03 Tibbott e-mail, Ex. 57, p. 2.

Second, the DEIS wrongly assumes that stream burial by valley fills "can be successfully offset by a comprehensive mitigation proposal." DEIS II.C-23. However, such an assumption is directly contradicted by the DEIS's own findings regarding the history of in-kind mitigation attempts and the state of the existing technology. That is, functioning headwater streams have never been successfully created in MTM/VF areas, and the technology to create them does not exist. *See, e.g.*, DEIS II.C-50, III.D-18 to 20, IV.B-9. Further, the proposed BMP manual's suggested reforestation practices are voluntary and unenforceable, and the DEIS points to nothing to suggest that the manual's existence will increase forestry PMLUs. *See, e.g.*, DEIS III.B-9, 11, and 15. 5-6-4

Third, the DEIS incorrectly claims that 68% of mountaintop mining sites in West Virginia "were to be reclaimed to forestry-related land uses [Appendix G; (Yuill, 2002)]." DEIS IV.C-5. In fact, Yuill reported the following percentages: forest/wildlife–36%; commercial woodland–5%; woodland–27%. DEIS, App. G, Yuill Report, p. 13. The "forest/wildlife" category, the largest of the three, includes the notorious "fish and wildlife habitat" land use. Id., p. 34. That land use usually consists of grassland. As defined by OSM, it does not require any forest component at all. 30 C.F.R. § 701.5 (definition of "land use," subsection (h)).

[51] *See also*, DEIS IV.B-5: "...nor could data differentiate impacts of mining, fills or other human activity in a watershed."

Furthermore, the DEIS ignores its own prior technical findings that "[l]arge-scale surface coal *mining will result in the conversion of large portions of one of the most heavily forested areas of* the country, also considered one of the most biologically diverse, to grassland habitat." Ex. 6, p. 6. Thus, by lumping non-forestry uses with true forestry uses, the DEIS grossly overestimates the actual forestry uses.

Fourth, the DEIS incorrectly asserts that "mountaintop mining may not have a significant impact on the biologic integrity of the terrestrial ecosystems," and that ample forest will remain to maintain high biological index scores for wildlife. DEIS IV.D-4. However, the DEIS states that "[h]abitat changes will occur ... [involving] a shift from a forest dominated landscape to a fragmented landscape with considerably more mining lands and eventually grassland habitat," (DEIS App. I, p. 93), and this "change in these habitats could put a number of species in peril." Id. at v. For example, "forest loss in the West Virginia portion of the study area has the potential of directly impacting as many as 244 vertebrate wildlife species." Id. at 86. "The potential adverse impact of loss of habitat for [three forest interior bird species - Louisiana Waterthrush, Worm-eating Warbler, and Cerulean Warbler] has extreme ecological significance in that habitats required by these species for successful breeding are limited in the eastern United States." Id. at 90 (emphasis added). "Loss of these species has more ecological importance than providing habitat for grassland species considered rare in the state because it suggests possible future endangerment of some forest interior species as opposed to the potential gain of some disjunct grassland species populations." Id. at 91. Further, "[s]alamanders are an important ecological component in the mesic forests of the study area... [and] are intimately associated with forest ecosystems[,] acting as predators of small invertebrates and serving as prey to larger predators." Id. (citations omitted). "Assuming that 80% of the salamanders are lost in the projected forest impact areas, approximately 1,232,972,280 have the potential of being adversely impacted." Id. at 92-93 (citation omitted). Further, 5-6-4

> [T]his EIS describes biotic interactions common in headwater streams and various vertebrate species including birds, salamanders (including newts), and mammals which require interactions with the aquatic environment in order to maintain their life cycle. Biotic communities have been demonstrated to occur in the uppermost reaches of watersheds, even in ephemeral stream zones which flow only as a result of rain or snow melt. Under all alternatives, the biota in these reaches are at risk from valley fills. Filling would eliminate all aquatic and aquatic-dependant interactions that would formerly have occurred in the filled area... [T]he permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems, including interactions linking terrestrial biota to the aquatic environment, may constitute a[n] irreversible impact to this system in the study area.

DEIS IV.D-4 - 5 (emphasis added).

Fifth, the DEIS incorrectly states that "mined sites may take as long as 120 years or more to attain mature forest conditions." DEIS App. I, p. 92. However, Cindy Tibbot (USFWS) has stated, and William Hoffman (USEPA) has agreed:

> [R]e-establishing native hardwood forests on reclaimed mines is still experimental. We don't know what the long-term success will be. Even if hardwood forests can be re-established, it should be intuitively obvious that they'll be a drastically different ecosystem from pre-mining forests for generations, if not **thousands** of years...

Ex. 5 (emphases added). The DEIS itself similarly observes: "[T]he permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems ... may constitute a[n] irreversible impact to this system in the study area." DEIS IV.D-5 (emphasis added). *See also*, Ex. 6, p. 6: "Unless reclamation practices are changed drastically, it can be assumed that this forest to grassland conversion is, for all practical purposes, permanent. Even if reclamation practices are changed, we must still consider the recovery of a functional mesophytic forest ecosystem as a long-term ecological experiment with uncertain results." (emphasis added).

Finally, the DEIS incorrectly describes West Virginia's AOC+ protocol as a "fill minimization analysis." DEIS IV.B-7. As OSM's Charleston Field Office explained, this is incorrect: 5-6-4

> The Draft EIS mis-characterizes the AOC+ document as a fill minimization document when in fact it is an optimization document that simply provides a process to determine the volume of excess spoil and calculates the size of the disposal area for the excess spoil. It creates a 'model' minesite, but the operator is not bound by the constraints of the model when completing the final mine plan. The only constraint is that the amount of material backfilled must equal the amount determined not to be excess by the AOC+ process. It does not limit the size or configuration of any particular fill.

12/12/02 Morgan email, Ex. 53. The Director of WVDEP's Division of Mining and Reclamation criticized the DEIS because it "contains no guidance for determining whether fill sizes have been minimized," and confirmed that the AOC+ formula used by that office is only designed to achieve fill optimization, not fill minimization. 1/13/03 Crum letter, Ex. 61.

III. The Corps Is Illegally Taking Actions Before the Final EIS Is Completed

A. The Corps Has Made Commitments to Actions that Prejudice the Results of the EIS

NEPA requires that, until an agency issues a Record of Decision for a pending NEPA document, "no action concerning the proposal shall be taken which would: (1) have an adverse environmental impact; or (2) limit the choice of reasonable alternatives." 40 C.F.R. § 1506.1(a)(1), (2). In addition, "the comprehensive 'hard look' mandated by Congress and required by the statute [NEPA] must be timely, and it must be taken objectively and in good faith, not as an exercise in form over substance, and not as a subterfuge designed to rationalize a 4-2

decision already made." Metcalf v. Daley, 214 F.3d 1135, 1142 (9th Cir. 2000).

The Corps has violated these requirements by making commitments to actions that prejudice the results of the final MTM/VF EIS. In a May-June 2003 briefing brochure entitled "Surface Coal Mining—The way forward," the Corps stated that it intended to "ensure that NWP 21 will continue to be available to accomplish sustainable use of coal resources." Ex. 69, p. 3 (emphasis added). Similarly, in an April 4, 2003 document entitled "Mountaintop Surface Coal Mining Master Strategy," the Corps lists a number of "agency commitments" that the Corps, EPA, and OSM will carry out regarding permitting of mountaintop coal mines. Ex. 74, pp. 5-7. Among other things, the Corps says that it would "make case-by-case determinations of the applicability of NWP 21 to MTM/VF projects." Id. at 6. As a result, the Corps has already committed to carry out Alternative 2 (case-by-case NWP 21 authorizations), and has rejected Alternative 1 (most mines require individual 404 permits), before the EIS is even finished. *See* DEIS II.B-3, IV.B-14 to B-15.

B. The Corps Has Decided to Segment the Issue of Fill Thresholds from the Rest of the NEPA Process

One of the most important issues that the EIS should consider in detail is whether to impose thresholds or limits on the amount of streams that can be filled with mining waste pursuant to § 404. However, as discussed above, the DEIS summarily dismisses this alternative without any detailed analysis. Instead, the DEIS promises that the Corps will continue collecting data on stream impact thresholds for future analysis and decisionmaking. DEIS II.D-2 to D-3. 4-2

The promise is hollow. The Corps plans to "undertake an independent analysis of the utility of thresholds using site-specific verification data, and using a GIS-based evaluation process . . ." Ex. 69, p. 8. However, the Corps already decided that it "will NOT supplement the MTM EIS to disclose the results of its independent analysis of thresholds because the MTM EIS does not contain the information necessary to inform a decision on the appropriateness of thresholds, or what alternative thresholds should be considered." Id. at 7 (emphasis in original). Instead, the Corps states that "[a]ny regulatory changes [regarding thresholds] would be accomplished by notice and comment rulemaking, as appropriate." Id. at 8.

NEPA requires that proposals "which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." 40 C.F.R. § 1502.4(a). A NEPA document is supposed to analyze the impacts of "[c]onnected actions," including actions that are "interdependent parts of a larger action and depend on the larger action for their justification." Id. § 1508.25(a)(1). In this instance, the larger action is federal regulation of mountaintop mining. Restrictions on stream filling are an "interdependent part" of that larger action and therefore must be analyzed together in one comprehensive EIS. In violation of this requirement, the Corps is planning on analyzing fill thresholds completely outside of the NEPA process.

Conclusion

For these reasons, the DEIS fails to meet the legal requirements of NEPA and other federal statutes and must be corrected to address the deficiencies noted above and reissued for public comment. 4-2

74

List of Exhibits to Comments by WVHC and OVEC on MTM/VF DEIS

No.	Date	Agency	Description
1	1990	NPS	Final EIS, Yukon-Charley Rivers National Preserve, Excerpt
2	1/97	CEQ	Considering Cumulative Effects Under NEPA, Excerpt
3	1/01	EPA	Preliminary Draft, Mountaintop Mining/Valley Fill EIS, Excerpts
4	1/18/01	EPA	Email from Rebecca Hanmer re: Did the status reports go out yet? with Attachment: Mountaintop Mining/Valley Fill Status Report, Executive Summary, January 16, 2001
5	6/26/01	FWS	Email from Cindy Tibbott re: MTM/VF EIS cumulative impact assessment
6	8/15/01	EIS Steering Team	Problems Identified/Confirmed/Inferred by Technical Studies
7	10/5/01	DOI	Letter from J. Steven Griles to CEQ, OMB, EPA, COE re: Mountaintop Mining/Valley Fills Issues
8	10/11/01	FWS	Email from Dave Densmore re: EIS Direction
9	10/19/01	EPA	Email from William Hoffman re: MTM/VF Briefing & OSM Vision, with Attachment: Executive Summary, A Plan to Address Mountaintop Mining Issues in Appalachia
10	1/8/02	EPA	Email from William Hoffman re: Alternative Framework
11	1/22/02	EPA	Email from William Hoffman re: Mt Top conf call on 1/23/02 at 1 PM
12	1/31/02	EPA	Email from William Hoffman re: Draft notes of our 1/29/02 post CEQ discussion, with Attachment: Summary of 1/29/02 mtg - debriefing from CEQ update on Mt Top EIS
13	2/7/02	EPA	Email from William Hoffman re: Declined: MTM/Valley Fill EIS
14	2/13/02	EPA	Email from William Hoffman re: EIS
15	2/13/02	EPA	Email from William Hoffman re: Next Steps
16	2/15/02	OSM	Email from Mike Robinson re: Citizen Complaint Study for EIS, with Attachment: Blasting Related Citizen Complaints within the Mountaintop Mining/Valley Fill Environmental Impact Statement (EIS) Study Area
17	2/27/02	EPA	Email from William Hoffman re: R3 to brief Ben Grumbles on Mountaintop Mining EIS Status and Issues on 3/5 with Attachment: Mountaintop Mining EIS Presentation, Office of Water, Office of Federal Activities, Office of General Counsel, March 5, 2002
18	3/1/02	EPA	Email from William Hoffman re: EIS Alternatives Pros & Cons, with Attachment: Pros & Cons

i

19	3/7/02	EPA	Email from William Hoffman re: One Pager for Whitman/Norton Meeting, with Attachment: Mountaintop Mining/Valley Fill Environmental Impact Statement
20	3/12/02	EPA	Email from William Hoffman re: OSM Action Descriptions
21	3/25/02	FWS	Email from Cindy Tibbott re: Purpose & need/alternatives write-ups, with Attachment: I. Purpose and Need for Action and IV. Alternatives
22	3/27/02	EPA	Email from Gary Bryant re: DRAFT Report
23	4/16/02	EPA	Email from William Hoffman re: Update, with Attachment: MTM/VF Status, April 15, 2002
24	4/02	EIS	Mountaintop Mining/ Valley Fill Draft EIS, April 2002, Excerpt
25	5/16/02	OSM	Email from Mike Robinson re: Senior Executive Conference Call–3pm Tuesday 5/21
26	5/17/02	OSM	Email from Mike Robinson re: Principals meeting
27	5/17/02	DOI.	Fax from Steve Griles re: 5/22/02 conference call
28	5/22/02	DOJ	Fax from John Cruden to Steve Griles re: 1998 settlement agreement
29	6/10/02	EPA	Email from Mike Robinson re: EIS Steering Committee Conference Call: Today (6/10) 1 p.m., with Attachment: EPA Issues- MTM/VF EIS
30	6/12/02	FWS	Email from Dave Densmore re: FWS EIS ISSUES
31	6/14/02	EPA	Email from David Rider re: EPA Expectations
32	6/14/02	EPA	Email from William Hoffman re: EPA Expectations/Disputed Actions
33	6/14/02	OSM	Email from Mike Robinson re: Agenda and Handout for 6/18 SES Issue, with Attachment: Mountaintop Mining/Valley Fill Environmental Impact Statement, Senior Executive Issue Resolution Meeting, Interior South Building Room 332, June 18, 2002, Proposed Agenda; Handout for SES/Steering Committee Issue Resolution Meeting, Refresh on Teleconference Meeting Decisions, May 21, 2002
34	6/19/02	EPA	Email from William Hoffman re: out of office, with Attachment: Proposed EIS Alternative Framework
35	6/26/02	OSM	Email from Mike Robinson re: Mock-up of Proposed new Alternative Framework, with Attachment: Mountaintop Mining/Valley Fill EIS Alternative Framework (June 26, 2002 v.)
36	7/31/02	FWS	Email from Cindy Tibbott re: Revised alternatives framework, with Attachments: Rationale for FWS "Alternative 4" (i.e., why this is not an alternative that can't be chosen); Draft - MTM/Valley Fill EIS Alternatives
37	8/13/02	OSM	Email from Mike Robinson re: Draft Proposed EIS Alternative Framework–Aquatic Issues; SES Issue, with Attachment: MTM/Valley Fill EIS Alternatives (August 13, 2002 version)

ii

38	8/15/02	EPA	Email from Gregory Peck re: Executive Committee Discussion, with Attachment: Alternatives Matrix for Draft MTM/VF PEIS
39	8/21/02	FWS	Email from Dave Densmore re: Explanation for Proposed Modification of Alternative #1, with Attachment: Background on FWS Proposed Modifications to Alternative 1
40	9/10/02	EPA	Email from William Hoffman re: Steering Committee Meetings/ Conference Call Summaries, with Attachment: September 9, 2002 Steering Committee Conference Call
41	9/20/02	OSM	Email from Mike Robinson re: Executive Conference Call Agenda–9/23/02, 9-10 am, with Attachment: MTM/VF EIS Executive Meeting Agenda, September 23, 2002 Conference Call
42	9/30/02	FWS	Email from Dave Densmore re: FWS Comments on Chapter IV, with Attachment: FWS Comments on 9/20/02 Draft of Chapter IV (Alternatives)
43	10/4/02	EPA	Email from John Forren re: Reminder: Comments on Draft Chapter IV Rewrite Up Due Today, with Attachment: John Forren's comments on the Alternatives Section
44	10/22/02	EPA	Email from Gregory Peck re: Draft Exec. Comm. Summary, with Attachment: Discussion Summary, MTM/VF EIS Executive Committee, October 16, 2002 - Shepardstown, WV
45	10/30/02	FWS	Email from Cindy Tibbott re: Alternatives Format, with Attachment: Alternatives discussion
46	11/1/02	OSM	Email from Mike Robinson re: Alternatives Format
47	11/7/02	EPA	Email from David Rider re: MTM study
48	11/12/02	FWS	Email from Cindy Tibbott re: OSM's draft on fill inventory
49	11/13/02	FWS	Email from Cindy Tibbott re: Chapters I & II comments, with Attachment: Review of Chapters I and II–Cindy Tibbott
50	11/15/02	FWS	Email from Cindy Tibbott re: Suggested edits/editions for aquatic study sheet, with Attachment: Comments on Aquatic Study Qualification Write-Up–Cindy Tibbott
51	11/15/02	EPA	Email from John Forren re: More on Sp Aquatic Sites
52	11/18/02	EPA	Email from Kathy Hodgkiss re: MTM/VF DEIS Conference Call Thursday 11/21 9-11 am, with Attachment: Agenda, Mountaintop Mining/Valley Fill DEIS Executive Committee & Steering Committee Conference Call
53	12/12/02	OSM	Email from Thomas Morgan re: Comments on Draft EIS
54	12/20/02	FWS	Letter from Lee Barclay re: Updated threatened and endangered species information for the Kentucky and Tennessee portion of the Southern Appalachian coal fields

iii

55	12/23/02	EPA	Email from John Forren re: Comments on DRAFT EIS for MTM/VF, with Attachment: Comments on the Draft EIS for MTM/VF Coal Mining (Dec 2002) from ESD, OEP, Wheeling Staff 12/20/02
56	12/29/02	EPA	Email from Ray George re: Comments on DRAFT EIS for MTM/VF
57	1/2/03	EPA	Email from Cindy Tibbott re: Comments from other FWS offices on draft EIS
58	1/2/03	EPA	Email from John Forren re: EPA-OGC NEPA comments on MTM/VF EIS, with Attachment: EPA OGC NEPA Comments on MTM/VF EIS
59	1/7/03	EPA	Email from Steve Neugeboren re: MTM legal issues, with Attachment: OGC water law office comments on mountaintop mining EIS 12/26/02
60	1/10/03	OSM	Email from Mike Robinson re: H&A economic analysis, with Attachment: Letter report from Morgan Worldwide Consultants, Inc.
61	1/13/03	WVDEP	Letter from Matthew Crum re: MTM DEIS
62	1/16/03	OSM	Mountaintop Mining/Valley Fill DEIS, Background Information for Communications Team
63	1/22/03	FWS	Email from Cindy Tibbott re: New Petra Wood Study
64	1/22/03	FWS	Email from Cindy Tibbot re: New Petra Wood Study, with Attachment: Cerulean Warbler (Dendroica Cerulea) Microhabitat and Landscape Level Habitat Characteristics in Southern West Virginia in Relation to Mountaintop Mining/Valley Fills, Final Project Report, December 2002, Abstract
65	1/27/03	EPA	Email from Kathy Hodgkiss re: MTM EIS Executive Committee Call Tuesday, 1/28; 9-11 am:, with Attachment: MTM/VF EIS Executive Committee Agenda
66	1/28/03	FWS	Email from Dave Densmore re: Re-proposed NWP 21 Scheme for Alternative 2, with Attachment: Proposal for Minimal Effects Threshold for NWP 21
67	2/18/03	FWS	Email from Cindy Tibbott re: Edits, with Attachment: Inserts for Chapters III and IV (information on the new study from Weakland and Wood on cerulean warblers)
68	3/12/03	EPA	Email from Kathy Hodgkiss re: MTM EIS Executive Committee Call, Friday, 3/14; 9-10 am, with Attachment: Email re: MTM Way Ahead
69	4/4/03	COE	Mountaintop Surface Coal Mining Master Strategy
70	4/17/03	COE	Email from Chip Smith re: Revised Info on New PCNs and Enforcement, with Attachment: Mountaintop Surface Coal Mining Status and Way Forward, April 17, 2003
71	4/21/03	EPA	Email from David Rider re: Ch 14 edits, with Attachment: DEIS, Ch. IV.J., Threatened and Endangered Species, pp. IV.J-1 to IV.J-2
72	5/21/03	EPA	Email from John Forren re: Briefing Outline, with Attachment: Briefing, Mountaintop Mining/Valley Fills (MTM/VF) Draft Programmatic Environmental Impact Statement
73	6/2/03	OSM	Email from Mike Robinson re: Hostile Q&A, with Attachment: Untitled

iv

74	5-6/03	COE	Briefing Brochure: Surface Coal Mining—The way forward
75	12/22/03	OSM	Letter to Jim Hecker re: FOIA request, with Enclosure B: withheld documents

v

90-0155F

final environmental impact statement
cumulative impacts of mining
volume 1

YUKON-CHARLEY RIVERS

NATIONAL PRESERVE • ALASKA

EXHIBIT 1

SUMMARY

FINAL ENVIRONMENTAL IMPACT STATEMENT

This *Final Environmental Impact Statement* (FEIS) evaluates a range of alternatives for managing mining activity, analyzing cumulative impacts, and mitigating environmental impacts in Yukon-Charley Rivers National Preserve (see Location of Yukon-Charley Rivers National Preserve, Alaska map). Four alternatives, including a proposed action, have been evaluated:

> alternative A (post-1985 status quo/no action) – review and analyze mining proposals using a qualitative evaluation of cumulative impacts
>
> alternative B – review and analyze mining proposals using a quantitative evaluation of cumulative impacts and resource protection goals
>
> alternative C – review and analyze mining proposals using a quantitative evaluation of cumulative impacts and resource protection goals with the addition of restrictions for mining claims patented in the future and a strengthened mining claim acquisition program
>
> alternative D (proposed action) – acquisition of all patented and valid unpatented mining claims

On July 22, 1985, the U.S. District Court for the District of Alaska enjoined the National Park Service (NPS) from approving plans of operations for mining in three national park system units. The court order resulted from litigation filed by the Northern Alaska Environmental Center, the Alaska Chapter of the Sierra Club, and the Denali Citizens Council (Civil Case J85-009). The court order directed the NPS to ensure full compliance with the National Environmental Policy Act (PL 91-190; NEPA) and the NPS regulations for mining and mining claims (36 CFR Subpart 9A) before taking actions to approve new mining operations in park units. The court also required the National Park Service to prepare an adequate environmental impact statements covering the cumulative impacts of multiple mining operations in Yukon-Charley Rivers National Preserve. On December 4, 1985, this order was amended to require the preparation of an additional environmental impact statement for mining in Denali National Park and Preserve. A final judgment and injunction was issued on March 3, 1988.

This FEIS was prepared in response to the court order. It addresses the cumulative impacts of mining associated with managing mining activity, analyzing cumulative impacts, and mitigating environmental impacts in the Woodchopper/Coal/Sam Creek and Fourth of July Creek study areas of Yukon-Charley Rivers National Preserve. This action coincides with the need to evaluate the minerals management programs in the Yukon-Charley Rivers, Wrangell-St. Elias, and Denali NPS units to provide for adequate resource management and protection, and is one element of a minerals management plan.

In developing this FEIS, numerous issues were identified through scoping for analysis. Some of these issues include hydrologic changes, water quality, impacts on wetlands, long-term and short-term impacts, nonmining uses of patented claims, reclamation, fish and wildlife habitat, riparian habitat, threatened and endangered species, criteria for cumulative effects analysis, impact thresholds, magnitude of impacts, economic impacts, access, impacts of access, impacts on subsistence, heavy metals contamination, abandoned mine lands, impacts on scenic values, administrative costs for mining claims, acquisition costs of mining properties, and wilderness.

For purposes of analysis, a probable mineral development scenario was developed and applied for each alternative to project environmental impacts. The scenario predicts where and to what extent future mining activity might reasonably occur in the preserve over the next 10 years. The scenario does not represent an NPS proposal, nor does it suggest levels of mining activity acceptable to the National Park Service.

Under alternative A (post-1985 status quo/no action), the National Park Service would review and analyze mining plans of operations submitted for proposed activity on patented and valid unpatented mining claims according to applicable regulations including 36 CFR Subpart 9A and the access provisions of 43 CFR Part 36. The National Park Service would review individual plans of operations on a case-by-case basis and prepare environmental documents as required by the National Environmental Policy Act (PL 91-190). Determinations of site-specific and cumulative mining impacts would be made qualitatively.

Under alternative B, the National Park Service would review and analyze proposed mining plans of operations according to applicable regulations. The National Park Service would review plans of operations on a comprehensive basis and prepare environmental documents as required by the National Environmental Policy Act. "Target" resources would be identified and used as the focal point for evaluating the effects of proposed mining activity. Resource protection goals would be established where adequate resource information is available and used to evaluate cumulative impacts. Resource protection goals would be established for the following target resources: arctic grayling habitat and riparian wildlife habitat. Resource protection goals would be only part of the information used by the National Park Service in determining the appropriate action on a proposed mining plan of operations. If the resource protection goal for any target resource cannot be met because of the potential effects of a proposed mining operation, the operator would have the option to perform mitigation to reduce the magnitude of the effect within the resource protection goal or otherwise protect resource values. In areas where resource protection goals have not been met because of past mining activity, the operator would have the option to perform mitigation that would avoid further effects on specific resources or reduce resource impacts. Resource protection goals would not be established at this time for wetlands, water quality, peregrine falcon, visual quality, cultural resources, subsistence, wilderness values, recreation, local economy, and paleontological resources. In cases where it is not possible to approve a mining plan of operations or other circumstances would not justify approval, the National Park Service would pursue acquisition of the mining claims.

Alternative C is identical to alternative B with two exceptions. As for alternative B, the National Park Service would review and analyze proposed mining plans of operations according to applicable regulations. The National Park Service would review plans of operations on a comprehensive basis and prepare environmental documents as required by the National Environmental Policy Act. "Target" resources would be identified and used as the focal point for evaluating the effects of proposed mining activity. Resource protection goals would be established where adequate resource information is available and used to evaluate cumulative impacts. Resource protection goals would be established for the following target resources: arctic grayling habitat and riparian wildlife habitat. Resource protection goals would be only part of the information used by the National Park Service in determining the appropriate action on a proposed mining plan of operations. If the resource protection goal for any target resource cannot be met because of the potential effects of a proposed mining operation, the operator would have the option to perform mitigation to reduce the magnitude of the effect within the resource protection goal or otherwise protect resource values. In areas where resource protection goals have not been met because of past mining activity, the operator would have the option to perform mitigation that would avoid further effects on specific resources or reduce resource impacts. Resource protection goals would not be established at this time for wetlands, water quality, peregrine falcon, visual quality, cultural resources, subsistence, wilderness

values, recreation, local economy, and paleontological resources. In cases where it is not possible to approve a mining plan of operations or other circumstances would not justify approval, the National Park Service would pursue acquisition of the mining claims. Alternative C differs from alternative B in that patent restrictions would be applied to all valid unpatented mining claims taken to patent in the future; this would require a change in the law. Once patented, the claim surface would remain in federal ownership to limit the extent of additional conversions of patented claims to nonmining uses. The restricted patent would convey the minerals only, and the claims would be subject to a stricter standard for reclamation. In addition, a strengthened mining claim acquisition program would be initiated under alternative C to acquire valid unpatented and patented claims whose development by mining or otherwise would be detrimental to park values.

Under the proposed action (alternative D), the National Park Service would develop a mining claim acquisition plan to acquire all patented and valid unpatented mining claims in the park/preserve. Existing nonmining developments or improvements on patented claims would be reviewed for compatibility with park purposes and possible acquisition. Compatible nonmining developments and improvements could be excluded from acquisition. During the acquisition phase, the National Park Service would process mining plans of operations according to the procedures specified in Alternative C. Existing operations with approved plans would be allowed to complete activities, including reclamaion, as approved. The National Park Service would also process plan amendments or operational modifications according to the procedures specified in Alternative C. Validity determinations for all unpatented mining claims not examined would occur and Congressional appropriations would be required for claim acquisition.

Under each of the four alternatives, mining claim acquisition methods would include purchase, exchange, or donation. A negotiated transaction would be sought based on fair market value. Eminent domain could be exercised in appropriate cases. Mining claims would be acquired under existing authorities of the secretary of the interior. Under each alternative, the National Park Service would pursue a program for reclamation of unreclaimed, abandoned, and acquired mined lands owned in fee by the United States within the unit's boundaries.

Alternative A could have the most adverse impacts on park resources because it involves the greatest potential for additional mining and nonmining uses of mining claims. Alternative B, C, or D would reduce adverse impacts from mining different amounts. Alternative B provides for a quantitative analysis of the cumulative effects of mining activities but does not prevent nonmining uses on claims taken to patent. In addition, alternative B does not include a strengthened program of mining claim acquisition. Alternative C would reduce the impacts from nonmining activities; provide for an quantitative analysis of cumulative impacts; strengthen claim acquisition; and reduce nonmining uses of claims taken to patent in the future. Alternative D would reduce surface impacts associated with mining and nonmining uses of mining claims more than alternative A, B, or C.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

The Draft Environmental Impact Statement (DEIS) assessed the cumulative impacts of multiple mining operations in Yukon-Charley Rivers National Preserve as required by the U.S. District Court's final judgement and injunction. The alternatives evaluated in the DEIS are identical to those evaluated in this FEIS with exception to alternative B which was identified as the proposed action in the DEIS.

The DEIS was released to the public on April 13, 1989, with a comment period of 60 days. In response to requests for a longer comment period and the availability of background information used for developing the DEIS, the comment period was extended by 60 days to August 14, 1989.

habitat. Additional impacts on water quality and fish habitat could be caused by increased erosion, sediment transport, and sewage associated with the operation of the facilities.

Future placer mining and nonmining development on both patented and unpatented claims which would discharge dredged and/or fill materials into waters of the U.S. would require a permit under section 404 of the Clean Water Act (PL 92-500). The U.S. Army Corps of Engineers administers the section 404 permit program (see appendix 16).

Possible nonmining impacts inside the study areas include the concentration of visitor use along mining access roads and trails. Because of the lack of other overland travel routes, visitors are likely to use mining roads, most of which follow areas from the Yukon River inland. Additional impacts on water quality and fish habitat from this type of use would be minimal.

Water Quality

Woodchopper/Coal/Sam Creek Study Area. Under alternative A, land cover disturbance in the study area from the three placer mining operations predicted by the mineral development scenario would total 70 acres within the stream and riparian corridor. The three operations would affect surface water quality in a total of 31.3 streams miles. Impacts on ground and surface water could reduce the productive capabilities of aquatic and terrestrial organisms in the study area.

Woodchopper Creek -- Placer mining has affected water quality in 12.2 miles of stream from the upper end of the disturbed areas downstream to the Yukon River. Dissolved oxygen, pH, alkalinity, hardness, and metal levels (except zinc) of water within and downstream of previously mined areas are within both the EPA (1986) criteria for protection of aquatic life and the drinking water standards for the state of Alaska. Zinc is naturally high in Woodchopper Creek. Petroleum products and other hazardous materials are present in the watershed. However, no measurable evidence of stream contamination from these materials was found during the 1986 water quality and fishery survey. Past surface disturbing activities adjacent to Woodchopper, Mineral, and Iron creeks have accelerated stream and riparian corridor erosion and sediment transport.

The single placer mining operation predicted by the mineral development scenario would impact surface water quality in approximately 11.3 miles of stream. Future mining would potentially modify 5.8 miles of stream channel and bank within the claims area and disturb 30 acres of soil and vegetation adjacent to the stream. Surface disturbing activities would affect water quality within the claims area and downstream to the Yukon River.

Coal Creek -- Placer mining has affected water quality in 8.7 miles of stream from the upper end of the disturbed areas downstream to the Yukon River. Dissolved oxygen, pH, alkalinity, hardness, and metal levels (except zinc) of water within and downstream of previously mined areas are within both the EPA (1986) criteria for protection of aquatic life and the drinking water standards for the state of Alaska. Zinc is naturally high in Coal Creek. Petroleum products and other hazardous materials are present in the watershed. Soil contaminated with mercury exists within 100 feet of Beaton Pup, a small tributary of Coal Creek. However, four Beaton Pup water samples collected and analyzed in 1986 showed no detectable concentrations of total recoverable mercury at the 0.0002mg/l detectable limit. During the 1986 water quality survey, no measurable evidence of stream contamination from other abandoned materials was found. Past surface disturbance adjacent to Coal Creek has elevated sediment and associated metal input from nonpoint runoff during storms and high flows.

Future mining in the Coal Creek drainage will be limited to mining claims on Boulder Creek. The single placer mining operation predicted by the mineral development scenario would impact surface water quality in approximately 6.2 miles of stream. In Boulder Creek, future mining would potentially modify less than 0.8 miles of stream channel and bank within the claims area and disturb 20 acres of soil and vegetation adjacent to the stream. Surface disturbing activities would affect water quality within the claims area and downstream to the Yukon River.

Sam and Ben Creeks -- The majority of past mining activities in the Sam Creek drainage have been concentrated in the Ben Creek area. Placer mining has affected water quality in 9.5 miles of stream from the upper end of the disturbed areas downstream to the Yukon River. Dissolved oxygen, pH, alkalinity, hardness, and metal levels (except zinc) of water within and downstream of previously mined areas are within both the EPA (1986) criteria for the protection of aquatic life and the drinking water standards for the state of Alaska. Zinc is naturally high in Ben and Sam creeks. Petroleum products and other hazardous materials are present in the watershed. However, no measurable evidence of stream contamination from these materials was found during the 1986 survey. Past surface disturbance adjacent to Ben Creek and several road crossings have elevated sediment and associated metal input from nonpoint runoff during storms and high flows.

The single placer mining operation predicted by the mineral development scenario would impact surface water quality in approximately 13.8 miles of stream in Sam and Ben creeks. These impacts would be in addition to past impacts. Future mining would potentially modify 7.7 miles of stream channel and bank within the claims area and disturb 20 acres of soil and vegetation adjacent to the stream. Surface disturbance would affect water quality within the claims area and downstream to the Yukon River.

Cumulative Impacts -- The total cumulative impacts to water quality are composed of both past impacts and impacts predicted under this alternative. Past placer mining operations have caused major modifications of the original stream channel and adjacent terrain, thus altering the chemical and physical characteristics of water draining the study area. These modifications include removal of vegetation, removal of the organic muck layer, increased exposure of subsurface rock and soil with high mineral content, and increased erosion. Past placer mining disturbance increased the depth of the permafrost table under 1,116 acres resulting in altered surface and groundwater regimes. Past mining has affected water quality within and downstream of the disturbed area in 30.4 miles of stream. The combined effects of both past impacts and impacts predicted under this alternative would affect 34.7 miles of stream within and downstream of disturbance. Long-term impacts on water quality would be associated with the continued input of sediment into streams from nonpoint runoff of disturbed areas during storms and high flows.

Conclusion -- Past mining activities have had an impact on existing water quality. These impacts have not caused the natural levels of various water quality parameters to fall outside the acceptable limits for both the protection of aquatic life (EPA 1986) and the state of Alaska drinking water standards. Under this alternative, predicted mining would further impact water quality. However, the three operations predicted under this alternative would be required to comply with all state and federal water regulations and NPS water protection requirements. Potential developments associated with the nonmining uses of patented claims would have additional impacts on water quality. The cumulative impacts of past placer mining and impacts under this alternative would be minor.

Under this alternative, the possible consequences of mining impacts on wetlands include degraded water quality, and loss of fish and wildlife habitat (see aquatic resources and wildlife resources sections).

Conclusion. Past mining activities have had a major impact on wetlands in the two study areas. The majority of these impacts involved riparian plant communities (see aquatic and wildlife resources sections). Loss of wetlands that would occur under this alternative would be less than those for alternative A, potentially greater than that for alternative C, and greater than that for alternative D. Potential developments associated with the nonmining uses of patented claims would have an additional impact on wetlands.

IMPACTS ON AQUATIC RESOURCES

Impacts caused by past mining operations on water quality and grayling habitat for Woodchopper, Coal, Sam, and Fourth of July Creeks are described under alternative A. Future impacts of individual operations described under alternative A could potentially be the same for this alternative.

Potential impacts caused by mining operations under this alternative would be reduced by meeting state and federal water quality standards and criteria, maintaining natural stream flows, and implementing the water resource protection measures and operating stipulations summarized in appendix 14.

Under this alternative, an undetermined number of unpatented claims could be patented without patent restrictions. The impacts from nonmining developments on patented claims, such as cabins, subdivisions, or commercial lodges, could result in further degradation of water quality and grayling habitat. Additional impacts on water quality and fish habitat could be caused by increased erosion, sediment transport, and sewage associated with the operation of the facilities.

Future placer mining and nonmining development activities on both patented and unpatented claims which could place dredged and/or fill materials into study area waters would be subject to section 404 of the Clean Water Act (PL 92-500). The U.S. Army Corps of Engineers regulates all disposal of dredge and fill materials in preserve waters (appendix 16).

Possible nonmining impacts inside the study area include the concentration of visitor use along mining access roads and trails. Because of the lack of other overland travel routes, visitors are likely to use mining roads, most of which follow areas from the Yukon River inland. Additional impacts on water quality and fish habitat from this type of use would be minimal.

Water Quality

Woodchopper/Coal/Sam Creek Study Area. Under alternative B, land cover disturbance in the study area that would result from new mining activities would be less than 70 acres. Groundwater and surface water quality would be affected within the disturbed area. New mining activities would affect stream water quality in less than 31.3 miles of stream.

Cumulative Impacts -- The total cumulative impacts to water quality are composed of both past impacts and impacts predicted under this alternative. Past placer mining operations have caused major modifications of the original stream channel and adjacent terrain, thus altering the chemical and physical characteristics of water draining the study area. These modifications include removal of vegetation, removal of the organic muck layer, thawing

of permafrost, increased exposure of subsurface rock and soil with high mineral content, and increased erosion. Past mining has affected water quality within 1,116 acres of disturbance and in 30.4 miles of stream. Existing disturbance has not caused major changes in the study area stream's natural water quality. Additional impacts from new mining would affect less than 70 acres of land cover and less than 31.3 miles of stream. Potential impacts on surface water and/or groundwater caused by past and new mining activities include: (1) altered water regimes, (2) elevated metal concentrations, (3) lowered pH, (4) accelerated erosion and transport of sediments, (5) increased turbidity, and/or (6) pollution from accidental spillage of oil, fuel, or other hazardous materials. Long-term impacts on water quality would be associated with the continued input of sediment into streams from nonpoint runoff of disturbed areas during storms and high flows. Impacts on groundwater and surface water could reduce the productive capabilities of aquatic and terrestrial organisms in the study area.

Conclusion -- Past mining activities have had an impact on existing water quality. These impacts have not caused the natural levels of various water quality parameters to fall outside the acceptable limits for both the protection of aquatic life (EPA 1986) and the state of Alaska drinking water standards. Under this alternative, predicted mining would further impact water quality. However, approved operations would be required to comply with all state and federal water regulations and NPS water protection requirements. Potential developments associated with the nonmining uses of patented claims would have additional impacts on water quality. The cumulative impacts of past placer mining and this alternative would be minor. Under this alternative, the impacts of mining on water quality would be less than those for alternative A, greater than those for alternative D, and potentially greater than those for alternative C.

Fourth of July Creek Study Area. Under alternative B, land cover disturbance in the study area that would result from new mining activities would be less than 20 acres. Groundwater and surface water quality would be affected within the disturbed area. New mining activities would affect stream water quality in less than 13.1 miles of stream.

Cumulative Impacts -- The total cumulative impacts to water quality are composed of both past impacts and impacts predicted under this alternative. Past placer mining operations have caused major modifications of the original stream channel and adjacent terrain, thus altering the chemical and physical characteristics of water draining the study area. These modifications include removal of vegetation, removal of the organic muck layer, thawing of permafrost, increased exposure of subsurface rock and soil with high mineral content, and increased erosion. Past mining has affected water quality within 80 acres of disturbance and in 13.1 miles of stream. Existing disturbance has not caused major changes in the study area stream's natural water quality. Additional impacts from new mining would affect less than 20 acres of land cover and less than 13.1 miles of stream. Potential impacts on surface water and/or groundwater caused by past and new mining activities include: (1) altered water regimes, (2) elevated metal concentrations, (3) lowered pH, (4) accelerated erosion and transport of sediments, (5) increased turbidity, and/or (6) pollution from accidental spillage of oil, fuel, or other hazardous materials. Long-term impacts on water quality would be associated with the continued input of sediment into streams from nonpoint runoff of disturbed areas during storms and high flows. Impacts on ground and surface water could reduce the productive capabilities of aquatic and terrestrial organisms in the study area.

Conclusion -- Past mining activities have had an impact on existing water quality. These impacts have not caused the natural levels of various water quality parameters to fall outside the acceptable limits for both the protection of aquatic life (EPA 1986) and the state of Alaska drinking water standards. Under this alternative, predicted mining would further term effects that would result from new mining activities would be less than alternative A. The long-term impacts that would result from new mining activity would reduce arctic grayling habitat by less than 0.9 HUs. The short-term losses of habitat would be less than 3.0 HUs. The actual reduction of impacts in alternative B, over those in alternative A, would depend on the site specific potential for mitigation, protection of sensitive areas, and the provisions of a specific plan of operations.

Cumulative Impacts – The total cumulative long- and short-term impacts to arctic grayling habitat are composed of both past impacts and impacts predicted under this alternative. Past mining activities reduced the grayling habitat to 90.4 percent of the premining total. The total amount of study area grayling habitat is only 0.1 HUs above the study area resource protection goal of 29.1 HUs (table 21). An additional loss of more than 0.1 HUs could cause major long- and short-term impacts. Additional long-term losses of arctic grayling habitat from new mining would be less than 0.9 HUs. Short-term habitat losses would be less than 3.0 HUs.

Under this alternative, possible consequences of the long- and short-term reductions in arctic grayling habitat include reduced survival, avoidance of spawning and feeding areas, displacement of fish, change in age class structure, and reduced or eliminated fish populations both downstream and upstream of the mine site (table 14).

Conclusion – Past mining activities have had a substantial impact on arctic grayling habitat through the loss of 3.1 habitat units. Major long- or short-term impacts on grayling habitat could occur if new mining caused an additional loss of more than 0.1 HUs. Potential developments associated with the nonmining uses of patented claims could have additional impacts on arctic grayling habitat and the fish that use it. Overall, the impacts on arctic grayling habitat associated with the implementation of alternative B would be less than those associated with alternative A. This would result from the requirement of potentially extensive mitigation or other operational requirements to lessen the impacts to arctic grayling habitat.

Summary. Under this alternative, the impacts on arctic grayling habitat in the two study areas would be less than those for alternative A, greater than those for alternative D, and potentially greater than those for alternative C. A long-term loss of 37.0 arctic grayling HUs has occurred from past mining activities (table 21). In addition, an undetermined number of mining claims could go to patent. There would be no restrictions on patented claims; required reclamation would be minimal resulting in extended durations of long-term impacts, and the potential for nonmining developments on patented claims, which would create additional impacts on the resource, would be high.

IMPACTS ON WILDLIFE RESOURCES

Short-term habitat loss would occur when animals are displaced from or avoid areas surrounding active mining operations. Vehicle noise, human activity, and other disturbance caused by transporting personnel and equipment to and from mine sites within the study areas would result in short-term habitat reductions along access routes between the claim groups, the Yukon River, and airstrips in Woodchopper, Coal, and Fourth of July creeks, and in the hills between Coal Creek and Sam Creek. Additional long-term habitat loss would be prevented by operators using existing routes or low-impact, all terrain vehicles. Heavy equipment would be moved in the winter across frozen, snow-covered terrain.

Table 21. Arctic Grayling Habitat Units Under Alternative B in the Yukon-Charley Rivers National Preserve

Study Area Drainage	Habitat (HUs): Premining	Habitat (HUs): Existing (% premining)	Long-Term Impacts (Habitat Units): Past Mining Loss	Long-Term Impacts: Existing Condition Meet RPG?	Long-Term Impacts: Alternative Loss	Long-Term Impacts: Could Habitat fall Below RPG?	Short-Term Impacts (HUs): Alternative Loss	Short-Term Impacts: Could Habitat fall Below RPG?
Woodchopper	45.1	[illegible]	[illegible]	[illegible]	[illegible]	*	< 1.5	*
Coal	66.7	42.0 [illegible]	[illegible]	[illegible]	< 0.1	*	< 0.5	*
Sam	39.2	35.1 [illegible]	[illegible]	[illegible]	< 2.2	*	< 5.3	*
Total	151.0	117.1 (77.5)	[illegible]	No	< 2.3	Yes	< 7.3	Yes
Fourth of July	32.3	29.2 (90.4)	3.1	Yes	< 0.9	Yes	< 3.0	Yes
Grand Total	183.3	146.3 (79.8)	37.0	*	< 3.2	*	< 10.3	*

* Resource Protection Goals (RPGs) apply to study area totals only.

Under this alternative, an undetermined number of unpatented claims could be patented without patent restrictions. The impacts from possible nonmining developments on patented claims, such as cabins, subdivisions, or commercial lodges, could result in further permanent loss of habitat. Depending on the location and extent of developments, the construction and occupation of facilities could result in (1) further long-term loss of habitat, (2) further unavailability of habitat due to disturbance, and (3) a greater potential for defense of life and property (DLP) bear mortality.

Possible nonmining impacts inside the study area include the concentration of visitor use along mining access roads and trails. Because of the lack of other overland travel routes, visitors are likely to use mining roads, most of which follow riparian areas from the Yukon River inland. This use would not result in habitat reductions; however, some sporadic, short-term reductions in available habitat near roads and trails would result due to disturbance.

Possible future impacts on habitat outside the study area include disturbance due to increased visitor use, new tour boat operators, or new, privately-operated lodges along the Yukon River.

Riparian Wildlife Habitat

Woodchopper/Coal/Sam Creek Study Area. Under alternative B, resource protection goals would be used as one of the methods of analysis of impacts in evaluating a mining plan of operations. Because of past mining disturbance in this study area, the long- and short-term resource protection goals for riparian wildlife habitat would not be met. A total of 841 acres have already been disturbed. Accordingly, a mining plan of operations may not be approved without appropriate and potentially extensive mitigation or other operation requirements to lessen the impact on riparian wildlife habitat. The long- and short-term effects that would result from new mining activities would be less than alternative A. The long-term vegetative disturbance that would result from new mining activity would reduce riparian wildlife habitat by less than 70 acres. Effective short-term losses of habitat would be less than 962 acres. The actual reduction of impacts in alternative B, over those in alternative A, would depend on the site specific potential for mitigation, protection of sensitive areas, and the provisions of a specific plan of operations.

ENVIRONMENTAL CONSEQUENCES
Alternative B

Cumulative Impacts – The total cumulative impacts to riparian wildlife habitat are composed of both past impacts and impacts predicted under this alternative. Past mining activities reduced the riparian wildlife habitat by 841 acres, leaving a total of 3,625 acres, or 81 percent of the premining total (table 22). This is less than the amount of habitat needed to meet either the long- or short-term resource protection goal. Additional long-term losses of riparian wildlife habitat from new mining would be less than 70 acres. Effective short-term losses would be [illegible].

Because less mining would occur under this alternative, the potential for defense of life and property bear mortality, although still moderate, would be less than that which is under alternative A.

The primary, life-sustaining resources for many species of wildlife are provided by riparian wildlife habitat. Riparian areas constitute important habitat components for black bear, moose, and many small mammals and birds. Many of these are important prey species for wolves. Under this alternative, possible consequences of the long- and short-term reductions of riparian wildlife habitat include lower species diversity, reduced numbers of individual species, and shifts in species distributions through den or nest abandonment, reduced reproductive success, decreased survival, overuse of adjacent habitat, and increased competition (table 15).

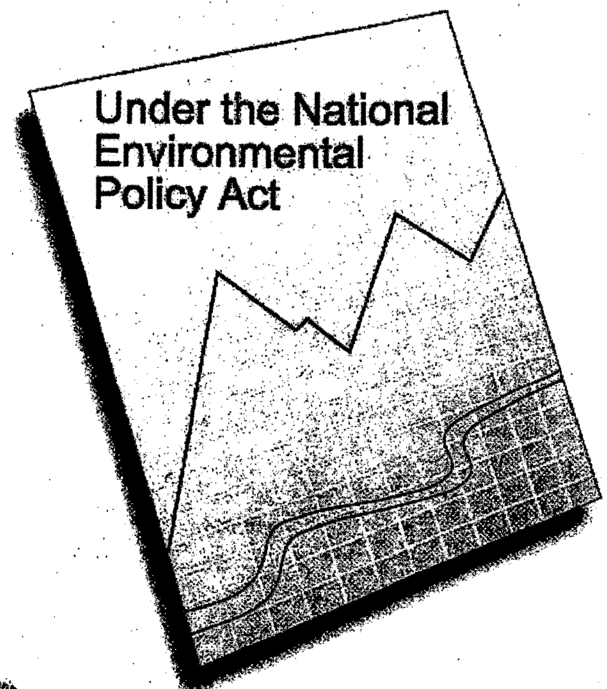
Conclusion – Past mining activities have already had a major, long-term impact on riparian wildlife habitat through the loss of 841 acres. Because of past disturbance, the existing acreage would not meet either the long- or short-term resource protection goals. Potential developments associated with the nonmining uses of patented claims could have additional long-term effects on riparian habitat and the animals that use it. Short-term habitat reductions from nonmining impacts, although minor, would add to the cumulative impacts. Some potential for DLP bear kills would also exist. Overall, the impacts on riparian wildlife habitat associated with the implementation of alternative B would be less than those associated with alternative A. This would result from the requirement of potentially extensive mitigation or other operational requirements to lessen the impact to riparian wildlife habitat.

Fourth of July Creek Study Area. Because of past mining disturbance in this study area, the long-term resource protection goal for riparian wildlife habitat would not be met. A total of 56 acres have already been disturbed. Accordingly, a mining plan of operations would may not be approved without appropriate and potentially extensive mitigation or other operation requirements to lessen the impact on riparian wildlife habitat. The long- and short-term effects that would result from new mining activities would be less than alternative A. The long-term vegetative disturbance that would result from new mining activity would reduce riparian wildlife habitat by less than 20 acres. Effective short-term losses of habitat would be less than 92 acres. The short-term resource protection goal would be met if short-term losses were kept below 83 acres. The actual reduction of impacts in alternative B, over those in alternative A, would depend on the site specific potential for mitigation, protection of sensitive areas, and the provisions of a specific plan of operations.

Cumulative Impacts – The total cumulative impacts to riparian wildlife habitat are composed of both past impacts and impacts predicted under this alternative. Past mining activities reduced the riparian wildlife habitat by 56 acres, leaving a total of 777 acres, or 93.3 percent of the premining total (table 22). This is less that the amount of habitat needed to meet the long-term resource protection goal. Short-term habitat losses resulting from active mining operations could reduce the available riparian wildlife habitat by up to 83 acres, and the short-term resource protection goal would be met. Additional long-term losses of riparian

150

Considering Cumulative Effects



Council on Environmental Quality
Executive Office of the President

EXHIBIT 2

4

DETERMINING THE ENVIRONMENTAL CONSEQUENCES OF CUMULATIVE EFFECTS

PRINCIPLES

- Address additive, countervailing, and synergistic effects.
- Look beyond the life of the action.
- Address the sustainability of resources, ecosystems, and human communities.

The diversity of proposed federal actions and the environments in which they occur make it difficult to develop or recommend a single method or approach to cumulative effects analysis. In this chapter, we attempt to provide insight into and general guidelines for performing analyses needed to determine the environmental consequences of cumulative effects. We assume the analysis has already been scoped, including stipulating geographic and time boundaries (see Chapter 2), and that appropriate data have been gathered for the resources, ecosystems, and human communities of concern (see Chapter 3). Reference is made, when appropriate, to specific cumulative effects analysis methods described in Chapter 5 and Appendix A.

The analyst must ensure that the resources identified during scoping encompass all those needed for an analysis of cumulative effects. The analyst must also ensure that the relevant past, present, and reasonably foreseeable future actions have been identified. As an iterative process, cumulative effects analysis often identifies additional resources or actions involved in cumulative effects during the analysis phase. In addition to confirming the resources and actions to be considered, the analyst should complete the following specific steps to determine the environmental consequences of the cumulative effects:

Step 8	Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
Step 9	Determine the magnitude and significance of cumulative effects.
Step 10	Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
Step 11	Monitor the cumulative effects of the selected alternative and adapt management.

CONFIRMING THE RESOURCES AND ACTIONS TO BE INCLUDED IN THE CUMULATIVE EFFECTS ANALYSIS

Even though scoping has identified likely important cumulative effects, the analyst should include other important cumulative effects that arise from more detailed consider-

Thresholds and criteria (i.e., levels of acceptable change) used to determine the significance of effects will vary depending on the type of resource being analyzed, the condition of the resource, and the importance of the resource as an issue (as identified through scoping). Criteria can be quantitative units of measure such as those used to determine threshold values in economic impact modeling, or qualitative units of measure such as the perceptions of visitors to a recreational area. No matter how the criteria are derived, they should be directly related to the relevant cause-and-effect relationships. The criteria used, including quantitative thresholds if appropriate, should be clearly stated in the assessment document.

Determinations of significance in an EA or an EIS are the focus of analysis because they lead to additional (more costly) analysis or to inclusion of additional mitigation (or a detailed justification for not implementing mitigation). The significance of adverse cumulative effects is a sensitive issue because the means to modify contributing actions are often outside the purview of the proponent agency. Currently, agencies are attempting to deal with this difficult issue by improving their analysis of historical trends in resource and ecosystem condition. Even where cumulative effects are not deemed to be significant, better characterization of historical changes in the resource can lead to improved designs for resource enhancement. Where projected adverse effects remain highly uncertain, agencies can implement adaptive management—flexible project implementation that increases or decreases mitigation based on monitoring results.

AVOIDING, MINIMIZING, AND MITIGATING SIGNIFICANT CUMULATIVE EFFECTS

If it is determined that significant cumulative effects would occur as a result of a proposed action, the project proponent should avoid, minimize, or mitigate adverse effects by modifying or adding alternatives. The proponent should not overlook opportunities to enhance resources when adverse cumulative effects are not significant. The separation of responsibilities for actions contributing to cumulative effects makes designing appropriate mitigation especially difficult. In the case of the Lackawanna Industrial Highway, the Federal Highway Administration and Pennsylvania Department of Transportation sponsored development of a comprehensive plan for the valley that provides a mechanism for ensuring that secondary development accompanying construction of the highway would protect valued resources, ecosystems, and human communities (see box).

By analyzing the cause-and-effect relationships resulting in cumulative effects, strategies to mitigate effects or enhance resources can be developed. For each resource, ecosystem, and human community of concern, the key to developing constructive mitigation strategies is determining which of the cause-and-effect pathways results in the greatest effect. Mitigation and enhancement strategies that focus on those pathways will be the most effective for reducing cumulative effects.

It is sometimes more cost-effective to mitigate significant effects after they occur. This might involve containing and cleaning up a spill, or restoring a wetland after it has been degraded. In most cases, however, avoidance or minimization are more effective than remediating unwanted effects. For example, attempting to remove contaminants from air or water is much less effective than preventing pollution discharges into an airshed or watershed. Although such preventative approaches can be the most (or only) effective means of controlling cumulative effects, they may require extensive coordination at the regional or national scale (e.g., federal pollution control statutes).

United States Environmental Protection Agency

EPA Region 3 Philadelphia, PA

EPA/903/R-00/013 October 2000

Mountaintop Mining/Valley Fill Environmental Impact Statement

Recycled/Recyclable
Printed with Vegetable Oil Based Inks
on 100% Recycled Paper
(20% Post Consumer)

EXHIBIT 3

EXECUTIVE SUMMARY

This document is a preliminary draft of the Mountain Top Mining/Valley Fill EIS referenced in the Notice of Intent published in the February 5, 1999 edition of the Federal Register (64 FR5778, 02/05/99). This is a "programmatic" EIS in that it evaluates broad federal actions such as the adoption of new or revised agency program guidance, policies or regulations. The purpose of the EIS, as stated in the above referenced edition of the Federal Register, is:

> *"to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the Unites States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills"*

In the process of conducting this EIS, alternatives are proposed to address the issues and concerns which initiated the NEPA action. In order to fully develop and evaluate the alternatives, relevant general and technical information were gathered together. Where data did not exist, studies were initiated, whenever possible, to fill the information gaps. With suitable background information in hand and results from the technical studies, the alternatives were evaluated and their social, economic, and environmental impacts (a.k.a. environmental consequences) were identified. The draft report is being issued for public review and comment. The preferred alternative will not be determined until the final EIS is circulated for review and comment.

The term "mountaintop mining," as used in this EIS generally refers to three different kinds of surface coal mining operations (contour mining, area mining and mountaintop removal mining) that result in the disposal of excess spoil in valley areas. These excess spoil disposal areas are known as valley fills. This use of the phrase "mountaintop mining" contrasts with the SMCRA term "mountaintop removal mining," which legally refers to a particular method of mining where a basal coal seam is completely removed from one side of a mountain to the other.

During the course of surface coal mining, overburden is removed to reveal the underlying coal. The overburden typically increases in volume during the removal process due to broken rock. As mining proceeds, completed areas are backfilled with previously removed overburden, but due to limitations on the steepness and height to which broken rock may be placed to achieve a stable slope, and the steep topography of the region, excess spoil generally results. Hauling the spoil away to other sites is typically not economically feasible. If by chance, the active mining operations are adjacent to abandoned mined lands, excess spoil may be used for reclamation of mine benches associated with the formerly mined site. More frequently than not, however, such fortuitous circumstances do not exist and it is necessary to construct valley fills to dispose of the excess spoil. These fills have advantages and disadvantages. One advantage is that the disposal area can be located very close to the mining activities thereby minimizing hauling costs. Mining operations that involve sequential ridges receive an additional benefit from the valley fills in that filled ravines facilitate moving heavy equipment from one ridge to the next. The valley fills generally result in an increase of level land and depending on the post mining land use, this can also be advantageous. One major disadvantage of valley fills is that the process destroys the portions of streams and headwater areas they cover and may substantially effect downstream portions of the watershed.

Mountaintop Mining / Valley Fill EIS ES-1 *Preliminary Draft - January 2001*

The amount of excess spoil generated during mining is related to a number of factors including rock type (sandstone "swells" more than shale during removal and fracture) and mining method (mountaintop removal mining typically has the highest overburden to coal stripping ratio). Excess spoil generation depends on other factors as well (including topography) and, as such, the quantities generated are very site specific.

Excess spoil disposal capacity is a prime consideration in the evaluation of steep sloped sites for potential mining projects. Physical or regulatory restrictions to excess spoil disposal may restrict the type and extent of surface mining. Stricter requirements would favor contour operations over area and mountaintop removal methods or might preclude surface mining of a site altogether. In this case, underground mining becomes the only option for coal extraction. For shallow or thin seams, underground mining is frequently not a viable alternative and, consequently, restrictions to excess spoil disposal may render some coal reserves unmineable.

The study area selected for the EIS is a unique and richly diverse ecological environment extending over portions of West Virginia, Kentucky, Virginia and Tennessee. It is located within the Appalachian Coalfield Region of the Appalachian Plateau physiographic province and Bituminous Coal Basin. As the name implies, this region is known for the substantial deposits of coal that lie beneath the surface. Physically, two factors must be coincident in order for mountaintop mining to occur and for excess spoil to be generated: steep terrain and sufficient contiguous coal reserves located close enough to the tops of mountains and ridges to justify large scale mining. In West Virginia, this close combination exists in the southern half of the state and is most frequently aligned with the existence of the Coalburg coal seam. In Kentucky, Virginia and Tennessee, this combination of factors also exists but delineation is not quite as simple because of more complex geology. The boundaries of the study area described above were dictated by the presence of valley fills or the potential for this method of spoil disposal in the future.

The study area is unique in the world because characteristically northern species coexist with their southern counterparts, and thus boast enormous richness and diversity. Individual watersheds and mountain peaks within the Appalachian ecoregions have been isolated for millions of years. That, in combination with relatively mild environmental conditions, has provided a perfect setting for the evolution of unique species of plants, invertebrates, salamanders, crayfishes, freshwater mussels, and fishes. These species include a great number of organisms, including terrestrial, aquatic, and plant species, which are supported by the Appalachian ecoregions (Stein et.al., 2000). In fact, the southern Appalachians boast the richest salamander fauna in the world (Petranka, 1999, Stein et al., 2000).

The Appalachian ecoregion forests, which cover 85 percent of the study area, represent a forest type that was once widespread in the northern hemisphere. These rich deciduous forests have been profoundly altered over the past few centuries and are becoming increasingly threatened. Cove forests tend to dominate the steep-sided, mesic (relatively moist) hollows while pine-heath communities dominate the more xeric (dry) ridges and peaks. Various oak forests dominate the flats and more open slopes that are intermediate between mesic and xeric conditions. The mixed mesophytic forest of the Appalachian coal fields supports one of the richest floral, breeding bird, mammal, and amphibian communities of any upland eastern U.S. forest type (Hinkle et al., 1989;

cited in McComb et al., 1991). It has been described as "the most biologically diverse ecosystem in the southeastern United States" (Hinkle et al., 1993). Further, West Virginia is considered the primary component of a major geographic area of importance to neotropical migratory song birds in the Northeast.

Increased concern about mountaintop mining operations occurred in 1997 and 1998, both in the media, by the Federal agencies, and in notices of intended litigation related to the subject. An interagency forum in 1997 hosted by EPA, called the Federal Regulatory Operations Group, or FROG was held and an interagency working team was formed by OSM, EPA, COE, and FWS in early 1998. Several studies were designed to prepare a consistent fill inventory, look at stream impacts, fill stability, and evaluate regulatory program inconsistencies in mitigation and other mining program requirements.

Press coverage of public issues with mountaintop mining surfaced beginning in August1997, in television, periodicals, and newspapers, including U.S. News and World Report, ABC's "Night Line" program, as well as the Charleston (WV) Gazette, Washington Post, New York Times, Lexington (KY) Herald-Leader, and Louisville Courier-Journal. In 1998, OSM initiated oversight activity evaluating how the West Virginia, Kentucky, and Virginia SMCRA-delegated programs were approving coal mines that proposed not to restore to "approximate original contour," which resulted in more numerous and larger valley fills. EPA, began utilizing the CWA authority under the Section 402 (National Pollution Discharge Elimination System permit) to object to the size and location of valley fills because of impacts to streams. EPA also began to evaluate the applicability of the existing framework under the COE Nationwide versus Individual Permit authority under CWA 404.

The notification by citizens and the West Virginia Highlands Conservancy of the intent to sue the State (WVDEP) and Federal (COE) government in West Virginia occurred in early 1998. Litigation ensued in July 1998 [Bragg, et al. v. Robertson, et al., Civ. No. 2:98-0636 [S.D.W. Va]. Generally, the lawsuit concerned allegations that valley fills associated with surface coal mining operations result in the loss and degradation of West Virginia streams, and that the Clean Water Act (CWA) and Surface Mining Control and Reclamation Act (SMCRA) were being improperly applied. The plaintiffs argued that the current practice of valley filling, both individually and cumulatively, caused more than a minimal impact to the "waters of the US." Under the CWA, activities causing more than a minimal impact are not eligible for a Nationwide or General Permit under CWA Section 404, but must apply the more rigorous standards imposed under the CWA 404 Individual Permitting process. As part of this claim, the plaintiffs alleged that the COE also violated the National Environmental Policy Act (NEPA), by failing to analyze the adverse and cumulative environmental impacts of valley fills and surface mining activities in West Virginia. In December 1998, the plaintiffs and the COE, EPA, OSM, FWS and the WVDEP agreed to settle the CWA portion of the case. The settlement agreement covers two primary objectives, which are increased scrutiny of permits involving valley fills and performance of an EIS.

To aid in the objective of increased scrutiny of permits, a Memorandum of Understanding (MOU) Among the USOSM, USEPA, COE, USFWS, and WVDEP for the Purpose of Providing Effective Coordination in the Evaluation of Surface Coal Mining Operations Resulting in Placement of Excess Spoil Fills in the Waters of the United States establishes a process for improving coordination in the review of permit applications. The entire MOU is provided in an appendix to this EIS. The signatory agencies entered into the agreement with the goals of enhancing cooperation and communication in order to ensure compliance with all applicable federal and state laws, improving time lines and predictability of the permit process, and minimizing adverse environmental impacts from surface coal mining operations resulting in placement of excess spoil fills in the waters of the United States. The experience of the agencies resulting from the increased permit scrutiny have been considered in the development of this EIS. Many of the efforts in this so-called "interim permitting" period identified areas where the agencies, the regulated community, and the environment would benefit from coordinated or clarified procedures, better baseline data collection, improved analysis of potential impacts, and different sequence of processes.

A separate but related investigation was initiated in June 1998 by West Virginia Governor Cecil Underwood. Governor Underwood created a task force to study the effects of mountaintop mining. The task force was organized into the following three committees:

1) Impact to the Economy
2) Impact on the Environment
3) Impact on the People

The findings of the task force were published in December 1998. The recommendations included:

/ The need for more research on the environmental and economic effects of mountaintop mining.
/ Establishment of a state office to regulate the impact of mountaintop-removal mining on people.
/ Establishment of a nationwide stream mitigation policy.
/ Discontinuing of fish and wildlife habitat as a postmining land use (PMLU).
/ Development of commercial forestland as a preferred PMLU.
/ Rigorous enforcement of existing regulatory requirements, including water quality and approximate original contour (AOC) guidelines.

In preparation for conducting the EIS, the agencies invited comments and suggestions on the scope of the analysis. Many people took advantage of the opportunity to participate in the public meetings. The public was also invited to provide written comments. Six hundred forty-one people provided verbal statements at the public meetings while ninety-five written comment letters were submitted. Scoping meetings were held in Summersville, Charleston and Logan, West Virginia, on February 23, 24, and 25, 1999, respectively. Concerns expressed in these public scoping meetings described economic and social impact concerns; policy and regulatory review issues; EIS process questions; and a broad range of environmental impacts associated with mountaintop mining/valley fill operations. Significant aquatic, terrestrial, and community impact concerns were raised during the scoping sessions held for this EIS. Issues of concern expressed in public comments received by the EIS Steering Committee during the scoping process have been summarized into the following aquatic, terrestrial, and community impact issues.

Aquatic Issues

Issue 1: *Stream loss and adverse surface and groundwater impacts from valley fills and other mountaintop mining operations.*

Issue 2: *Ability of mined area reclamation practices to restore stream habitat and aquatic functions impacted by mining.*

Issue 3: *Effectiveness of compensatory mitigation projects to make up for loss of stream habitat and aquatic functions.*

Issue 4: *Protecting watersheds from cumulative effects of mountaintop mining/valley fill activities and other land disturbances.*

Terrestrial Issues

Issue 5: *Concerns that current mountaintop mining reclamation practices introduce and increase exotic and invasive plant species.*

Issue 6: *Effects of mountaintop mining and resulting deforestation/forest fragmentation on plants and wildlife, including unique/endangered species, and on biodiversity and sustainability.*

Community Issues

Issue 7: *Effects of blasting on homes, water wells, and quality of life.*

Issue 8: *Potential health risks of airborne dust and fumes from blasting and other mining operations*

Issue 9: *Effects from mountaintop mining on flooding of downstream communities*

Issue 10: *Valley fill stability.*

Issue 11: *Ability for reclaimed mined land to provide an economic or social benefit to coal field communities.*

Issue 12: *Effects of Mining on Scenery and Culturally Significant Landscapes.*

Issue 13: *Economic Impacts of Reducing Mining*

Issue 14: *Environmental Justice*

A programmatic review process was undertaken by the agencies shortly after the scoping process was completed in order to assess those program areas where improvements could be made, and specific programmatic actions were formulated to address the identified concerns and problem areas.

The Program Review Group, chartered by and including the Steering Committee, developed the actions representing improvements to baseline regulatory programs. Ideas for government action to address the potential environmental impacts of mountaintop mining and valley fills in the study area were developed in a series of meetings that centered around three domains: aquatic; terrestrial; and community/human. Each domain covered all relevant values; for example, the terrestrial domain meetings covered forests, and terrestrial biota. Pursuant to NEPA, values are defined as aesthetic, historical, cultural, economic, social, and health considerations relevant to the proposed action and the alternatives. The Program Review Group went through a three step process where they: 1) summarized existing State and federal policies and regulations related to mountaintop mining/valley filling; 2) brainstormed potential changes to existing policies, regulations, and program coordination to improve environmental protection; and 3) consolidated/summarized alternatives. The subsequent actions, which are associated with one or more action alternative being addressed within the EIS, represent specific programmatic changes that could be undertaken to minimize the environmental impacts of mountaintop mining/valley fill operations.

Alternative A is the baseline alternative, which reflects agency policies, guidance, and decision making processes in effect prior to the December 1998 settlement agreement between the plaintiffs and the COE, USEPA, USOSM, USFWS, and WVDEP. Presettlement conditions are how agencies may have continued to operate if there were no lawsuit. This alternative also reflects the environmental consequences that would be expected to occur if the agencies were to revert back to presettlement programs should the current Federal Court ruling in Bragg v. Robertson (Bragg, Civ. No. 2:98-0636 S.D. WV) be overturned.

Alternative B would restrict fills to the uppermost reaches of the watershed, and recommend improvements to other baseline regulatory programs governing mountaintop mining operations. For study purposes, the watershed size being evaluated ranges from 0-75 acres. Under this alternative, specific action items have been proposed primarily in response to terrestrial and community impact concerns raised during the scoping process. Several aquatic related action items have also been proposed under this alternative, as effluent discharges from sediment ponds may still be anticipated to occur downstream of the fills.

Alternative C would authorize the placement of fill further downstream, possibly under the Corps of Engineer's CWA Section 404 Nationwide Permit Program, provided certain fill minimization requirements are met (such as AOC Plus Fill Optimization and/or Section 404(b)(1) avoidance tests). The current Federal Court ruling in Bragg v. Robertson (Bragg, Civ. No. 2:98-0636 S.D. WV) would require one or more rule changes to allow fills within the intermittent stream zone. For study purposes, the watershed size being evaluated ranges from 75 - 250 acres. This alternative differs from Alternative B in that additional aquatic related action items have been proposed.

Alternative D is similar to Alternative A in that fills would not be restricted to any particular stream segment, but it differs substantially from Alternative A in that many new programmatic actions would be implemented to reduce the aquatic, terrestrial, and community impact concerns raised during the scoping process. The current Federal Court ruling in Bragg v. Robertson (Bragg, Civ. No. 2:98-0636 S.D. WV) would also require one or more rule changes to allow fills within the intermittent and/or perennial stream zone.

IV. ALTERNATIVES

Significant aquatic, terrestrial, and community impact concerns were raised during the scoping sessions held for this EIS. A programmatic review process was undertaken by the agencies shortly after the scoping process was completed in order to assess those program areas where improvements could be made, and specific programmatic actions were formulated to address the identified concerns and problem areas. The subsequent actions, which are listed under each action alternative being addressed within the EIS, represent specific programmatic changes that could be undertaken to minimize the environmental impacts of mountaintop mining/valley fill operations. A description of the problem area being addressed by each action is included under each action item. The alternatives were developed to consider the full range of response options available to the agencies.

Alternative A is the baseline alternative, which reflects agency policies, guidance, and decision-making processes in effect prior to the December 1998 settlement agreement between the plaintiffs and the COE, USEPA, USOSM, USFWS, and WVDEP. Pre-settlement conditions are how agencies may have continued to operate if there were no lawsuit. This alternative also reflects the environmental consequences that would be expected to occur if the agencies were to revert back to presettlement programs should the current Federal Court ruling in *Bragg v. Robertson (Bragg,* Civ. No. 2:98-0636 S.D. WV*)* be overturned.

Alternative B would restrict fills to the uppermost reaches of the watershed, and recommend improvements to other baseline regulatory programs governing mountaintop mining operations. For study purposes, the watershed size being evaluated ranges from 0-75 acres. Under this alternative, specific action items have been proposed primarily in response to terrestrial and community impact concerns raised during the scoping process. Several aquatic related action items have also been proposed under this alternative, as effluent discharges from sediment ponds may still be anticipated to occur downstream of the fills.

Alternative C would authorize the placement of fill further downstream, possibly under the Corps of Engineer's CWA Section 404 Nationwide Permit Program, provided certain fill minimization requirements are met (such as AOC Plus Fill Optimization and/or Section 404(b)(1) avoidance tests). The current Federal Court ruling in *Bragg v. Robertson (Bragg,* Civ. No. 2:98-0636 S.D. WV*)* would require one or more rule changes to allow fills within the intermittent stream zone. For study purposes, the watershed size being evaluated ranges from 75 - 250 acres. This alternative differs from Alternative B in that additional aquatic related action items have been proposed.

Alternative D is similar to Alternative A in that fills would not be restricted to any particular stream segment, but it differs substantially from Alternative A in that many new programmatic actions would be implemented to reduce the aquatic, terrestrial, and community impact concerns raised during the scoping process. The current Federal Court ruling in *Bragg v. Robertson (Bragg,* Civ. No. 2:98-0636 S.D. WV*)* would also require one or more rule changes to allow fills within the intermittent and/or perennial stream zone.

There are actions common to both Alternatives C and D. There are actions common to Alternatives B, C, and D. The actions comprising the alternatives are presented in Table IV.-1.

IV. Alternatives

It should be noted that no alternative has been identified as a preferred alternative at this time. The preferred alternative and final set of recommended action items will not be determined until the final EIS is circulated for public review and comment.

Mountaintop Mining / Valley Fill EIS IV-2 *Preliminary Draft -January 2001*

Rebecca Hanmer
01/18/01 06:18 PM

To: Mary Josie Blanchard <MBLANCHA@OSMRE.GOV>
cc: mrobinso@osmre.gov, cindy_tibbott@fws.gov, William Hoffman/R3/USEPA/US@EPA, Rich Kampf/R3/USEPA/US@EPA, rodney.l.woods@irdor.usace.army.mil, rhunter@mail.dep.state.wv.us
Subject: Re: Did the status reports go out yet?

The MTM/VF executive summary did not go out. Russ Hunter and I were working on last minute drafting but we received calls from David Satterfield in the Governor's office saying that the WV Legislative leaders were really upset that we were breaking our agreement not to issue the EIS without completing all the studies. The Governor's office felt caught in the middle. We went back and forth a couple of times to try and explain the difference between the EIS and the status reports we were working on. However, with the shortness of time, it has been impossible to have a productive exchange of views. Given this, I told Mr. Satterfield around 5:30 pm that EPA would not issue anything until we had had an opportunity to talk through the "don't release anything" issue with the Legislative leaders. (We need to rendezvous before setting up a meeting.) That means Brad Campbell won't sign a letter transmitting the status report before he leaves his office tomorrow, unless Russ Hunter can achieve a miracle.

I regret we had to do this, especially in view of Bill Hoffman's hard work and the great input and editorial support we have been getting from OSM and other agencies. We did send the January 16 draft to the WV Governor's office and to Sen. Jackson but I don't know that the people who reacted so strongly ever saw our product.

You will recall that Sen. Tomblin and Speaker Kiss sent us a letter in December asking us not to issue the draft EIS prior to completion of the technical studies. Brad Campbell responded on Jan. 2 and said the following:

"To respond to your request...the participating agencies have decided that in lieu of releasing a DEIS in January 2001, the agencies will prepare a status report for release in early to mid-January 2001. The status report will not affect the ongoing process for completing the DEIS, and we will continue seeking comments from the public and affected constituencies on specific technical studies as they become available. A revised schedule for release of the DEIS will be provided to you and the public once the schedule for the underlying technical studies can be taken into account."

I can be reached tomorrow in Washington in the late afternoon (202 260-4470) if anyone wants to discuss this with me, and I will ask Bill H. to set up an EIS Steering Committee call. PS, everyone, we really need to come to closure on the plan and timetable for the macroeconomic study.

Cheers, Rebecca

EXHIBIT 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Dear Citizen:

I am writing you again to give an update on the environmental impact statement (EIS) which four Federal agencies and the State of West Virginia are preparing on mountaintop mining and valley fills. The four Federal agencies are EPA, the U.S. Army Corps of Engineers, the U.S. Office of Surface Mining and the U.S. Fish and Wildlife Service. The Division of Environmental Protection is the lead agency for the State of West Virginia, and we have established cooperative activities with the Kentucky and Virginia surface mining and environmental programs.

It was our intention to publish the draft EIS in December 2000. Regrettably, it will not be possible to publish the document at this time because a few of the technical studies, particularly the economic study of mining restrictions, are still incomplete. Instead, the agencies have prepared a status report to provide a snapshot of the Federal and State initiatives that have been undertaken to date, and to describe work remaining before the draft EIS can be released. An Executive Summary highlighting key findings within the Status Report is attached. The longer report will be made available on EPA's web page at www.epa.gov/region3/mtntop at a later date.

There are two other reports that have been issued in 2000 that I wish to bring to your attention which heighten the importance of finding better controls on mountaintop mining and valley fills in Appalachian forest habitats. The first report, Precious Heritage, The Status of Biodiversity in the United States, by The Nature Conservancy and Association for Biodiversity Information (Bruce A Stein, et al., editors), highlights the southern Appalachians as an area of "enormous biological diversity and a center of richness and rarity in the United States." According to this study, "Southern Appalachia forests represent the last American stronghold of a forest type once widespread in the northern hemisphere." The only other similar surviving area is in eastern China. The report also points out that, of the more than 2000 small watershed areas in the continental U.S., 87 stand out as "hot spots", harboring 10 or more vulnerable or imperiled freshwater species. These hot spots are concentrated in the southeastern U.S., in the Tennessee, Ohio, Cumberland and Mobile River basins, with the upper Clinch River on the Virginia-Tennessee border surpassing all other areas (48 imperiled and vulnerable fish and mussel species).

The second report, The Bird Community Index: A Tool for Assessing Biotic Integrity in the Mid-Atlantic Highlands, was based on work by the Penn State Cooperative Wetlands Center

Customer Service Hotline: 1-800-438-2474

for EPA's Office Research and Development, as part of the Mid-Atlantic Integrated Assessment (MAIA). The purpose of the study was to show how the types of birds found in the area indicate its ecological conditions. The highlands study area covered central and western Pennsylvania, all of West Virginia, and western Virginia. According to the project summary, the Penn State studies found that only 16 and 27% of the highlands is in excellent or good ecological condition. Further "Sites in good or excellent ecological condition were usually associated with an average of 87% forest cover" and "Sites in excellent condition had a taller and more closed tree canopy (a mature forest) than sites in good condition." The mountaintop/valley study area contains the greatest percentage of sites in excellent and good ecological condition areas in the Mid-Atlantic Highlands.

Thank you for your continued interest in the mountaintop mining/valley fill issue. Public participation is an essential part of the EIS process, and your continued interest and involvement are much appreciated. Should you have any questions on this topic, or on the agencies' findings to date, please contact Bill Hoffman at the above address. Bill can also be contacted at (215) 814-2995 or at Hoffman.William@epa.gov.

Sincerely,

Bradley M Campbell
Regional Administrator

Enclosure

Mountaintop Mining/Valley Fill Status Report
Executive Summary
January 16, 2001

Introduction:

Surface coal mining in Kentucky, Tennessee, Virginia, and West Virginia is conducted by a variety of mining methods and in different topographic settings. Surface mining in the steep slope areas of these central Appalachian coalfield states is referred to as "mountaintop mining." Typical surface coal mining removes soil and rock (called spoil or overburden) above the coal seam, and a portion of the overburden is returned to the mining area to reclaim the site. In steep slope areas, because the solid rock material over the coal seam increases in volume when it is broken, it is not possible to return all of the spoil to its original location after mining. The portion that can't be returned to reclaim the mined area is called "excess spoil." In steep slope Appalachia, excess spoil is often placed in valleys adjacent to the mining area. Thus, excess spoil disposal areas are often called "valley fills."

Concerns over the impacts from mountaintop mining/valley fill operations in Appalachia have been the topic of much discussion in the media, the courts, and at the State and Federal level. Widespread national and local media coverage of public issues surrounding these operations first surfaced in August 1997. Teams consisting of staff from the Environmental Protection Agency (EPA), Office of Surface Mining (OSM), Army Corps of Engineers (COE), and the Fish and Wildlife Service (FWS) were formed in early 1998 to address concerns voiced over these types of mining operations. Later in 1998, several citizens and the West Virginia Highlands Conservancy sued the West Virginia Division of Environmental Protection (WVDEP) and the COE. The suit alleged that valley fills resulted in the loss and degradation of streams, and that the Clean Water Act (CWA) and Surface Mining Control and Reclamation Act (SMCRA) were being improperly applied. The four federal agencies and the WVDEP agreed to a partial settlement of the suit in December 1998. The agencies agreed to prepare an Environmental Impact Statement (EIS) to consider new guidance and policies to minimize the adverse impacts of mountaintop mining and valley fills. The agreement stated an intent to complete the EIS within a two-year time frame. The agencies also agreed to increase scrutiny of new permit applications for mountaintop mining and valley fills until the EIS was completed. Permitting requirements for fills in watersheds greater than 250 acres are more rigorous under these interim procedures.

The EIS process initiated by the agencies included a review of existing information regarding the economic and environmental impacts of mountaintop mining and valley fills, and meetings with various academic experts. Certain data was found to be either lacking or inadequate to address all EIS concerns, and a number of actions (studies and forums) were initiated to address these data gaps. Concurrently, the agencies evaluated program requirements under the various Federal and State laws and regulations, and assessed possible areas for improvement.

In December 2000, the agencies concluded that the draft EIS could not be published within the original two-year time frame because the technical studies, particularly the economic study of mining restrictions, were still incomplete. Because of the delay in completing the draft EIS, the

agencies prepared a status report to update the public on the Federal and State initiatives that have been undertaken to date, and to describe work remaining before release of the draft EIS. The following section summarizes the highlights of the status report, which will be made available on EPA's mountaintop mining web page at www.epa.gov/region3/mtntop at a later date.

Key Findings of Agency Initiatives:

/ The inventory of fills permitted since 1985 includes 5,858 valley fills proposed in the EIS study area (4,421 in Kentucky; 945 in West Virginia; 439 in Virginia; and, 53 in Tennessee). Only 4,057 of these proposed fills have been constructed as of late 2000. This inventory indicates that the majority of valley fills proposed are in watersheds draining areas less than 250 acres in size. In Kentucky, 81% of fills were in watersheds smaller than 75 acres; 14% were in watersheds between 75 and 250 acres; and 5% were in watersheds larger than 250 acres. In Virginia, 70% of fills were in watersheds smaller than 75 acres; 26% were in watersheds between 75 and 250 acres; and 4% were in watersheds larger than 250 acres. In West Virginia, 59% of fills were in watersheds smaller than 75 acres; 34% were in watersheds between 75 and 250 acres; and 7% were in watersheds greater than 250 acres. In Tennessee, 79% of fills were in watersheds smaller than 75 acres; 19% were in watersheds between 75 and 250 acres; and 2% were in watersheds greater than 250 acres.

/ The agencies' experience with permitting indicates that mining companies can do more to avoid filling long stream segments. As part of a consent decree, WVDEP adopted new rules for minimizing the placement of fill in stream valleys. Since the December 1998 Settlement Agreement, 46 permits in West Virginia were approved to place fill in streams in watersheds smaller than 250 acres.

/ Using a hydrologic technique developed by West Virginia to establish the ephemeral point in a stream, the mining technology team found that limiting valley fills to the ephemeral stream segment caused significant or total loss of the coal resource for 9 of 11 mine sites studied, when compared to original mining plans. All of the coal resource was lost for 6 of the 11 mine sites. As this was a limited study on a small population of mining sites, a broader study is being undertaken for the EIS to evaluate the economic effects of limiting valley fills to various watershed sizes (35 acres, 75 acres, 150 acres, and 250 acres). This study is still underway, and no results are available at this time.

/ An extensive technical review concluded that valley fills are generally stable and massive failures are rare. Only twenty documented failures occurred out of more than 4,000 fills constructed since 1982. While fill failures are costly to repair, no loss of life nor significant private property damage have resulted from these movements.

/ Hydrologic modeling studies of selected fills found that peak storm water flows are slightly higher during and after mining. Whether or not increased peak flows results in flooding requires site- and storm-specific analysis. The agencies continue to assess the proper level of flooding analysis required for permit applications and approvals. Preliminary hydrologic results from a separate field study indicate that runoff and ground water appear to be stored in valley fills. The study, to date, appears to show that fills tend to increase the base flow of the stream and decrease the peak flow during a storm event. Water temperature in streams in filled watersheds was less variable than in unfilled watersheds. Substrate material was generally finer in streams in filled watersheds compared to unfilled watersheds.

The studies for the EIS have evaluated the function and value of headwater streams in steep slope Appalachia. At an EIS-sponsored symposium, scientists reported that headwater streams are extremely important to the health of the entire aquatic ecosystem downstream. Biological sampling in West Virginia found aquatic organisms in the uppermost reaches of watersheds, even in "ephemeral" stream zones which flow only as a result of rain or snow melt. Ephemeral/intermittent and intermittent/perennial boundaries were also found to be at much higher points (i.e. in smaller watersheds) than previously thought. Studies conducted by EPA showed impairment of aquatic organisms below valley fills, which may be the result of adverse water quality changes. Monitoring protocols were also developed by the agencies to improve chemical and biological data collection and assessment at mining operations.

A symposium assembled ecological and stream restoration experts to explore aquatic resource re-creation on mine sites. Although opportunities exist to reshape mining land forms to a more natural configuration and to incorporate state-of-the-art stream restoration methods in mining reclamation, it is difficult to reconstruct free flowing streams on or adjacent to mined sites. The difficulty results from the inability to capture sufficient groundwater flows necessary to provide a constant source of flow for the new stream. Only with careful and potentially costly planning and implementation will flows be sufficiently captured such that a new stream can be created on the mined site.

Many published studies report that West Virginia and the Appalachian Highlands are characterized by some of the best forest habitat in the United States. Loss of forest habitat and/or forest fragmentation, because of mining or other man-made disturbances, is a national, regional, and local environmental concern. In studies conducted for the EIS, researchers examined plant succession on reclaimed areas, soil health on mined sites, and effects of mountaintop mining/valley fill operations on herpetiles (e.g., snakes, salamanders, frogs, etc.), birds, and small mammals. Researchers found that surface mining significantly alters terrestrial ecology. Plants and wildlife that require forest habitats are replaced by those that inhabit grasslands. Fragmentation-sensitive bird species such as the cerulean warbler, Louisiana waterthrush, worm-eating warbler, black-and-white warbler, and yellow-throated vireo will likely be negatively impacted as forest habitat is lost and fragmented from mountaintop mining/valley fill operations. In addition, the studies found that the natural return of forests to mountaintop mines reclaimed with grasses under hay and pasture or wildlife postmining land uses occurs very slowly. Full reforestation across a large mine site in such cases may not occur for hundreds of years. State-of-the-art soil reclamation techniques and tree plantings would

be necessary to more quickly establish forests and counter the effects of forest fragmentation on wildlife.

Even before the Environmental Impact Statement, the West Virginia Governor's Task Force focused on the need to restore forests after mining, both for environmental purposes and as an economic resource. In technical studies conducted for this EIS, soil scientists and foresters examined State and Federal regulations, policies, and practices; relevant scientific literature; and talked with soils and forestry experts to assess the effectiveness of current reclamation practices to promote the growth of trees on reclaimed mined lands. The study determined that reclamation with trees has not been particularly successful. However, the study also concluded that state-of-the-art reclamation practices exist that could create mine soils that are superior to native soils for growing trees. West Virginia adopted new rules for commercial forestry incorporating these state-of-the-art reclamation practices.

The EIS process involves evaluating ways of addressing cumulative impacts from multiple mining activities in the same watershed. The more headwater streams in a given watershed which are filled, the more difficult it will be to protect the aquatic ecosystem downstream. The same point can be made of land disturbance and forest fragmentation. Regulations require cumulative impact assessments in connection with approval of new mines. However, the assessment of cumulative impacts has not been rigorous.

The Mining and Reclamation Technology Symposium included presentations on mining techniques, equipment selection, mining cost analysis, coal market forecast through 2020, and panel discussions on alternative reclamation possibilities, approximate original contour, and post-mining land use. Presentations by mining companies indicated that the potential for new investment was highly dependent on the price of coal.

- A nationwide study of surface-mining blasting complaints undertaken as part of routine OSM oversight characterized the nature of blasting complaints received in a one year period. Within the EIS study area, the vast majority of the 637 complaints lodged pertain to annoyance (76 percent), followed by vibration damage (33 percent), water wells (14 percent), dust and fumes (4 percent), and flyrock (2 percent). Following investigation of the 637 complaints by the state regulatory authorities, only 59 of the complaints resulted in violations of the approved regulatory programs. Another EIS chartered study monitored 11 surface mining blasts for the incidence of respirable dust and fumes from incomplete combustion. The monitoring generally found that neither measure posed hazardous levels beyond 1000 feet from the detonation.

- In April 1999, EPA, COE, OSM, FWS, and WVDEP entered into a Memorandum of Understanding (MOU) to enhance cooperation and communication among the agencies in order to ensure compliance with all applicable Federal and State laws, improve timeliness and predictability in the mining permit process, and minimize adverse environmental impacts from surface coal mining and valley fills. Progress has been made, but full implementation has not occurred. The agencies will continue to work together to:

- enhance coordination between Federal and state agencies to address Endangered Species Act concerns earlier in the permitting cycle;

- improve coordination of public participation requirements for both SMCRA and CWA programs by combining public comment requests and hearings wherever possible;

- use the SMCRA permit application process to provide information that can satisfy applicable CWA and National Environmental Policy Act responsibilities;

- develop water monitoring protocols for use by applicants for larger or multiple-valley fill permits that, when implemented, will fulfill SMCRA and CWA requirements, allow better permitting decisions, and improve assessment of aquatic impacts;

- increase coordination among the agencies to address flooding potential from surface mining; and

- develop unified guidance on the appropriate types of compensatory mitigation.

- Because of inconsistent state approval of post-mining land uses justifying non-AOC reclamation, OSM issued a national policy spelling out what lands uses were appropriate and the type of demonstration required by SMCRA for approval.

Alternatives to be Evaluated in the Draft EIS:

As the stated purpose of the EIS is to "consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations and to environmental resources that could be affected by size and location of excess spoil disposal sites in valley fills," the agencies formulated alternatives for the draft EIS that evaluate changes to the current restrictions on mountaintop mining operations in varying degrees. The alternatives use watershed size as a frame of reference as described below. This is considered a definitive and practical basis for comparing the economic and environmental consequences among the respective alternatives. A preferred alternative will not be determined until the draft EIS has been circulated for public review and public comments have been considered.

- Alternative A is the baseline alternative, which reflects agency policies, guidance, and decision-making processes in effect prior to the December 1998 settlement agreement between the plaintiffs and the COE, USEPA, USOSM, USFWS, and WVDEP. Pre-settlement conditions are how agencies may have continued to operate their regulatory programs if there had not been a lawsuit. This alternative also reflects the environmental consequences that would be expected to occur if the agencies were to revert back to presettlement programs should the current Federal Court ruling in *Bragg v. Robertson (Bragg*, Civ. No. 2:98-0636 S.D. WV*)* be overturned. Under this alternative, fills would

not be restricted to any particular stream segment.

- Alternative B would restrict fills to the uppermost reaches of the watershed, and recommend improvements to other baseline regulatory programs governing mountaintop mining operations. For study purposes, the watershed size being evaluated ranges from 0 to 75 acres.

- Alternative C would authorize the placement of fill further downstream, possibly under the Corps of Engineer's CWA Section 404 Nationwide Permit Program, provided certain fill minimization requirements are met (such as AOC Plus Fill Optimization and/or Section 404(b)(1) avoidance tests). For study purposes, the watershed size being evaluated ranges from 76 to 250 acres.

- Alternative D is similar to Alternative A in that fills would not be restricted to any particular stream segment, but it differs substantially from Alternative A in that many new programmatic actions would be implemented to reduce the aquatic, terrestrial, and community impact concerns raised during the scoping process. Alternative D reflects most closely the restrictions on filling that have been used during the interim permitting process under the 1998 Settlement Agreement.

A number of specific programmatic actions have been developed to address aquatic, terrestrial, and community impact concerns raised during the scoping sessions held for the EIS. None of these actions, which are listed in the full status report, will be selected for implementation until they have been fully evaluated in the draft EIS.

Pending Initiatives:

/ A study of the economic effects of restricting mining by watershed size (35, 75, 150, and 250 acres) is underway. Results will show the impacts on tax revenues, utility prices, as well as direct and indirect mining employment. The anticipated costs for implementing government actions for each of the EIS alternatives is also under evaluation.

/ A study designed to assess the impacts of historic, current, and potential mountaintop removal mining on land use and development patterns in West Virginia is nearing completion. Using a combination of remote sensing and geographic information system (GIS) based analysis, the study will show the market need for flat land based on proximity and demographics. A catalogue of actual versus proposed post-mining land use for past mountaintop removal sites will be presented.

/ A future mining study is underway that will use GIS, combined with mining engineering principles, to show areas of potential mountaintop surface mining in steep slope Appalachia.

/ A GIS-based modeling effort is being carried out independently by the Canaan Valley Institute which includes assessing the cumulative impacts of present and future mining on

7

a major-watershed basis. The results of that effort will be useful for the cumulative impact section of the EIS. Land use changes will be modeled using specific environmental indicators, such as percent headwater streams impacted, degree of forest fragmentation, etc.

- A Groundwater Hydrology Workshop was held which involved discussions of the requirements for baseline data collection, hydrologic consequence analyses, and typical hydrologic impacts related to surface mining. Findings and conclusions from the workshop will be published on compact disk in the next month.

- Sampling of fish populations and diversity occurred on 5 major basins in West Virginia and 1 in Kentucky. Data analysis is ongoing.

- Additional modeling of storm runoff effects on downstream water levels is underway to assess reclamation configurations of AOC + and reforestation ground cover. A site in Kentucky will be modeled under several "during mining" scenarios as well.

- OSM commissioned two research studies to evaluate the effect of blasting on wells and non-traditional residential construction. The studies may not be completed before issuance of the draft EIS, but results should be available prior to publication of the final EIS.

- Stream chemistry samples were collected by WVDEP mine inspectors at the same sites used in the completed macroinvertebrate analysis. Stream sampling began in October, 1999 and results are available through May 2000. This sampling is expected to continue through January 2001. Quality assurance/data verification reviews will be conducted and a report is anticipated to be available in Spring 2001.

- Macroinvertebrate and water quality studies were performed in several watersheds located in both West Virginia and Kentucky to assess the impact of mountaintop mining/valley fills on aquatic resources. While the results have been published for the studies conducted in West Virginia, the results in Kentucky are not expected to be available until Spring 2001.

Conclusion:

This summary was intended to update the public on the Federal and State initiatives that have been undertaken since the December 1998 settlement agreement, and the level of effort that remains to be completed prior to the issuance of a draft EIS later this year. A more detailed report will be placed on EPA's mountaintop mining web page at www.epa.gov/region3/mtntop at a later date. For further information, please contact Mr. William J. Hoffman at either (215) 814-2995 or Hoffman.William@epa.gov.

William Hoffman
06/29/01 09:12 AM
To: Cindy_Tibbott@fws.gov
Subject: Re: MTM/VF EIS cumulative impact assessment

Jennifer- After giving it some thought- I tend to agree.

Cindy_Tibbott@fws.gov

Cindy_Tibbott@fws.gov
06/26/01 10:59 AM
To: "Stump, Jennifer M." <jstump@GFNET.com>
cc: William Hoffman/R3/USEPA/US@EPA, "Kogelmann, Wilhelm (\"Chip\")" <wkogelmann@geodecisions.com>, handel@aesop.rutgers.edu, Dave_Densmore@fws.gov, Daniel_Ramsey@fws.gov
Subject: Re: MTM/VF EIS cumulative impact assessment

Hi Jennifer,

Thanks for sending out the landscape assessment plan for comment.

I am very concerned about running all of the Alternatives without a 0% forest recovery scenario, for the following reasons:

With all due respect to Burger's research, re-establishing native hardwood forests on reclaimed mines is still experimental. We don't know what the long-term success will be.

Even if hardwood forests can be re-established, it should be intuitively obvious that they'll be a drastically different ecosystem from pre-mining forests for generations, if not thousands of years, until leaf litter builds up, an understory and herbaceous plant community develop, and hydrologic conditions can re-establish themselves. "Forest recovery" in your scenarios implies that we're getting back exactly what we lost.

The industry has shown a lot of opposition to implementing Burger's recommendations. If they completely balk at widespread implementation (to the 50%, 75%, or 100% level), then we have no representation that will depict the impacts of each valley fill restriction alternative.

West Virginia talks of the need for the flat areas created by mines for commercial development purposes. This almost certainly conflicts with a 75% and 100% reforestation scenario, and probably even 50%.

"Contemporaneous reclamation" is sort of an oxymoron when we're talking about trees. If most of the mining impacts happen in the next 15 years or so, it will be 40+ years beyond reclamation until we have pseudo-"forest revery".

Therefore, I recommend we run a 0% forest recovery for each Alternative.

"Stump, Jennifer M." <jstump@GFNET
To: "'cindy_tibbott@fws.gov'"

EXHIBIT 5

.com>

06/06/01
02:58 PM

<cindy_tibbott@fws.gov>
cc: 'WILLIAM HOFFMAN'
<HOFFMAN.WILLIAM@epamail.epa.gov
>, "Kogelmann, Wilhelm
(\"Chip\")"
<wkogelmann@geodecisions.com>
Subject: MTM/VF EIS
cumulative impact assessment

<<approach.wpd>> As we discussed, the attached file outlines our approach to the landscape scale cumulative impact study for the MTM/VF EIS. We are developing a separate file outlining data coverages that we are planning to use. We are in the beginning stages at this point. We welcome comments and suggestions for improvement. Thank you, Jennifer Stump

(See attached file: approach.wpd)

approach.wpd

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

Problems Identified/Confirmed/Inferred by Technical Studies

I. *Streams- Direct Loss of Headwater Streams*

Problem: EIS studies have found that hundreds of miles of headwater streams have already been lost to valley fill activities. Experts convened for a symposium on the value of headwater streams advised the EIS agencies that headwater streams are extremely valuable in terms of the biological services they perform for downstream aquatic ecosystems. Many of the concerns raised by these experts, such as the loss of organic matter processing and transport from the filled streams, could not be studied with the funding and time restrictions of the EIS. However, limited field studies did confirm that healthy and diverse macroinvertebrate communities are found in the uppermost reaches of unmined headwater streams.

Recommendations: No scientific basis could be established for arriving at an environmentally "acceptable" amount of stream loss (e.g., a maximum allowable percentage of watershed that could be filled without adverse effect). Therefore, because headwater streams provide important ecological functions, direct impacts should be avoided to the greatest practicable extent.

II. *Streams- Macroinvertebrates*

Problem: This investigation found that macroinvertebrate communities located downstream of mining operations are impaired relative to control streams. A general decline in the population of pollution intolerant species (primarily Mayflies) was observed, which is indicative of a general decline in water quality, and a general decline in the overall health of the stream. Habitat or substrate did not seem to be the controlling factor in these studies.

Recommendations: Water chemistry monitoring efforts should be continued to establish potential cause and effect relationships, ie- can specific chemicals be linked to the biological impairment. Should such relationships be established, consideration should then be given to developing or revising water quality criteria designed to protect aquatic life. Consideration should also be given to the types of controls that might be implemented to reduce these pollutant loadings.

III. *Streams- Fisheries*

Problem: Preliminary results from this investigation found a decline in the population of pollution intolerant fish species downstream of mining operations, which is indicative of a general decline in water quality, and a general decline in the overall health of the stream.

Recommendations: Water chemistry monitoring efforts should be continued to establish

-1-

EXHIBIT 6

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

potential cause and effect relationships, ie- can specific chemicals be linked to the biological impairment. Should such relationships be established, consideration should then be given to developing or revising water quality criteria designed to protect aquatic life. Consideration should also be given to the types of controls that might be implemented to reduce these pollutant loadings.

IV. Streams- Water Quality

Problem: Preliminary results from this investigation found that a number of parameters were elevated downstream of mining operations and that even higher concentrations were found downstream of fills. Differences varied by several orders of magnitude. Specific conductance values differed by hundreds of uohm/cm2. Sulfate concentrations differed by the hundreds of mg/L. Alkalinity, total calcium, and total magnesium differed in the tens of mg/L. Chloride, total potassium, and total sodium differed in the mg/L range. The preliminary investigation also found that mining activity in the study area does not appear to cause any difference in several parameters. Those are: dissolved aluminum, dissolved iron, dissolved manganese, total beryllium, total cadmium, total copper, total manganese, total mercury, total phosphorous, total silver, and total zinc. Analysis is ongoing and the results are subject to change.

Recommendations: Water chemistry monitoring efforts should be continued to establish potential cause and effect relationships, ie- can specific chemicals be linked to the biological impairment. Should such relationships be established, consideration should then be given to developing or revising water quality criteria designed to protect aquatic life. Consideration should also be given to the types of controls that might be implemented to reduce these pollutant loadings.

V. Wetlands:

Problem: This investigation concluded that wetland resources do not seem to be a major natural land cover type in the steep slope terrain of West Virginia. The percentage of vegetated wetlands (PF, PEM, PSS designations) in the five watersheds studied was found to be extremely low, representing less than 1/10 of 1% of the watershed in all cases. The majority of the NWI wetlands in these watersheds, furthermore, consisted of unvegetated wetlands, and appeared in most cases to be sediment ponds (PUB designations) associated with mined sites.

The investigation also found that wetlands are becoming established in many sediment structures located on the tops of mined areas. The wetland functions being provided at the ten wetland sites studied (mainly linear drainage structures and basin depressions) varied. Many of the wetland systems were providing excellent sediment stabilization functions, and a few were providing good water quality (defined as nutrient retention) and wildlife functions.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

Recommendations: Opportunities appear to exist for the creation of functioning wetland systems on mined sites. Planned wetlands, if incorporated into the restoration design, can provide valuable functions by enhancing sediment stabilization, water quality improvement (nutrient retention), and wildlife habitat on mined sites. As the structures studied were designed to control sediment, we expected them to score highly in this regard. The defined water quality function, on the other hand, is very much dependent on vegetative cover within the wetland system, and the low percentage of vegetative cover at these sites appears to be the reason for their low scores in this regard. Wildlife scores are also highly dependent on the vegetative communities present, the degree of interspersion, and other physical and biological features of the system.

VI. Aquatic Ecosystem Enhancement:

Problem: This investigation/symposium found that it is difficult if not impossible to reconstruct free flowing streams on or adjacent to mined sites. The difficulty results from the inability to capture sufficient groundwater flows necessary to provide a constant source of flow for the new stream. Only in rare instances will flows be sufficiently captured such that a new stream can be created on the mined site.

The investigation/symposium also found that it is possible to create functioning wetland systems on mined sites, and that offsite restoration/enhancement opportunities do exist as a means of compensating for lost resources.

Recommendations: While mitigation or compensation for stream losses that generally takes the form of restoring degraded streams at offsite locations will seldom replace the functions lost in the headwater areas, they can provide or enhance other aquatic ecosystem functions, and may be considered as possible mitigation measures in limited situations.

Ponds and wetland areas have been created on mining sites, in connection with sediment control structures, and these areas do perform some aquatic functions. However, it is common practice to remove the structures after the bonding period because of safety and/or long-term management concerns. Consideration might be given to leaving shallow pond-wetland resources on site.

With respect to the mitigating downstream effects, the stream studies discussed above have observed that certain chemical parameters are being elevated downstream from valley fill operations, and that these water quality impacts may responsible for the adverse effects that are being observed in downstream biological communities. Further work is necessary, therefore, to evaluate these potential cause and effect relationships and to develop appropriate controls to minimize such effects.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

VII. Post Mining Land Use

Problem: This investigation found that many sites are not being developed as envisioned when PMLU variances are granted, and that the supply of flat land seems to outweigh the demand.

Recommendations: Greater consideration should be given to improving a site's infrastructure (access, water supply and other utilities, etc) if residential, commercial, or industrial PMLU is the objective.

VIII. Soil Health/Forest Productivity

Problem: Current reclamation practices result in conditions that discourage the re-establishment of trees.

- Requirements for erosion control have promoted the use of vigorous herbaceous vegetation that prevents the establishment of trees
- Requirements for erosion control and site stability have resulted in excessive compaction of the rooting medium, preventing establishment and/or proper growth of trees
- Native topsoils, which contain "all of the living matter that makes the collection of sand, silt and clay a living soil capable of sustaining plant life," are rarely salvaged.
    - Variances to the requirement that topsoil be removed, segregated, stockpiled, and saved for redistribution are routinely granted
    - "Recognizing that all topsoil is not created equally, topsoil substitutes are permissible, provided the new material can be shown to be as good as or better than the original topsoil....this is an area where on-the-ground failures occur. The approved substitute material is often whatever material ends up on top, regardless of the pre-mining overburden tests."
    - When selective overburden handling does occur, there is a bias towards salvaging fine-textured, high-pH soil materials that are good in an agronomic sense; that is, they provide favorable chemical conditions for the growth of grasses and legumes. These materials have a negative impact on the growth of native trees.
    - State surface mining laws require that "the permit include a discussion of the utility and capacity of the reclaimed land to support a variety of alternative uses. This requirement has not been thoroughly addressed by mining applicants or strictly required by regulatory agencies. It is a significant contributing factor why forestry land use is not routinely chosen for or successful on reclaimed mined lands."

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

Recommendations:

- OSM and state regulatory authorities should continue to work toward promoting reforestation; this will require eliminating some barriers while assuring compliance with other provisions.
- Forestry might be considered by the U.S. Army Corps of Engineers as an appropriate on-site mitigation for 404 cumulative impacts such as forest fragmentation or deforestation
- The SMCRA regulatory authority could view a forestry PMLU as an acceptable offset of cumulative hydrologic impacts

IX. Terrestrial Plants

Problems:

- The study found no evidence that native hardwood forests, including their herbaceous understory component, will eventually recolonize large mountaintop mine sites using current reclamation methods.

X Wildlife

Problems:

- On large-scale steep slope mines, wildlife typical of forest habitats is replaced by wildlife typical of grassland or shrub habitats.
- For birds, abundances of the forest interior guild, and some forest interior species, were significantly lower in fragmented forest than in intact forest. Some forest species also were detected more frequently at points further from mine edges.
- Populations of forest birds will be detrimentally impacted by the loss and fragmentation of mature forest habitat in the mixed mesophytic forest region, which has the highest bird diversity in forested habitats in the eastern United States. Fragmentation-sensitive species such as the cerulean warbler, Louisiana waterthrush, worm-eating warbler, black-and-white warbler, and yellow-throated vireo will likely be negatively impacted as forested habitat is lost and fragmented from MTM/VF.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

- The study was unable to document that grassland habitats on large-scale surface mines are good for grassland birds, and left open the question that they may in fact be population "sinks." Additional study is taking place this summer.

- MTM/VF results in a shift from a woodland raptor community to a grassland raptor community.

- Salamander species decreased while snake species increased as a result of MTM/VF. Herpetofaunal species that require loose soil, moist conditions, and woody or leaf litter ground cover generally were absent from reclaimed sites.

Recommendations

Minimizing soil compaction, establishing a diverse vegetative cover, and adding coarse woody debris to reclaimed sies would provide habitat for some herpetofaunal species more quickly after mining.

Other problems inferred by the study results

- Large-scale surface coal mining will result in the conversion of large portions of one of the most heavily forested areas of the country, also considered one of the most biologically diverse, to grassland habitat.
    - Unless reclamation practices are changed drastically, it can be assumed that this forest to grassland conversion is, for all practical purposes, permanent.
    - Even if reclamation practices are changed, we must still consider the recovery of a functional mesophytic forest ecosystem as a long-term ecological experiment with uncertain results.
    - Various other potential post mining land uses, such as economic development projects, may conflict with reforestation efforts.

- The forests of this particular geographic area are the core breeding area for a number of forest interior bird species that have extremely limited breeding ranges, including the cerulean warbler, which is currently under review by the Fish and Wildlife Service for endangered species listing. Even if the grassland habitat created by reclamation is optimal habitat for grassland bird species (which may not be the case), this region is outside of the primary breeding range of these widely-distributed grassland species.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

- Forest products important to local economies and social heritage will be adversely affected.

XI Fill Inventory

Problem: At least, 563 miles of intermittent and perennial streams have been buried under valley fills in the central Appalachian region.

XII Fill Stability

Problem: This investigation has found no systemic failings in the regulations pertaining to ensuring valley fill stability.

XIII Flooding (Corp of Engineer Modeling & USGS Fill Hydrology Study)

Problem: Extensive surface mining can potentially alter the hydrography of the watershed by either increasing or decreasing the peak flow discharge associated with storm events. The effect of a surface mine is dependent upon site-specific factors and other factors within the drainage basin down gradient from mining. The following are generalizations related to mining factors that tend to affect peak flow discharge:

- Increases in the size of the drainage basin increase peak flow,
- Conversely decreases in the size of the drainage basin decrease peak flow,
- Overly compacted soils and mine spoil increases runoff,
- Conversely, loosely compacted soils and mine spoil decrease runoff,
- Steeper slopes causes greater runoff than gentler slopes,
- Tree-covered surfaces lessen peak flow more than grass-covered surfaces.
- Diversion ditches and sediment ponds lessen peak discharge, and
- Excess spoil fills tend to increase base flow and lessen peak flow.

Recommendations: All mine permit applications should be analyzed rigorously to discern the impact on surface flow alternations.

XIV Blasting Complaint Study

Problems: Coalfield residents near large-scale surface coal mines are frequently frightened, startled, and annoyed by blasting.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

Recommendation: Better communication between the coal operators and the citizens in the community may significantly reduce these kinds of complaints. Some operators and regulatory authorities have successfully held public meetings to inform and involve the public on its proposed blasting plans.

XV Blasting Dust and Fumes (Dr. English study & Blasting Complaint Study)

Problem: Blasting fumes and gases are byproducts of the explosive reaction of blasting agents used on modern mining. Because the temperature of blasting gases and fumes is higher than surrounding air, most often these byproducts rise to higher altitudes and dissipate. Blasting dust is heavier than air and drops from suspension a short distance from the site of blast. However, both dust and fumes may affect residential areas adjacent to the blast area under certain meteorological conditions.

Recommendations: Blasting must not be conducted when winds will direct dust and fumes towards nearby populated areas or during times of temperature inversions. Mining companies typically refrain from blasting during temperature inversions. Some mining operations use windsocks located in various locations around the mine in order to monitor wind speed and direction. This has proven to be a low technology and low cost solution to the dust, fume and gas concerns.

XVI Blasting Effects on Water Wells (J. Hawkins Presentation Groundwater Symposium)

Problems: The minor water fluctuations attributed to blasting may cause a short term turbidity problem, but do not pose any long term problems. This fluctuation would not cause well collapse, as fluctuations from recharge and pumping occurs frequently.

Most of the long term impacts on water quality are due to the mining (the breakup of the rocks). The mechanisms of these changes (via pyrite oxidation) are well known.

They increase the dissolved solids component especially sulfate, iron, manganese, aluminum, and sometimes sodium. Occasionally, other minor metals show up.

XVII Groundwater Impacts (R.Evans Presentation Groundwater Symposium)

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

Problems: Sulfates, conductivity, total dissolved solids, and metals frequently increase in the groundwater as the result of mining.

Recharge to stress relief systems frequently changes spoil water storage and discharge.

Recharge of "spoil water" to streams frequently increases the sulfates, conductance, and total dissolved solids. Metal content may increase but will usually return to premining levels after reclamation.

Recommendations: Further research is needed to study the relationship of geochemistry to post-mining water quality.

Addition research is needed to study the flow path of ground water through mine spoil.

Problems Identified with Program Coordination

XVIII State Programs with Federal Oversight

Problem: Requests for interpretations and guidance from the federal oversight authority by the states are routinely given little to no response.

1. AOC
2. Buffer Zone
3. Adverse or Minimal Impact standards or guidance.
4. Cumulative Impacts
5. Mitigation

Problem: Lack of clearly defined terms in different Federal programs required for permits/actions at the same facility and their relationship to each other.

1. Waste vs. Fill
2. Minimal impact vs. Adversely impacting.
3. Many different stream definitions.

Problem: Lack of coordination between Federal programs for the same facility.

1. Complete SMCRA permit required before USACE 404 permit reviewed.
2. Endangered Species comments received after SMCRA permit completed
3. USEPA objections under 402 after SMCRA permit issued or 404 issued.

Problem: Lack of regulatory equality in the Federal programs from state to state.

1. Some states were required to get their 404 permits while others were allowed to slide.

This document was prepared on Wednesday, August 15, 2001 as a working draft for internal interagency discussions among members representing agencies of the EIS steering team. The problems/recommendations contained in this document have not been confirmed or endorsed by the EIS Steering team or their respective agencies.

2. Some states have had been held to a higher degree or standard in the same USEPA regions while others are not. Regulations not approved for changes in standards when other states don't even have that standard in the same EPA Region.
3. USACE not implementing same standards of requirements in VA, KY and WV for 404 permits.

-10-

OCT-15-01 MON 02:25 PM USFWS PA FIELD OFFICE FAX NO. 8142340748 P. 02

11:15 FAX 703 358 1889 FED. PROGRAM ACTIVITIES 002

United States Department of the Interior

OFFICE OF THE DEPUTY SECRETARY
Washington, D.C. 20240

OCT -5 2001

James L. Connaughton, Chairman
Council on Environmental Quality
722 Jackson Place, N.W.
Washington, DC 20503

Marcus Peacock, Associate Director
Natural Resources, Energy & Science
Office of Management and Budget
725 17th Street, NW
Washington, D.C. 20503

Tracy Mehan, Assistant Administrator of Water
Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Michael Parker, Assistant Secretary
Department of the Army
Corps of Engineers
441 G Street, NW
Washington, D.C. 20314

Subject: Mountaintop Mining/Valley Fills Issues

Dear Colleagues:

As you know, key goals for this Administration are environmental protection, maintaining the nation's energy supply, and government efficiency. Addressing the controversy surrounding mountaintop coal mining in Appalachia provides an opportunity to further these goals.

Our agencies have been grappling with the mountaintop mining issues for some time. There have been, and continue to be, legal challenges to implementation of various provisions of the Clean Water Act (CWA) and the Surface Mining Control and Reclamation Act (SMCRA) that relate to mountaintop mining and valley fills. Our Office of Surface Mining and Fish and Wildlife Service have been working since 1998 with the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (COE); to carry out a settlement agreement entered in December 1998 in the *Bragg v Robertson* litigation in the U.S. District Court for the Southern District of West Virginia. That settlement agreement established a coordinated decision making process for the review of new coal mining projects with "valley fills," and recognized the need for the preparation of an environmental impact statement (EIS).

We believe the mountaintop mining/valley fill EIS is the logical vehicle to address environmental protection and promote government efficiency, while meeting the nation's energy needs. In order to address these needs, the EIS must consider and recommend solutions to well-documented, significant impacts that will allow steep slope Appalachian coal mining to proceed in an environmentally sound manner. We do not believe that the EIS, as currently drafted, focuses sufficiently on these goals. We must ensure that the EIS lay the groundwork for coordinating our respective regulatory jurisdiction in the most efficient manner. At a minimum, this would require that the EIS focus on centralizing and streamlining coal mine permitting, and minimizing or mitigating environmental impacts.

cc: FWS

EXHIBIT 7

-01 MON 02:25 PM USFWS PA FIELD OFFICE FAX NO. 8142340748 P. 03

10/11/2001 11:15 FAX 703 358 1865 FED. PROGRAM ACTIVITIES 003

2

I understand we have a meeting scheduled for Tuesday, October 9, at 11:00 a.m. and hope that we will be able to begin discussions on possible strategies that will enable us to move forward to achieve these goals. Thank you in advance for your personal attention to this important matter.

Sincerely,

J. Steven Griles
Deputy Secretary

cc: ASLM, OSM, FWS

William Hoffman
10/11/01 04:01 PM

To: Dave_Densmore@fws.gov
cc: Cindy_Tibbott@fws.gov, Mike Robinson <MROBINSO@OSMRE.GOV>
Subject: Re: EIS Direction

Many of us will be in Annapolis tomorrow. We might be able to set up a call around 1pm.

Dave_Densmore@fws.gov

Dave_Densmore@fws.gov
10/11/01 12:43 PM

To: Mike Robinson <MROBINSO@OSMRE.GOV>
cc: Cindy_Tibbott@fws.gov
Subject: Re: EIS Direction

Mike:

Needless to say, this is not a shining example of our Department having "spoken with one voice," since I can find no evidence of anyone at FWS having reviewed or concurred with this approach. Regardless, based on my initial review, I find I cannot support this approach, if for no other reason than the record having amply demonstrated that it has been the absence of federal oversight, not its confounding influence, that has gotten us in the fix we are in now. Unfortunately, we will have no opportunity to discuss this further next week, since my entire office will be at a workshop at NCTC. If folks can get together this afternoon or tomorrow, that might work better.

DD.

"Mike Robinson" <MROBINSO@OSMRE.GOV>
10/11/01 09:06 AM

To: <hanmer.rebecca@epa.gov>, <Hoffman.William@epamail.epa.gov>, <Peck.Gregory@epamail.epa.gov>, <Benjamin_Tuggle@fws.gov>, <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <jstump@gfnet.com>, <Charles.K.Stark@HQ02.USACE.ARMY.MIL>, <gconrad@imcc.isa.us>, <Rodney.L.Woods@lrdor.usace.army.mil>, <Michael.D.Gheen@lrh01.usace.army.mil>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>, <Paul.Rothman@mail.state.ky.us>, <bcl@mme.state.va.us>, <lsv@mme.state.va.us>
cc: <Tom_Bovard@ios.doi.gov>, "Al Klein" <AKLEIN@OSMRE.GOV>, "Bill Kovacic" <BKOVACIC@OSMRE.GOV>, "Dave Hartos" <DHARTOS@OSMRE.GOV>, "Buck Miller"

EXHIBIT 8

"Roger

"Robert A.

<GMILLER@OSMRE.GOV>, "Glenda Owens"
<GOWENS@OSMRE.GOV>, "John Craynon"
<JCRAYNON@OSMRE.GOV>, "Larry Trainor"
<LTRAINOR@OSMRE.GOV>, "Mary Josie
Blanchard" <MBLANCHA@OSMRE.GOV>,

Calhoun" <RCALHOUN@OSMRE.GOV>,

Penn" <RPENN@OSMRE.GOV>
Subject: EIS Direction

OSM has received some executive direction from the Department of the Interior on a overall theme for the EIS to embrace. Attached is a sketch of our thoughts on how we can accomplish the stated original intent of the EIS--both improving environmental protection and government efficiency. It's also in line with the President's desired direction for the energy policy. the document was shared by Deputy Secretary Griles with many of the principals of our agencies this Monday at a meeting with the President's council on Environmental Quality. I'd like to have an EIS Steering Committee call to explain/discuss this concept and get your feedback sometime next week for an hour/hour and a half. Could you let me know of your availability for a call on, say Tuesday or Wednesday?

(See attached file: WhitePaper.final.doc)

WhitePaper.final.

William Hoffman
10/19/01 02:59 PM

To: Elaine Suriano/DC/USEPA/US@EPA
Subject: MTM/VF Briefing & OSM Vision

Here's the briefing we gave for the RA yesterday. It should come up if you click on it, and it should keep working with each click. I've also included the "vision" that OSM developed in response to the Griles letter.

October2001RABriefing1.e OSMVision.wp

EXHIBIT 9

Executive Summary

A Plan to Address Mountaintop Mining Issues in Appalachia

The Vision: ***Streamline the regulation of valley fills by creating a "one-stop" permitting authority to satisfy all pertinent statutory requirements.***

Background:

- The federal government provides regulatory grants to states to implement the **Clean Water Act** (CWA, Sections 401 and 402) and the **Surface Mining Control and Reclamation Act** (SMCRA) within their borders.
- The states permit surface coal mining and reclamation operations under this delegated SMCRA authority--with oversight by the federal **Office of Surface Mining (OSM)**. The states also permit associated effluent discharges to the "waters of the United States" from these mining operations under delegated CWA authority--with oversight by the **Environmental Protection Agency (EPA)**.
- The **Corps of Engineers (COE)** is responsible for regulation of "discharges" of "dredge and fill" material (overburden, or excess spoil) from surface coal mining operations under CWA, Section 404.
- A settlement agreement in the Southern District Federal Court of West Virginia (*Bragg v Robertson*) provided an interim framework for surface coal mining permit scrutiny by these agencies until a programmatic environmental impact statement (EIS) on steep slope, Appalachian mountaintop mining and valley fills is complete. The EIS purpose is to:

  "Consider developing agency policies, guidance, and coordinated decision-making processes to minimize, to the maximum extent practicable, adverse environmental effects to waters of the United States and to fish and wildlife resources from mountaintop mining operations and to other environmental resources that could be affected by the size and location of fill material in valley fill sites."

- The EIS analyzes alternatives for enhancing environmental protection, advancing government efficiency, and allowing for continued efficient production of energy resources for the nation.

Statutory Concepts:

- The CWA established general principles providing that impacts to the waters of the U.S. must be no more than minimal unless there is adequate mitigation (nor cause more than significant adverse effect unless there are no practical alternatives) to offset the impacts. A project that proposes to affect these waters must demonstrate that alternatives are considered; that the alternative chosen results in minimized impacts; and that no practical alternative to conducting the project exists. "Nationwide" or "general" permits authorized by the COE allow projects where net impacts are "less than minimal," in accordance with CWA Section 404. Where impacts exceed this threshold, a more comprehensive "individual" permit and **National Environmental Policy Act (NEPA)** analyses are required.
- SMCRA seeks similar minimization of impacts (to the maximum extent practicable), but its requirements cannot supersede the CWA.

Problem:

- The *Bragg* settlement agreement increased COE and EPA involvement in the review of coal mining permit applications, effectively creating independent state and federal regulatory processes. Similar, overlapping, or different SMCRA and CWA statutory provisions cause government inefficiency and economic instability within the volatile Appalachian economy. This situation has improved, but not maximized, environmental protection.

Vision/Solution:

We propose a comprehensive "one-stop" permitting authority within state government to satisfy CWA and SMCRA. Programmatic changes to certain SMCRA regulations can provide a framework to ensure the environmental protection envisioned by the CWA (as well as SMCRA), and promote government efficiency. These rule changes are subject to the Administrative Procedure Act, and should be adopted only after opportunity for full public review and comment (and concurrence by EPA). The NEPA compliance requirements for proposed SMCRA regulations would be satisfied by concurrent publication of the draft EIS with similar alternatives to the proposed regulations.

- OSM would establish permitting requirements and performance standards, through rulemaking, to assure compliance with CWA 404. Subsequently, the states would amend their programs to reflect these requirements. These proposed rules would include modification of the stream buffer zone rule, development of fill minimization criteria, and necessary adjustment to other OSM regulations to establish comparable requirements to the CWA 404(b)(1) guidelines.
  - Currently, neither SMCRA or state regulations contain provisions for the applicant to demonstrate the alternatives for excess spoil placement considered when planning a coal mine. Nor is it explicit in OSM or state rules that fill minimization considerations are a requisite part of an application.

2

- The SBZ rule is viewed as more stringent than CWA standards. Revision of the SBZ rule must be integrated with all other regulatory changes to reflect the CWA 404 requirements.

- SMCRA rulemaking would complement the ongoing COE rulemaking to define overburden material generated by surface coal mining as "fill" (for the purposes of CWA Section 404).

- We propose to delegate the CWA 404 program to the SMCRA regulatory authority. The CWA encourages delegation; which is possible for: 1) all types of dredge and fill activities in the waters of the United States; or, 2) certain limited but similar activities (e.g., coal mining). Two states obtained total delegation of the CWA 404 program, and 15 states can issue "state programmatic general permits." This proposal is practical because:

  - The SMCRA permit is already the platform for hydrological and biological impact assessments, as well as engineering alternative analyses envisioned by 404(b)(1) Guidelines.

  - State SMCRA- and CWA-delegated program staff includes large, multi-disciplinary groups of scientists and engineers familiar with mining proposals and their impacts. State programs have infrastructure in place for inspection and enforcement. COE districts have more limited staff and mining expertise to conduct permit review, inspection and enforcement.

  - The state regulatory authority agencies must routinely coordinate CWA 401 and 402 and SMCRA permit issuance. Integrating CWA 404 evaluations with this current practice is a fundamentally efficient and reasonable process control goal for the Federal and state governments to embrace.

  - Combining the existing state CWA 401 water quality certification authority for mitigation with state 404 delegation provides all the necessary components for the states to review applications and issue permits that create less than minimal impacts as envisioned by the CWA.

Benefits of the Vision:

- CWA 404 delegation to the states introduces a number of efficiencies. "One-stop" permitting for coal mining and reclamation operations will result in:

  - earlier and better public participation
  - integrated regulatory programs under two federal environmental statutes
  - streamlined processes with improved environmental protection
  - reduced processing times and costs of permit applications

3

  - reduced program administration costs
  - a single entity with coal mining regulatory expertise
  - a framework for efficient, environmentally responsible production of energy resources
  - clear environmental performance targets for industry and regulators based on combined analyses of SMCRA and CWA performance standards
  - complete permit information provided to one reviewing agency
  - better basis for decisions and findings by state regulators
  - allows states, which know more about environmental resources within their borders, local conditions, etc. to set priorities for mitigation
  - comprehensive Endangered Species Act evaluation and consultation process

Refocusing of the EIS:

- The proposed vision accomplishes the stated intent of the EIS. The EIS, as currently drafted, however, does not sufficiently consider options for centralizing and streamlining coal mine permitting. The scope of the EIS should be narrowed to focus on minimizing and mitigating impacts to the waters of the U.S rather than the broad scope currently contained in the draft.

4

William Hoffman
01/08/02 08:59 AM

To: Rich Kampf/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, John Goodin/DC/USEPA/US@EPA, Brenda Mallory/DC/USEPA/US@EPA, John Lishman/DC/USEPA/US@EPA, Rebecca Hanmer/R3/USEPA/US@EPA, Ray George/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA
Subject: Alternative Framework

This came right out of the blue last night. There has been absolutely no agency coordination (to my knowledge), and it flys in the face of all of our previous agreements not to designate a preferred alternative. It is also not a NEPA or CEQ requirement.

If anyone knows any background on this, I would appreciate being brought up to speed.

----- Forwarded by William Hoffman/R3/USEPA/US on 01/08/02 08:46 AM -----

Michael Robinson <robinson@sgi.net>
01/07/02 08:12 PM

To: William Hoffman/R3/USEPA/US@EPA, jstump@gfnet.com, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, James.M.Townsend@lrl02.usace.army.mil, Paul.Rothman@mail.state.ky.us, lsv@mme.state.va.us, cstark8396@aol.com
cc:
Subject: Alternative Framework

Attached is a new Alternative Framework Table for discussion on tomorrow's or ensuing day's conference calls. You will note that I made Alternative B the "proposed action," and re-lettered former Alternative C to B and former D to C.

This is a result of discussions with our NEPA folks and in line with what NEPA and the CEQ rules require--which we can explain tomorrow or whenever. I also moved other actions to Tier III because they didn't fit the overall theme of our alternatives. To be able to explain the alternatives to executives in our agencies/Departments, I also added a statement on Alternative A for each action and a problem statement to justify each action. These additions are not to be considered complete as written, but just a somewhat illustrative or a mock-up of a proposed format that I believe we should complete for presentation "up our ladders." These changes are based on feedback from OSM management on the earlier framework dated 12/20.

I'll talk to you folks tomorrow at 1 pm, on the same dial-up number that we've been using. If you've misplaced the number, give me a call 412.937.2882 and I'll give it to you. MKR

Alternative Framework.1.7.02.2wpd.

EXHIBIT 10

William Hoffman
01/22/02 11:02 AM

To: Elaine Suriano/DC/USEPA/US@EPA
cc: Cliff Rader/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, James Havard/DC/USEPA/US@EPA, Joseph Montgomery/DC/USEPA/US@EPA, Steven Neugeboren/DC/USEPA/US@EPA
Subject: Re: Mt Top conf call on 1/23/02 at 1 PM

Just to clarify- OSM does agree that the terrestrial impacts are an issue that will be "addressed" in the EIS- they are, however, claiming that the terrestrial issues are insignificant, and that the terrestrial issues should take a back seat in the EIS analysis. We have developed "tiered" actions in the EIS. The first tier includes actions we will implement, but that are slightly different depending on the alternative that gets selected. For example, enhanced monitoring will be required under every alternative in the EIS, but the monitoring will be more comprehensive under the alternative that allows fills into perennial streams than for the alternative that restricts fills to the ephemeral zone. The second tier includes actions that will be implemented the same under every alternative- such as enhanced permit coordination procedures. The third tier includes actions that would be nice to do, but no commitment is being made to do them. Further- because tier 3 is a "wish list" so to speak, the EIS would not evaluate the environmental consequences of their implementation with the same degree of analysis- since they never may be implemented. The current problem is that OSM is trying to put all the actions related to terrestrial concerns into Tier 3- which reduces the scope of analysis significantly.

More importantly- and the focus of our concern- is that OSM is also claiming that even if they conceded terrestrial issues to be significant, SMCRA does not give them the authority to do anything about it. They have even gone so far as to say that SMCRA prohibits them from taking actions in the uplands to require reforestation, because that is a deal that gets worked out between the landowner and the mining operator under the PMLU agreement (that they must approve before a variance is granted????). If the PMLU is for pasture- they argue that they cannot require the landowner to do something else (but again- they have to approve the PMLU as a variance from returning the land to its previous condition). In a nutshell, we are arguing that if the premining area is forest, then the operator must get a variance to return it to anything else but forest- and that SMCRA does not prohibit them from taking actions to ensure the land is returned to forest.

Elaine Suriano

Elaine Suriano
01/22/02 10:27 AM

To: William Hoffman/R3/USEPA/US@EPA, Joseph Montgomery/DC/USEPA/US@EPA, Steven Neugeboren/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
cc: Cliff Rader/DC/USEPA/US@EPA, James Havard/DC/USEPA/US@EPA
Subject: Mt Top conf call on 1/23/02 at 1 PM

Per my earlier email summarized below it looks like most folks are available at 1 PM on Wed, 1/23. If you have not sent me the # we need to call you at please do so.

Greg - if you are unable to participate please ask someone else from your staff to sit in and have them send me their phone #. Thks.

The EIS workgroup knows they have to address impacts to terrestrial resources, but OSM maintains they do not have to address it in the alternatives since they do not have the authority to take action. CEQ will give them more info on that count. While I wouldn't think of telling DOI what authorities it has officially, but we are entitled to a reasoned discussion about authority and prohibitions of taking actions to address

EXHIBIT 11

William Hoffman
01/31/02 10:19 AM

To: Elaine Suriano/DC/USEPA/US@EPA
Subject: Re: Draft notes of our 1/29/02 post CEQ discussion

Thanks- looks OK to me. We have an internal meeting with the RA to discuss the issues on Feb 4th. I will keep you informed as appropriate.

Bill

Elaine Suriano

Elaine Suriano
01/30/02 06:50 PM

To: Joseph Montgomery/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Michael Castle/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
cc:
Subject: Draft notes of our 1/29/02 post CEQ discussion

I have attached a summary of our 1/29/02 post CEQ mtg. Please review and edit if necessary.

My notes were just bullets and I did not get everything down. So, feel free to modify per your notes.

epajan29.wpd

Elaine Suriano
Office of Federal Activities
Environmental Scientist
Ph-202/564-7162, Fx-564-0072

EXHIBIT 12

<u>ımmary of 1/29/02 mtg - debriefing from CEQ update on Mt Top EIS</u>

<u>Participants:</u>
Joe Montgomery, Elaine Suriano. Mike Castle, Kathy Hodgkiss, Bill Hoffman, Greg Peck

EPA staff convened a meeting to discuss next steps given the issues discussed at the CEQ mtg and other factors (EPA's Fill Rule, Rivenburgh Case, Nationwide 21) that could impact the Mt Top EIS.

Bill asked if we could get a bit more clarification on whether CEQ would be comfortable with no preferred alternative given the rationale presented at the 1/29/02, 10 pm CEQ mtg. Elaine/Joe agreed to follow-up on that.

Greg summarized the status of EPA's Fill Rule and suggested that we proceed thoughtfully in terms of what we ask OSM to do or not do concerning modification of their rule. Bill felt is was pretty clear where they were heading and that those changes and selecting alternative B was a likely outcome. Greg suggested that Reg 3 & 4 have a discussion in the next week or so on the Fill Rule and how this might impact the EIS. Bill will keep OFA apprized of mtg outcomes.

Should EPA have concerns with choosing alt. B as the preferred we need to have a process to raise this through our mgt. The question of whether HQ's or the Reg is the lead. HQ's OFA was under the impression that this was a Reg 3 lead. Reg 3 thought that since McCabe came to HQ and brought the project the decision making would occur at Hqs. Participants will discuss with their respective mgrs.

Mike raised the issues that OSM almost has to go with alt B. and that without mining we might not get the old sites reclaimed. Also, OSM will have to rely on encouraging adequate mitigation (reforestation) because of private property issues. We should seek a middle ground in terms of soil mix that will sustain trees vs. very stringent SOPs that were proposed in WVA.

We discussed the possibility of a field trip in Feb. (Mike C., Kathy, Elaine and 2 folks from OSM). Mike said even if we go now we should see sights in summer as well to see the full effect of reclamation. Elaine will follow up and get back to folks.

The outcome from the Rivenburgh case could impact the EIS. We will continue to keep tabs on it. We should brief Reg 4 on issues raised here today and make sure they are adequately represented at future workgroup meetings. Does anyone know the status of the 404(c) action related to this case?

While Nationwide 21 was discussed it does not appear that the EIS will be shedding much light on those issues. Do the comments that EPA issued on Nationwide 21 have any relevance to the MT Top EIS?

Some of our next steps depend on where the workgroup goes from here. It may be useful for this group to have another discussion in a few weeks.

William Hoffman
02/07/02 08:47 AM

To: Rebecca Hanmer/R3/USEPA/US@EPA
Subject: Re: Declined: MTM/Valley Fill EIS

Rebecca:

The length of time Don and Tom have allotted for this meeting indicates its importance. They want to be briefed on all the finer details involved with the EIS, ie- the tech study results and the alternatives/action items we've developed, so they can understand the policy choices now before them and the Agency. Don is having a meeting the following day with OSM leadership- where we can expect OSM to promote their vision, their desire to pick Alternative B as the preferred alternative in the draft EIS, and perhaps their desire to eliminate terrestrial action items from being actively considered in the EIS as real policy response options. Shortly after these two meetings, we will take the show to HQs- where decisions will probably be made on the direction we want to take as an Agency.

If your call doesn't happen or ends early- I would really like you to be there if possible to back me up. Thanks!

Bill

Rebecca Hanmer

Rebecca Hanmer
02/06/02 05:44 PM

To: Kathy Hodgkiss/R3/USEPA/US@EPA
cc: William Hoffman/R3/USEPA/US@EPA
Subject: Re: Declined: MTM/Valley Fill EIS

Kathy, I appreciate very much being invited to this meeting and regret having to decline. I am one of the co-chairs of the Ches. Bay WQ Subcomm. and we have a subcommittee conference call scheduled Monday from 2:00 until 4:00. If the call ends early, I will come to the EIS meeting if it's still going on. Please let me know if there is a change in schedule. Thanks, Rebecca

You have declined this request

You have declined this request

Begins:	02/11/2002 02:30 PM Local Time
Ends:	02/11/2002 04:30 PM Local Time
Conflicting dates:	
Title:	MTM/Valley Fill EIS
Location:	RA's conference room
Chair:	Kathy Hodgkiss/R3/USEPA/US
To (required):	Bob Mitkus/R3/USEPA/US@EPA, Donald Welsh/R3/USEPA/US@EPA, Michael Castle/R3/USEPA/US@EPA, Michael Kulik/R3/USEPA/US@EPA, Ray George/R3/USEPA/US@EPA, Rebecca Hanmer/R3/USEPA/US@EPA, Rich Kampf/R3/USEPA/US@EPA, Tom Slenkamp/R3/USEPA/US@EPA, Tom Voltaggio/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
cc (optional):	

Comments

EXHIBIT 13

William Hoffman 02/13/02 10:17 AM

To: Gregory Peck/DC/USEPA/US@EPA
Subject: Re: EIS

We've spent or committed about 4.5 million. We will spend another 500K to finish up- depending on how the public comment period goes.

Gregory Peck

Gregory Peck 02/12/02 03:36 PM

To: William Hoffman/R3/USEPA/US@EPA
cc:
Subject: EIS

Bill:

DOJ is writing their brief in this Rivenburg case and would like to know how much the government (all agencies)has currently spent on the EIS and how much we expect to spend to complete the final EIS. Round numbers are fine.

If you could let me know asap I would appreciate it.

Hope all is well in Philly,
Greg

EXHIBIT 14

William Hoffman 02/13/02 08:57 AM

To: Kathy Hodgkiss/R3/USEPA/US@EPA
Subject: Next Steps

Kathy:

How do you want to handle setting up the HQ meeting. I doubt that the EIS decision tree has ever been on anyon'e radar screen down there, and it has probably always been presumed to be the Region's call. We have been trying to set something up for months without success- which might be an indicator of their interest level. Greg Peck has been the main point of contact on the issue in OWOW primarily with respect to the court case and the fill rule, but he has had very little involvement in the EIS. Jim Serfis- who is no longer with the agency- was representing OFA until Elaine Suriano got involved a month or so ago. I am also 95% confident that none of the current AA's have been involved- other than the 1 or 2 meetings that Tracy Meehan may have attended on the fill rule. That being the case, we may really confuse them if we go down there seeking input on who is the decisionmaker. Its true that McCabe took the issue with him to HQs, but it was his issue more than HQs issue. Its also true that it affects two EPA Region's, but Region 4 has not been very involved in the EIS decisionmaking process to this point either. It might be best for us to approach HQ's (with R4 in attendance???)- as if we are merely seeking their input before Don decides which way to proceed. I would also suggest including both OFA and Water in the meeting, since both have an interest in the outcome.

In any case, here's some issues I think we should take with us when we go to headquarters:

1. VISION: My biggest concern is that OSM seems to be understating the "environmental criteria" aspects of the Section 404(b)1 guidelines that must be satisfied before a decision to issue a permit can be made. OSM seems to be focusing soley on procedural aspects, which, if satisfied, will always lead to permit issuance; ie- if the applicant minimizes the amount of fill, develops mitigation measures, and evaluates alternatives, a permit will always be issued, even if the impacts continue to be significant. If OSM focuses soley on incorporating the procedural aspects of the Section 404(b)1 guidelines without including the "environmental criteria", the Section 404/SMCRA merger will be incomplete. The reason this is troubling to me is a statement made during our discussions in DC a few weeks ago by an OSM attorney which suggested that if an operator meets the performance standards in the SMCRA regulations they get a permit, and that permits will not be denied based upon environmental effects as long as the operator is meeting those performance standards. We must make sure that the SMCRA rule changes incorporate performance standards that look at both process and environmental effects (material damage in OSM lingo) if the one stop permitting process is to work. (I'm sure that the public comment process will make sure that happens whether or not we persuade OSM to tighten up their language now).

2. PREFERRED ALTERNATIVE: I see us heading towards the selection of Alternative B as the preferred alternative in the EIS. If we decide to do this, we need to characterize why we would support such an alternative as a PR strategy. We must make it clear that the regulatory review process will be significantly improved under Alternative B, and that as a result, impacts will be minimized. We might also want to suggest that picking Alternatives C or D would end up creating alot of small fills that could have more impacts to the headwater system than the one or two larger ones that might be permtted under an Alternative B construct.

3. MULTIPLE REGION ISSUE: Under Section 309 of the CAA, EPA is supposed to comment on the EIS. As R3 has been the lead in preparing the EIS, perhaps R4 should be the lead in preparing the Agency's comments on it.

EXHIBIT 15

Mike Robinson
<MROBINSO@OSMRE.GOV>

02/15/02 02:24 PM

To: Jeffrey Alper/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Gary Bryant/R3/USEPA/US@EPA, Michael Castle/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, "Benjamin Tuggle"@fws.gov, jstump@gfnet.com, Charles.K.Stark@HQ02.USACE.ARMY.MIL, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, gconrad@imcc.isa.us, James.M.Townsend@lrl02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Paul.Rothman@mail.state.ky.us, bol@mme.state.va.us, lav@mme.state.va.us, Andrew DeVito <ADEVITO@OSMRE.GOV>, Al Klein <AKLEIN@OSMRE.GOV>, Bill Kovacic <BKOVACIC@OSMRE.GOV>, Dave Hartos <DHARTOS@OSMRE.GOV>, Dan Ross <DROSS@OSMRE.GOV>, Buck Miller <GMILLER@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, John Craynon <JCRAYNON@OSMRE.GOV>, Larry Trainor <LTRAINOR@OSMRE.GOV>, Mary Josie Blanchard <MBLANCHA@OSMRE.GOV>, Mike Robinson <MROBINSO@OSMRE.GOV>, Roger Calhoun <RCALHOUN@OSMRE.GOV>, "Robert A. Penn" <RPENN@OSMRE.GOV>, Vann Weaver <VWEAVER@OSMRE.GOV>

Subject: Citizen Complaint Study for EIS

Attached is the subject document for use in the draft EIS.

EISMTMBL.WPD

Blasting Related Citizen Complaints within the Mountaintop Mining/Valley Fill Environmental Impact Statement (EIS) Study Area

Introduction

Individual citizens and citizens groups have expressed concern for many years that the various state regulatory authorities do not serve the interests of the citizens on blasting damage complaints. As a result of these concerns, in FY 1999, the OSM Executive Council directed the formation of an OSM blasting team to conduct a national study, collecting and analyzing citizens complaints related to surface coal mine blasting.

Background

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) was designed to protect all structures outside the permit area from damage relating to ground vibrations, air blast and flyrock, as well as protecting all citizens from injury as a result of blasting. People often feel the house shake and hear rattling caused by ground and air vibration levels well below those levels that cause damage to structures. In the experience of OSM and other regulatory authorities damage is rarely found where blasting vibrations are kept within the regulatory limits. Very often the citizen does not complain that a *specific* blast resulted in *specific* damage. The complaints are often that the citizen is "feeling" the blasting and that the blasting is doing some non-specific damage to public or private property.

The investigation of a blasting complaint requires a person with specialized technical training in blasting, seismology, acoustics and construction engineering. Because of the complexities in each complaint and the uniqueness in the process each regulatory authority exercises in dealing with these complaints, it is difficult to compare one regulatory authority with another or with relating one region of the country with another. Where comparisons could be made without destroying the quality of the data, those comparisons were made and conclusions were drawn.

For the purpose of this EIS, only the data relating to Central and Southern West Virginia, Eastern Kentucky, Southwestern Virginia, and Tennessee was used. The reason for this is that these are the only coal producing areas where Mountaintop Mining is conducted. Mountaintop mining may include mountaintop removal (MTR) mining, where many coal seams are completely extracted from the upper reaches of a mountain. MTR is usually associated with cast type blasting. Cast blasting uses large amounts of explosive agents, not only to fracture the rock overlying the coal, but also to move the fractured rock so that handling by mechanical excavators is minimized. Cast blasting is not a new concept in mining (Legislative History-Committee on Interior and Insular Affairs; House of Representatives; 92 Congress; September 21, 1971).

1

EXHIBIT 16

The following blasting complaint data was gathered for the period 7/98 to 6/99:

Area	Total Blasting Related Complaints
Southwestern VA	87
Central and Southern WV	339
Eastern KY	205
TN	6

Data Summary:

1. Nationally, the greatest number of complaints were lodged in central and southern West Virginia and eastern Kentucky (53.2 percent and 32 percent , respectively). Southwestern Virginia and Tennessee follow with 13.6 percent and one percent, respectively.

2. Annoyance/ noise which relate to concerns for excessive vibration (house shaking) accounted for about 70 percent of the complaints in the four state area.

3. Alleged damage to structures (residential dwellings) accounted for about 25 percent of the complaints.

4. Alleged complaints of damage to domestic water well systems accounted for about 2 percent of the complaints.

5. Complaints of excessive dust and fumes accounted for about 1 percent of the complaints.

6. Complaints of flyrock accounted for 2 percent of the blast related citizen complaints. Flyrock has the greatest potential for causing damage to property and injury or death to persons who reside in the mining areas.

Dust, fumes and gases

The data do not indicate that excessive dust and fumes are a significant problem with a complaint percentage rate of only 1 percent. The fumes are by-products of the explosive reaction and are usually released at a temperature somewhat higher than the ambient air temperature of the mining environment. Fumes from the explosive reaction will rise and expand adiabatically as a result of this differential temperature gradient. This adiabatic process will usually force these gases to higher altitudes and away from the residential areas.

The dust and fumes are also acted on by the winds aloft and dissipate over short distances. It is always a good blasting practice to conduct blasting at the most advantageous meteorological periods. On occasion, temperature inversions will cause the fumes and dust to stay close to the ground and possibly drift off site. Large mining operations often use wind socks located in various locations around the mine in order to monitor wind speed and direction. Using this information, the mines will blast only during periods of high wind directed away from populated areas. This has proven to be a low-technology and low-cost solution to the dust and fumes concerns of the nearby residents.

Flyrock

Complaints of flyrock, material traveling through the air or along the ground outside the permit area makes up only 2 percent of the blasting complaints. Although flyrock accounted for just over 2 percent of the complaints, flyrock has the greatest potential for causing death and injury to persons as well as damage to private property.

The primary cause of flyrock is inadequate blast design, failure to pay attention to detail when loading blast holes or changing geology. Proper supervisory controls, training of blasters (both certified blasters and the blasting crew) and the establishment of set procedures are the best methods to eliminate flyrock. To protect the public, the blaster is responsible for clearing the blast area (any place flyrock might be expected) prior to the detonation.

Water Well Quantity and Quality

Two percent of the complaints in the study area were related to domestic water wells. Scientific studies have determined that there is an extremely low probability of causing damage to a domestic water well by blasting activities associated with mining, quarrying or road construction. When a water well is damaged by mining activity, quarrying or road construction, it is almost always caused by an interruption of the aquifer--either by draining the aquifer, or cutting off the recharge to the aquifer as a result of the mining excavation. Problems with the quality of well water are almost always the result of an increase in dissolved solids at the well from groundwater percolating through the rubble zone of the backfill area.

Even though ground vibrations induced by blasting has not been shown to cause changes to the quality or quantity of well water, OSM is currently undertaking an additional study of blasting effects on water wells.

Annoyance

Complaints of annoyance accounts for a over 70 percent of the complaints in the study area. Annoyance includes, startle, noise, fear of damage, blasting too hard, objects moving on shelves, windows rattle, frightens the children, etc. Unfortunately the law does not allow OSM to prevent annoyance. Peoples homes may be shaken by the blasting, which is annoying to most people, but mines are not allowed shake the house and cause property damage. Both ground vibrations and air vibrations cause homes to shake.

Ground vibrations enter a house through the ground and airblast through the roof or building side. As a result the house will respond or shake. A typical house will respond 1 to 3 times the ground vibration level. The higher shaking is caused when the vibration frequency of the ground matches the natural frequency of the house, causing it to resonate. The natural frequency of typical homes is between 4-12 Hertz. In other words when the frequency of the incoming vibrations match the natural frequency of the house, the house will ring. The greater the difference in frequencies between the vibration of the ground and the house, the less the house responds. This significantly impacts people's perception of the blast depending on how the house is built and how it is constructed. It also explains why the same vibration will cause a complaint at one house but not the neighbors (i.e. the neighbor house has a different natural frequency)

Complaints of annoyance can stem from the lack of communication between the coal operators and the citizens in the community. A well-implemented public relations program sometimes significantly reduce complaints. OSM experience is that the coalfield citizens typically desire more information from the regulatory authority and the mine operator. The regulations require, at a minimum, information notice to citizens such as blasting warning signs and warning signals, pre-blasting surveys, pre-permit public involvement and a comment period for the citizen to express their concerns.

Some operators and regulatory authorities have held public meetings in order to involve the public and inform them on what they can expect to experiencing living near the mining operation. This would include a dialog on blasting and the possible effects on the community. Exchanges of information prior to mining and blasting may reduce the number of annoyance complaints.

Vibration Damage

Allegations of blast damage to property were lodged in 25 % of the complaints. Property damage could be broken windows, cracked walls, broken bricks, wall separations, doors sticking, chimney cracks, foundation cracks, driveway cracks, roof leaks, etc. When damage is alleged, the regulatory authority is required to evaluate the damage potential.

Scientific investigations by various investigative groups, including the U. S. Bureau of Mines has related the occurrence of damage at typical structures to the intensity and frequency (in cycles per second) of blast induced vibrations. This data has accumulated over a period of more than 60 years. An analysis of data collected by the Bureau of Mines shows that no damage[1] (threshold, minor or major) is expected at ground vibration levels at or below 0.5 in/sec (ips). Within a 95 percent confidence interval, major damage can not be expected below about 2.34 ips; and minor damage can not be expected below about 1.80 ips. Airblast below 134 dB has never been documented.

OSM and other state regulatory authorities, throughout almost 25 years of SMCRA control, have not found conclusive evidence of damage to typical structures at ground vibration and airblast levels below the performance standards of the regulations. However, OSM is currently conducting research on the effect of blasting vibrations and airblast on mobile, log, and other types of non-traditional residences.

Conclusions

Based upon the results of the survey, annoyance is the chief source of citizen complaints about blasting. The survey conducted could not capture whether each complaint was a legitimate complaint of damage, or a complaint of concern that damage has occurred or may occur. Many citizens complaints take several years before final resolution. Some complaints result in regulatory litigation against the mine or tort litigation by the citizen in state courts before final resolution.

Complaints that are lodged with the regulatory authorities may be resolved in a more timely manner by lodging the complaint instead with the insurance company that represents the coal mine operator. Section 507 (f) of SMCRA requires that each permit applicant obtain public liability insurance. This policy must provide for personal injury and property damage protection as a result of surface coal mining, and includes damage or injury that are the result of the use of explosives. Insurance companies are required by state law and regulation to investigate each allegation of damage or injury. Should a claim of damage or injury be denied, the insurance company must have a rational bases for rejecting any claim. Any decision by an insurance company is subject to civil litigation in the appropriate state court.

The regulatory authorities can not require the coal mine operator to make compensation for damages or require the operator to repair any damage that is alleged to have been caused by blasting. The regulatory authorities can (and some have) advised the citizen to contact the insurance company directly or they have required the operator to refer a claim to their insurance company.

The performance standards in the blasting regulations were established to provide protection against damage to typical homes that are located in the coal producing regions. Both SMCRA and the regulations make it clear that all private property must be protected from damage. This includes the typical structures as well as any unique structures that may be more sensitive to damage because of age (e.g. historical structures, old stone walls) or those structures that are poorly constructed or constructed of poor quality building materials.

[1] There are three classifications of damage-*Threshold* -Loosening of paint, small plaster cracking at joints, lengthening of old cracks. *Minor*-Loosening and falling of plaster, fall of loose mortar, hairline to 3-mm cracks. *Major*-Cracks of several mm in walls, structural weakening, fall of masonry. (U.S. Bureau of Mines RI 8507)

The regulations allow the regulatory authorities to reduce the peak particle velocity and airblast standards when blasting activity may impact these type strictures. This is to say, that a one inch per second peak particle velocity that would be safe for a properly constructed typical home may not be the appropriate vibration level for a historic structure where the walls and ceiling are cade of plaster. OSM has not seen many cases where the regulatory authorities have established a lower vibration or airblast standard on a site-specific basis to tailor the performance standards in order to protect unique structures. The regulatory authorities do not want to appear arbitrary or capricious in setting a lower standard and may not have the expertise to evaluate the structure in order to set that lower standard.

The survey also indicates that the states with the largest number of mines located in populated areas also have the greatest number of complaints.

The regulations allow the regulatory authority to require any and all blasts be monitored using a blasting seismograph which monitors both ground vibrations and airblast. Often the monitoring of blasts is only required as a reaction to citizen complaints. The survey indicates that there is little proactive monitoring by either the regulatory authority or the operator. In areas where there will be continued blasting activity over a long period of time and where there is a population concentration there should also be frequent monitoring of blasts in order to establish a record of the intensity of ground vibrations and airblast that is generated by the mine and extends into the area around surrounding the mine.

6

William Hoffman
02/27/02 01:42 PM

To: Tom Welborn/R4/USEPA/US@EPA
Subject: Re: R3 to brief Ben Grumbles on Mountaintop Mining EIS Status and Issues on 3/5

Tom:

We asked for this meeting so the RA could let HQs know that we are close to a decision point on the EIS, and to make sure that everyone is comfortable before any positions are taken. OSM has been pushing hard to avoid requiring reforestation and PMLU controls, and to create a one-stop permitting process for mining with the State SMCRA agency as the regulatory agency for CWA 402 and 404 permitting. They are beginning to understand that assumption isn't likely and that there is no such thing as partial assumption- so they are now focusing on SPGPs for mining.

They are going to propose rule changes at the same time the EIS goes out that would incorporate 404(b)1 analyses into SMCRA regs and which would modify the stream buffer rule to permit fills under this "enhanced" State review process. As such, they are pushing for the selection of Alternative B in the EIS as the preferred alternative (fills would not be restricted to any particular watershed size or segment- but decisions would be made case-by-case under an improved regulatory scheme). Until the administration changed, we had agreed not to select any alternative as preferred, and to wait to see how the public reacted to the different options. That's all changed now under the current OSM regime.

As a minimum, we want HQs support for incorporating the reforestation and PMLU controls we've developed, and support to pull the NWP 21 minimal impact line back to the ephemeral or intermittent zone (*the COE may be willing to pull back to the ephemeral line*). If we can successfully use these as bargaining chips with OSM in return for our supporting the selection of Alternative B- we will be satisfied. Pulling NWP 21 back to the ephemeral line would also ease our problems with an SPGP.

Attached is an electronic version of the presentation we will be giving. One of the figures in the presentation shows that over 50% of the historic valley fills have been in watersheds less than 75 acres in size (>3500 fills). This figure might help convince the COE and OSM that there would still be plenty of fills for the state to work on if the NWP/SPGP were keyed to the ephemeral/intermittent zone.

Call to discuss as you feel the need.

Bill

OW-OFA.exe

William J. Hoffman (3ES30)
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995
Tom Welborn

EXHIBIT 17

Mountaintop Mining EIS Presentation

Mountaintop Mining EIS

Current Issues- Why We are Here

Mountaintop Mining EIS

Current Issues

- OSM envisions a one stop SMCRA/CWA permitting process for mining projects, and proposes to modify its stream buffer rules to incorporate avoidance, fill minimization, and mitigation/compensation tests similar to those found in the CWA Section 404(b)1 Guidelines. This would facilitate "Section 404 type" reviews by State SMCRA agencies, and set the stage for SPGP development or program assumption efforts.
- DOI/OSM is developing a "pilot" one stop permitting process in Virginia in consultation with the Virginia Department of Mines, Minerals, and Energy. An interagency MOA is being drafted, but neither the COE nor EPA have been consulted. .
- The direct and indirect aquatic impacts from MTM/VF operations are arguably more than minimal, complicating SPGP development and the NWP 21 issue.

Mountaintop Mining EIS

Current Issues

- To accommodate the proposed revisions to the stream buffer rule, OSM is recommending that Alternative B (project-by-project reviews, no set restrictions) be designated as the preferred alternative in the draft EIS.
- Cumulative terrestrial impacts from MTM/VF activities are considered to be significant, and have a high level of public interest. Actions to promote reforestation involve private property rights and are difficult to implement. As a result, OSM and COE are reluctant to impose regulatory requirements to minimize terrestrial impacts.
- Post Mining Land Use (PMLU) studies suggest that, in general, post-mining development is not occurring as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned have been developed, but OSM recommends deleting these actions from further consideration in the EIS.

Mountaintop Mining EIS

Current Issues

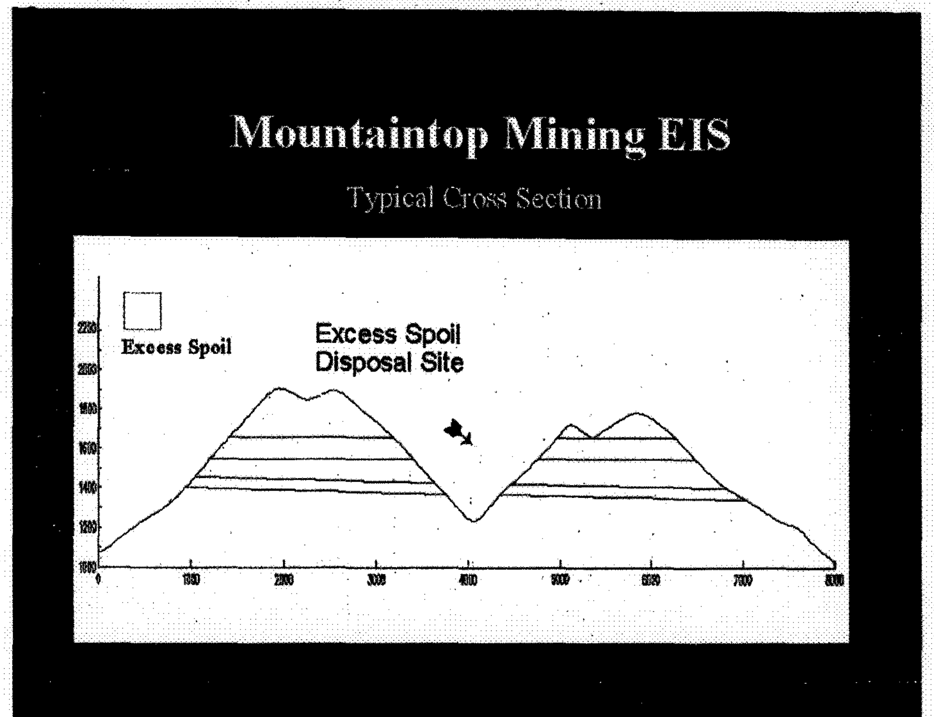
- The regulatory history of MTM/VF activities suggests that the development of a one stop permitting process, the lack of effective actions to minimize terrestrial impacts, the lack of effective actions to insure that PMLU occurs as envisioned, and the selection of Alternative B as the preferred alternative is likely to generate a significant negative response from the environmental community.

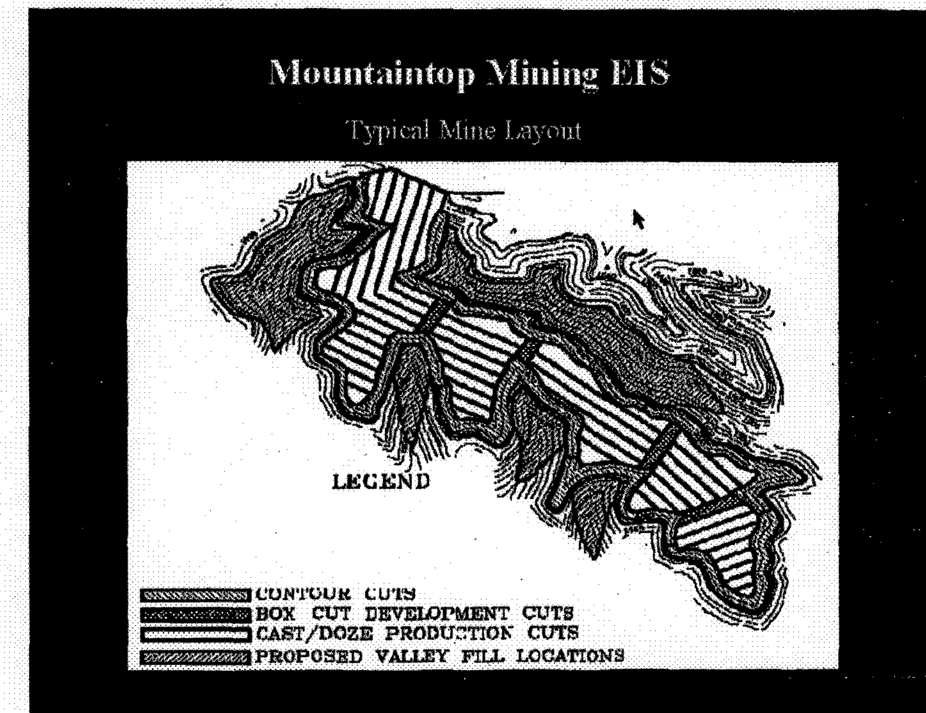
Mountaintop Mining EIS

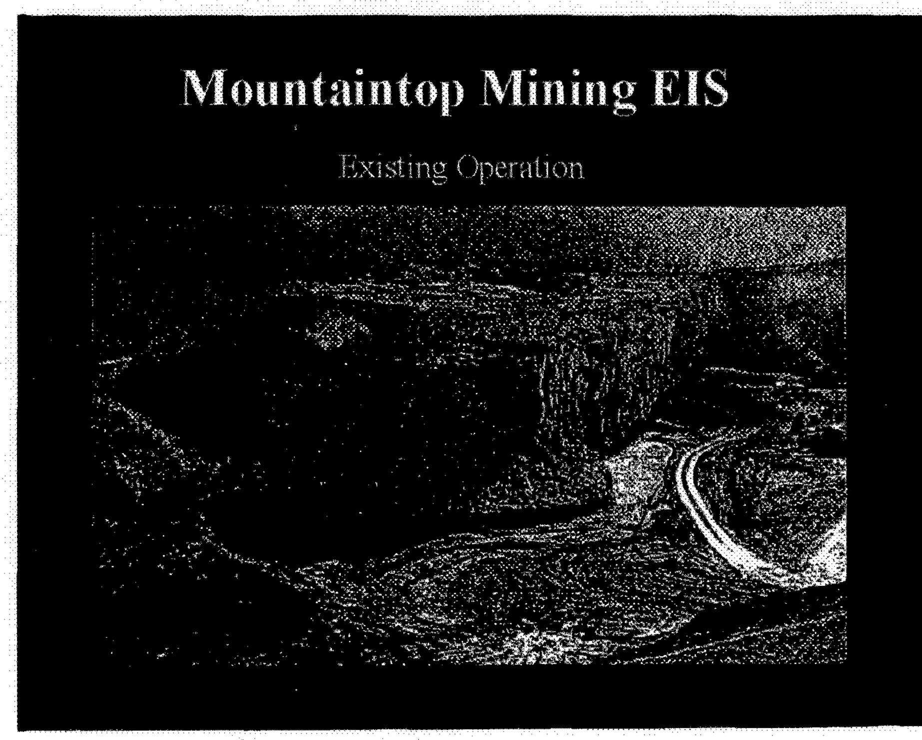
Mountaintop Mining

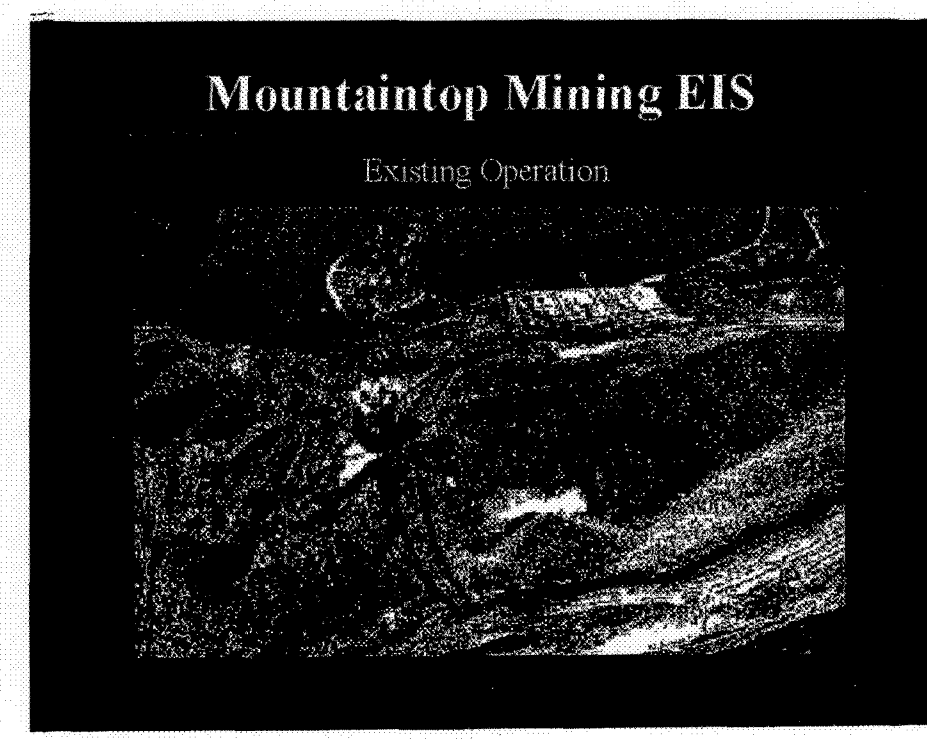
-What Is It

-Where Does It Occur


Mountaintop Mining EIS
Typical Cross Section
Excess Spoil
Excess Spoil
Disposal Site


Mountaintop Mining EIS
Typical Mine Layout
LEGEND
CONTOUR CUTS
BOX CUT DEVELOPMENT CUTS
CAST/DOZE PRODUCTION CUTS
PROPOSED VALLEY FILL LOCATIONS

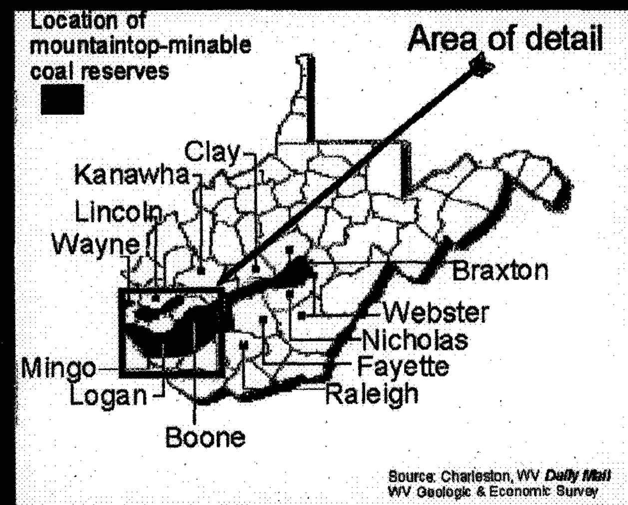

Mountaintop Mining EIS
Existing Operation

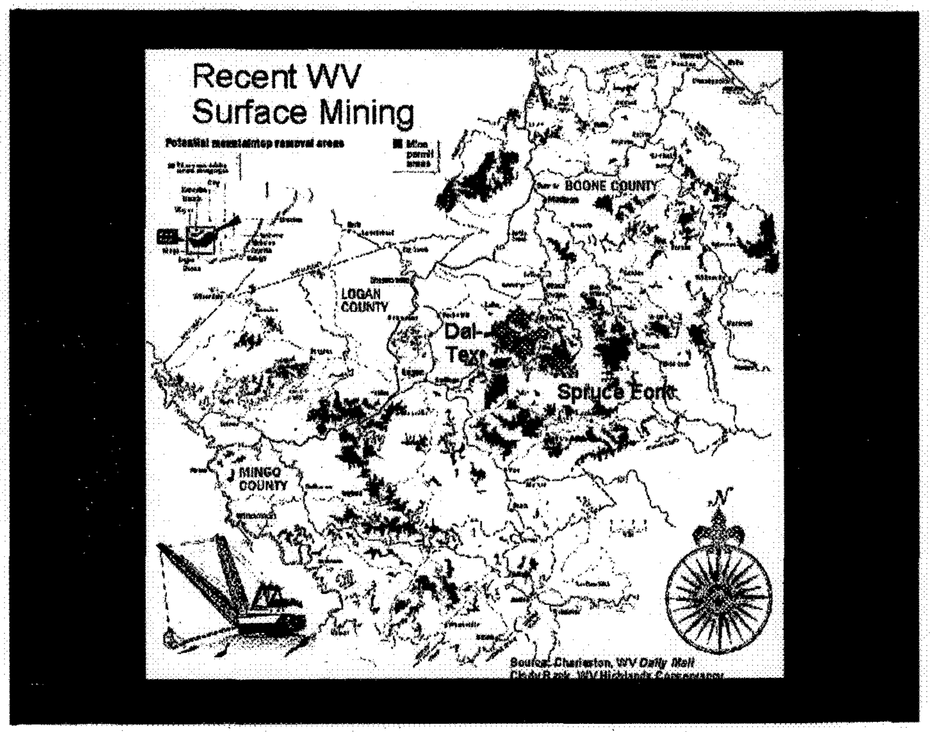

Mountaintop Mining EIS
Existing Operation

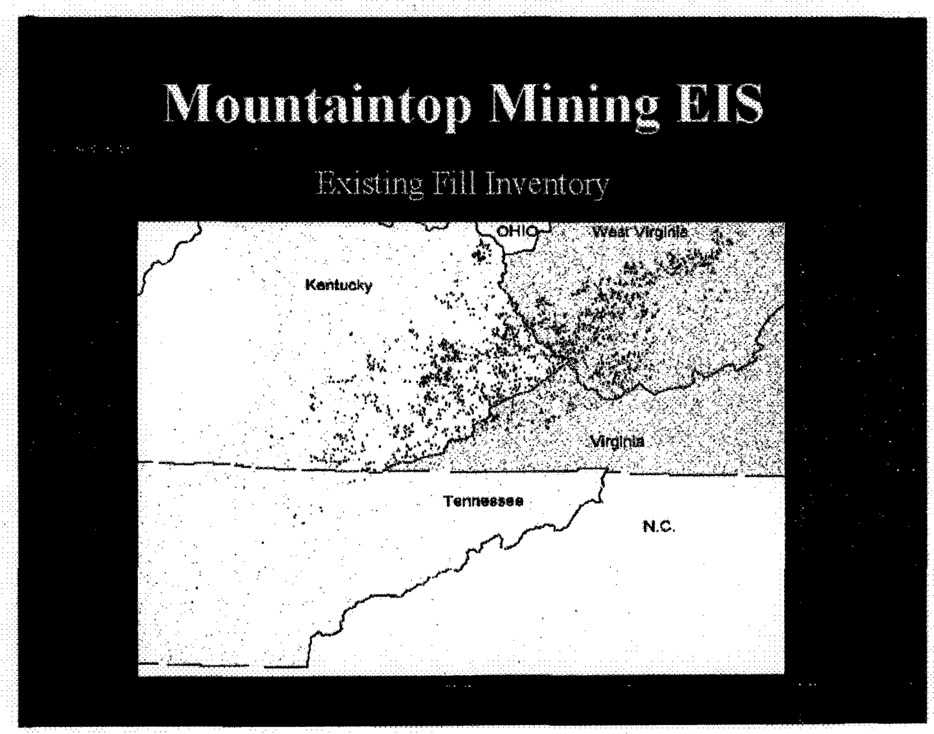
Mountaintop Mining EIS

Existing Operation

Potential WV Mountaintop Mining Areas




Recent WV
Surface Mining
BOONE COUNTY
LOGAN COUNTY
Dal-
Tex
Spruce Fork
MINGO COUNTY


Mountaintop Mining EIS
Existing Fill Inventory
OHIO
West Virginia
Kentucky
Virginia
Tennessee
N.C.

Mountaintop Mining EIS

Background

Mountaintop Mining EIS

Regulatory Background

- **Surface Mining Control and Reclamation Act (SMCRA)**- establishes permitting requirements for surface mining operations. Administered by the U.S. Office of Surface Mining (OSM) and/or delegated States such as West Virginia.
- **OSM Regulations at 30 CFR Section 816.71 and 817.57 (Stream Buffer Rule)**- requires that no land within 100 feet of a perennial or intermittent stream shall be disturbed unless authorized by the regulatory authority. The regulatory authority may authorize such activities only upon finding that the activity will not cause or contribute to the violation of applicable State or Federal water quality standards, and will not adversely affect the water quantity and quality or other environmental resources of the stream.

Mountaintop Mining EIS

Regulatory Background

- Clean Water Act Section 402- establishes permit requirements for pollutant discharges (generally effluent wastes) into waters of the United States. Administered by the U.S. Environmental Protection Agency (EPA) and delegated States such as West Virginia.
- CWA Section 404- establishes permit requirements for discharges of dredged or fill material (generally solid fills) into waters of the United States. Administered by the U.S. Army Corps of Engineers (COE) or authorized States. EPA developed the environmental criteria for permitting under Section 404(b)1, and can veto COE permitting decisions under Section 404(c). No States are authorized to administer the CWA 404 program in the mountaintop mining region.

Mountaintop Mining EIS

Regulatory Background

- CWA Section 404 authorization can be granted through:
  - Individual Permits (IPs) for specific projects. Each project undergoes a separate public environmental review process.
  - General Permits/Nationwide Permits (GPs/NWPs) for classes of activities which have previously been evaluated and determined to have minimal impact on the environment. NWP 21 was developed by the COE for certain mining activities.

Mountaintop Mining EIS

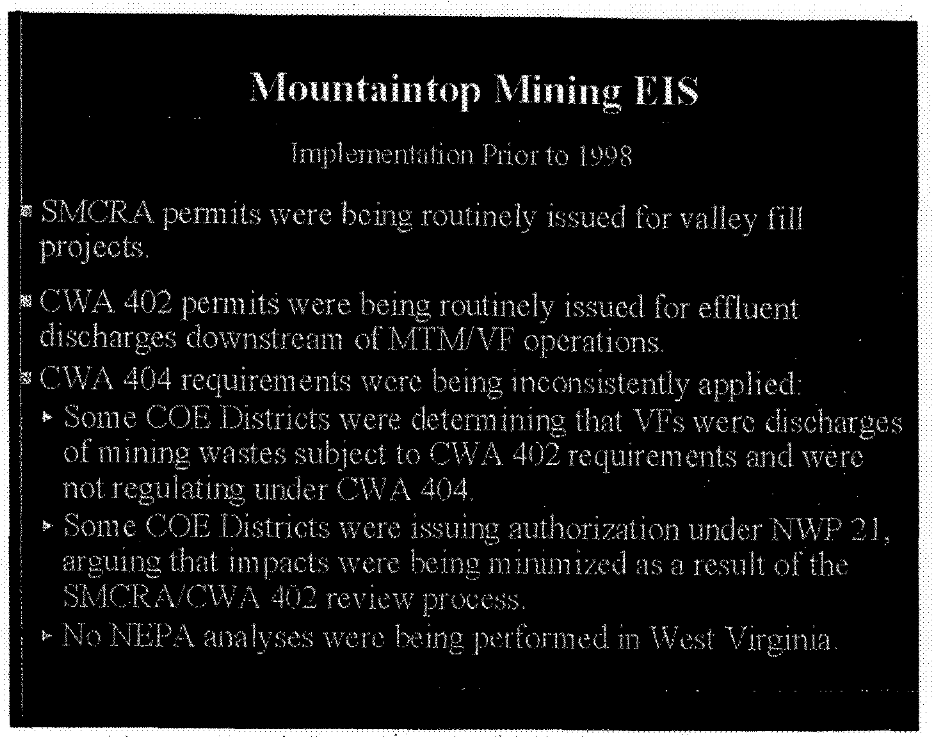
Regulatory Background

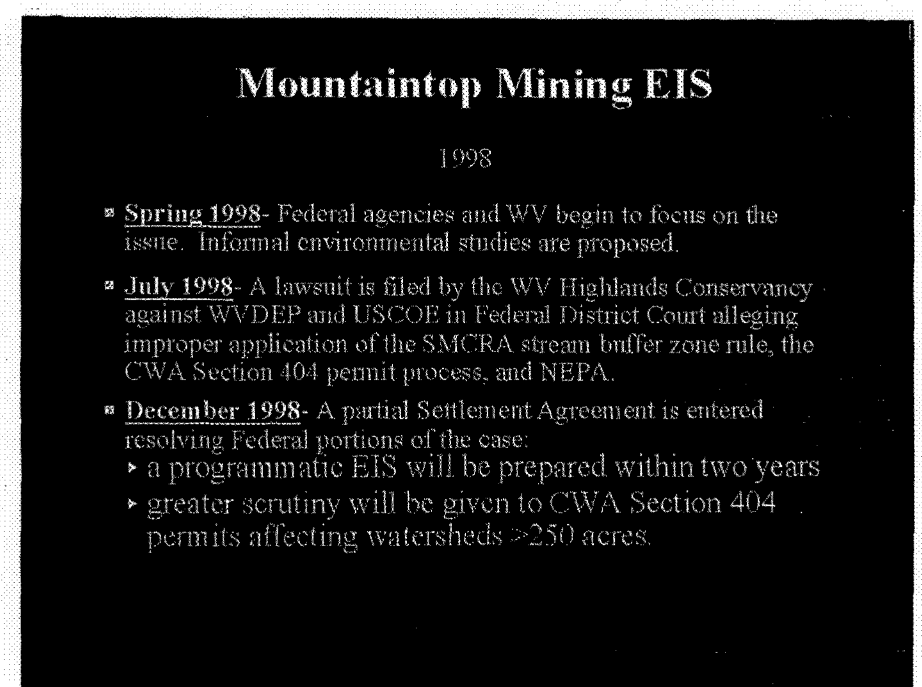
- **National Environmental Policy Act of 1969 (NEPA)**- requires a detailed environmental evaluation of all major federal actions significantly affecting the human environment.
  - Undertaken by COE prior to issuance of CWA 404 IPs for specific projects, and prior to issuance of GPs/NWPs for classes of activities. Projects subsequently authorized under GP/NWP are considered NEPA compliant.
  - Undertaken by OSM prior to the issuance of SMCRA permits.
  - Not required for projects authorized by SMCRA/CWA programs that have been delegated to the States.

Mountaintop Mining EIS

Regulatory Background

- **Endangered Species Act-** establishes formal consultation requirements when Federal actions affect a listed species. Administered by the U.S. Fish and Wildlife Service (FWS).


Mountaintop Mining EIS
Implementation Prior to 1998
SMCRA permits were being routinely issued for valley fill projects.
CWA 402 permits were being routinely issued for effluent discharges downstream of MTM/VF operations.
CWA 404 requirements were being inconsistently applied:
Some COE Districts were determining that VFs were discharges of mining wastes subject to CWA 402 requirements and were not regulating under CWA 404.
Some COE Districts were issuing authorization under NWP 21, arguing that impacts were being minimized as a result of the SMCRA/CWA 402 review process.
No NEPA analyses were being performed in West Virginia.


Mountaintop Mining EIS
1998
Spring 1998- Federal agencies and WV begin to focus on the issue. Informal environmental studies are proposed.
July 1998- A lawsuit is filed by the WV Highlands Conservancy against WVDEP and USCOE in Federal District Court alleging improper application of the SMCRA stream buffer zone rule, the CWA Section 404 permit process, and NEPA.
December 1998- A partial Settlement Agreement is entered resolving Federal portions of the case:
a programmatic EIS will be prepared within two years
greater scrutiny will be given to CWA Section 404 permits affecting watersheds >250 acres.

Mountaintop Mining EIS

1999 to Present

Mountaintop Mining EIS

1999

- February 1999- A Notice of Intent is placed in the Federal Register stating that a Programmatic Environmental Impact Statement (EIS) will be prepared by EPA, COE, OSM, FWS, and WVDEP. The purpose of the EIS is:
  - "To consider developing agency policies, guidance, and coordinated decision-making processes to minimize, to the maximum extent practicable, adverse environmental effects to waters of the United States and to fish and wildlife resources from mountaintop mining operations and to other environmental resources that could be affected by the size and location of fill material in valley fill sites."

Mountaintop Mining EIS

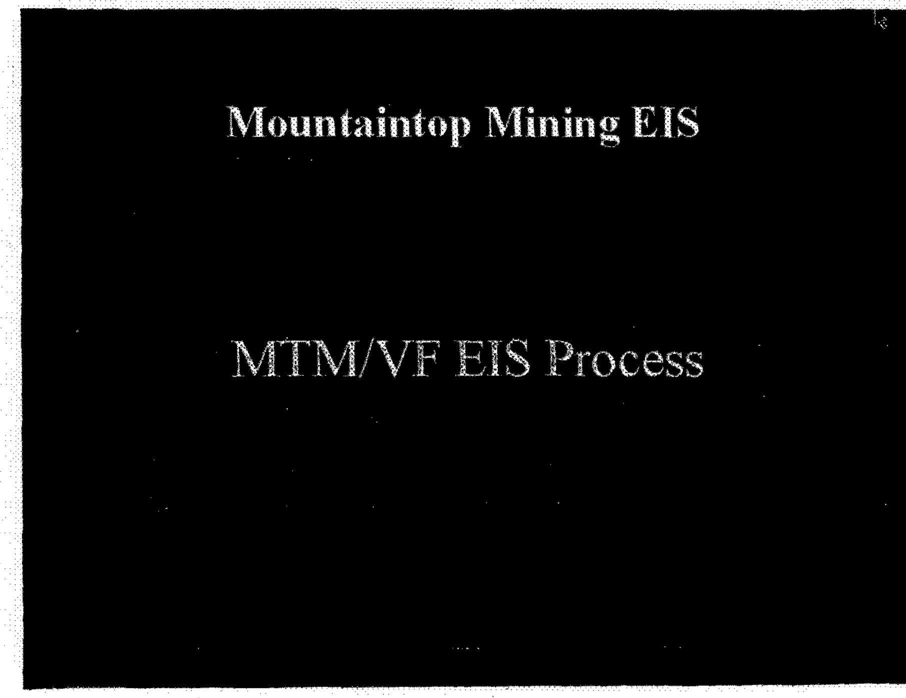
1999

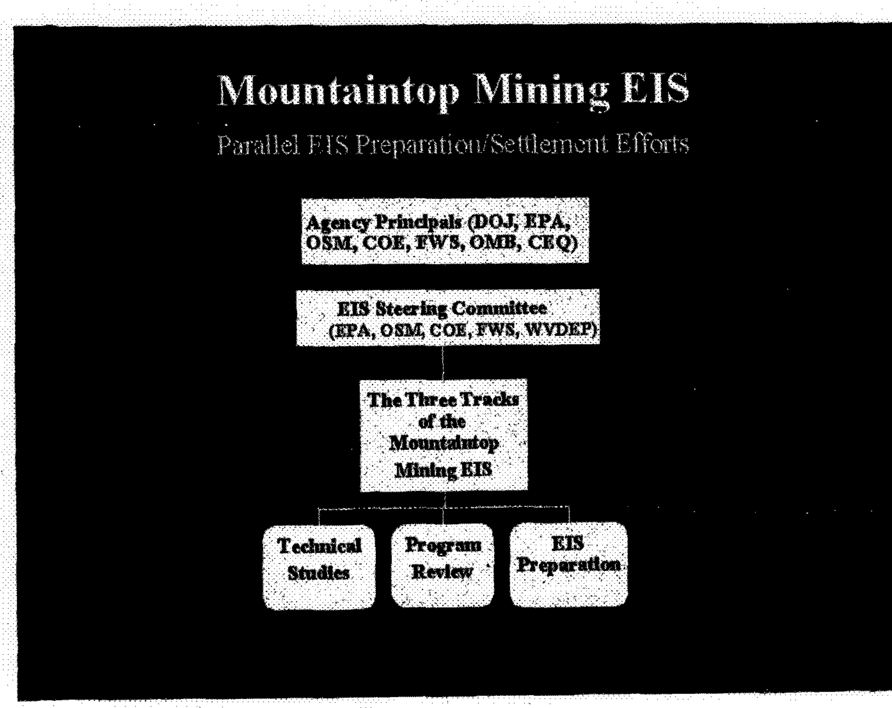
- October 20, 1999- Chief Judge Charles Haden II of the United States District Court for the Southern District of West Virginia rules:
  - the buffer zone rule under SMCRA restricts valley fills from being placed in intermittent or perennial streams; and
  - excess spoil is a "waste material" subject to Section 402 of the CWA, not a "fill material" subject to Section 404 of the CWA.
- October 29, 1999- The Court by Memorandum Opinion and Order stays its October 20, 1999 ruling pending appellate action.
- December, 1999- Parties appeal the Haden decision. Federal Brief agrees that the District Court has subject matter jurisdiction and supports Haden on the SMCRA stream buffer ruling, but disagrees with Haden on the CWA Section 402/404 ruling. State and industry appeal all aspects.

Mountaintop Mining EIS

2000 - 2001

- April 2001- the 4th Circuit Court of Appeals rules that the doctrine of sovereign immunity bars citizens from bringing their claims against a State official in Federal court; vacates the District Court's injunction; and remands with instruction to dismiss without prejudice so the citizens can present their claims in the proper forum (State Court). The decision to prepare the EIS is unaffected.
- October 2001- the WV Highlands Conservancy appeals the decision to the U.S. Supreme Court.
- January 2002- the Supreme Court decides not to review the case.
- February 2002- Kentuckians for the Commonwealth file motion asking Judge Haden to block the Corps from issuing any new valley permits, arguing that the Corps has no legal authority to issue permits for waste discharges into streams.


Mountaintop Mining EIS
MTM/VF EIS Process


Mountaintop Mining EIS
Parallel EIS Preparation/Settlement Efforts
Agency Principals (DOJ, EPA, OSM, COE, FWS, OMB, CEQ)
EIS Steering Committee (EPA, OSM, COE, FWS, WVDEP)
The Three Tracks of the Mountaintop Mining EIS
Technical Studies
Program Review
EIS Preparation

Mountaintop Mining EIS

MTM/VF EIS Process

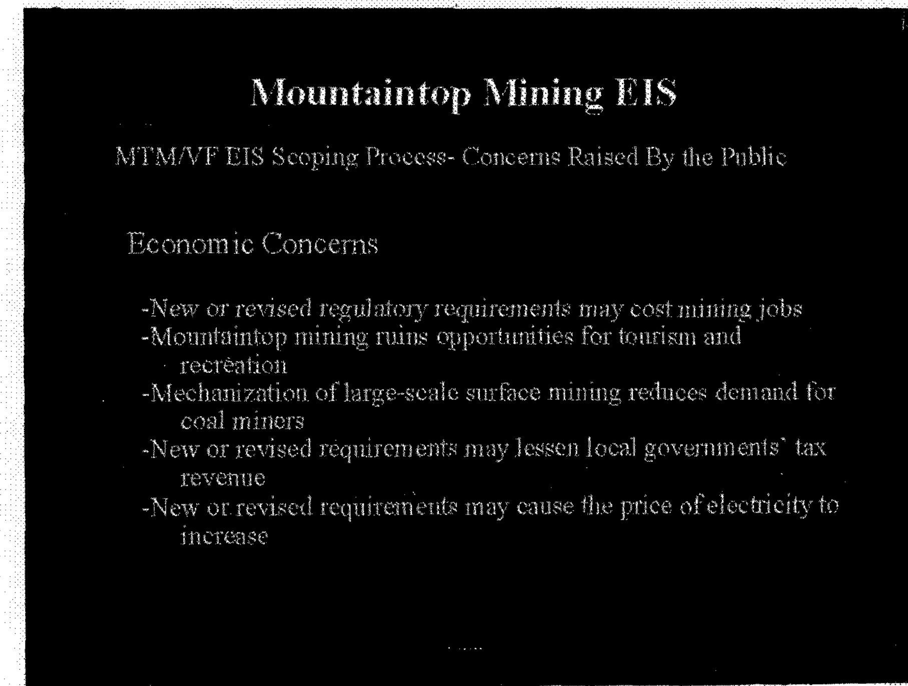
- Public concerns are identified through a public scoping process.
- Programmatic alternatives and actions are developed for evaluation in the EIS.
- Technical studies are developed and initiated by the agencies.
- A contractor is hired to gather and analyze background data for inclusion into the EIS; to incorporate results of interagency technical studies into the EIS; and to prepare the EIS document for printing and distribution per Agency instruction.

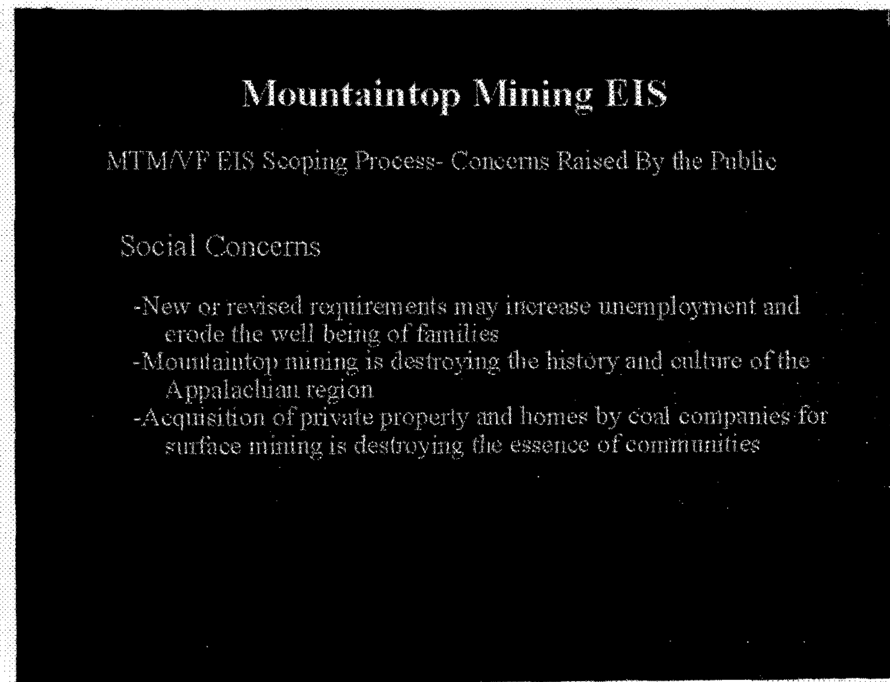
Mountaintop Mining EIS

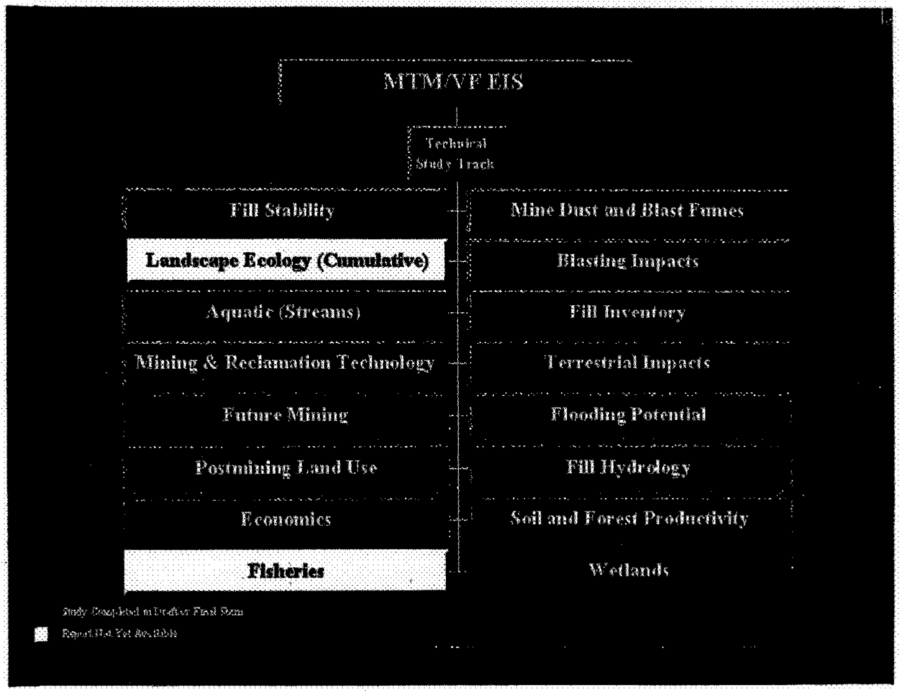
MTM/VF EIS Scoping Process- Concerns Raised By the Public

Environmental/Nuisance Impacts of Mining

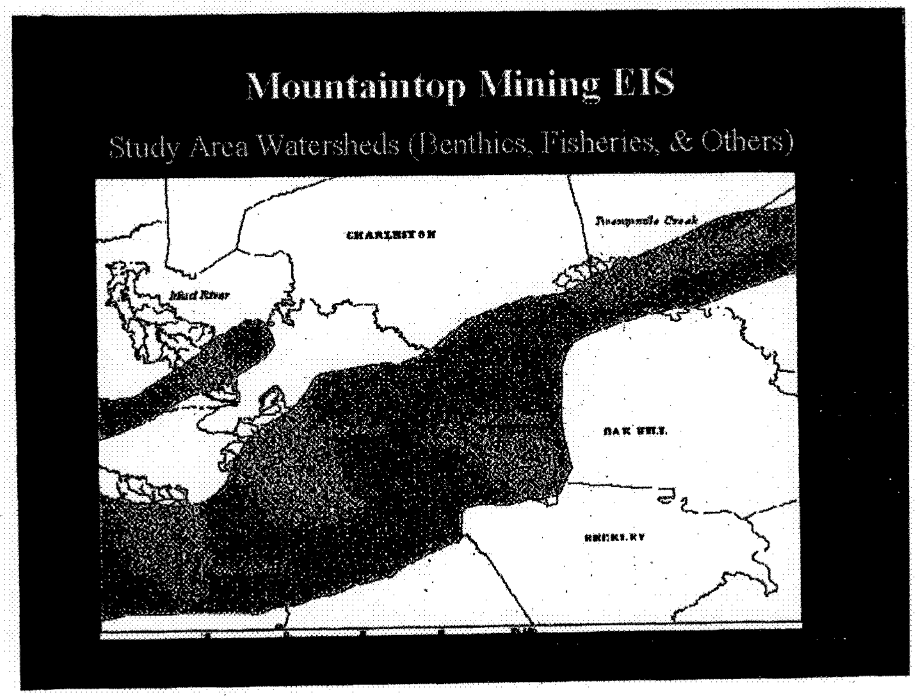
-Destruction of aquatic and terrestrial resources
-Impacts to unique and endangered species
-Introduction of exotic and invasive species
-Damages to wells and homes from blasting
-Increased flooding
-Increased dust and noise
-Air quality deterioration from coal burning
-Less biodiversity and sustainability of ecosystems
-Adverse cumulative effects


Mountaintop Mining EIS
MTM/VF EIS Scoping Process- Concerns Raised By the Public
Economic Concerns
-New or revised regulatory requirements may cost mining jobs
-Mountaintop mining ruins opportunities for tourism and recreation
-Mechanization of large-scale surface mining reduces demand for coal miners
-New or revised requirements may lessen local governments' tax revenue
-New or revised requirements may cause the price of electricity to increase


Mountaintop Mining EIS
MTM/VF EIS Scoping Process- Concerns Raised By the Public
Social Concerns
-New or revised requirements may increase unemployment and erode the well being of families
-Mountaintop mining is destroying the history and culture of the Appalachian region
-Acquisition of private property and homes by coal companies for surface mining is destroying the essence of communities



MTM/VF EIS
Technical
Study Track
Fill Stability
Landscape Ecology (Cumulative)
Aquatic (Streams)
Mining & Reclamation Technology
Future Mining
Postmining Land Use
Economics
Fisheries
Mine Dust and Blast Fumes
Blasting Impacts
Fill Inventory
Terrestrial Impacts
Flooding Potential
Fill Hydrology
Soil and Forest Productivity
Wetlands



Mountaintop Mining EIS
Study Area Watersheds (Benthics, Fisheries, & Others)
CHARLESTON
Mud River

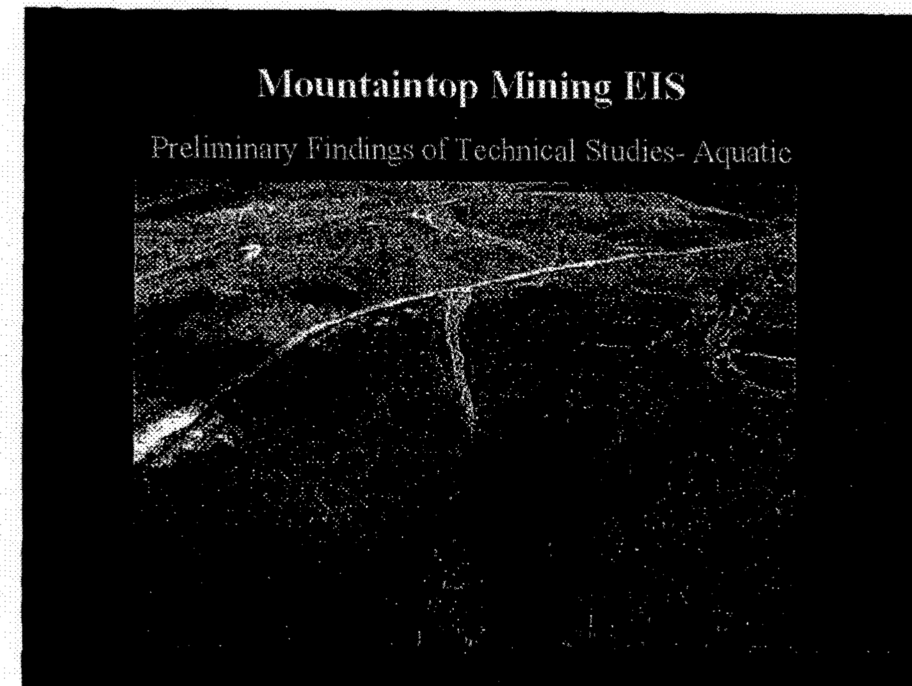
Mountaintop Mining EIS

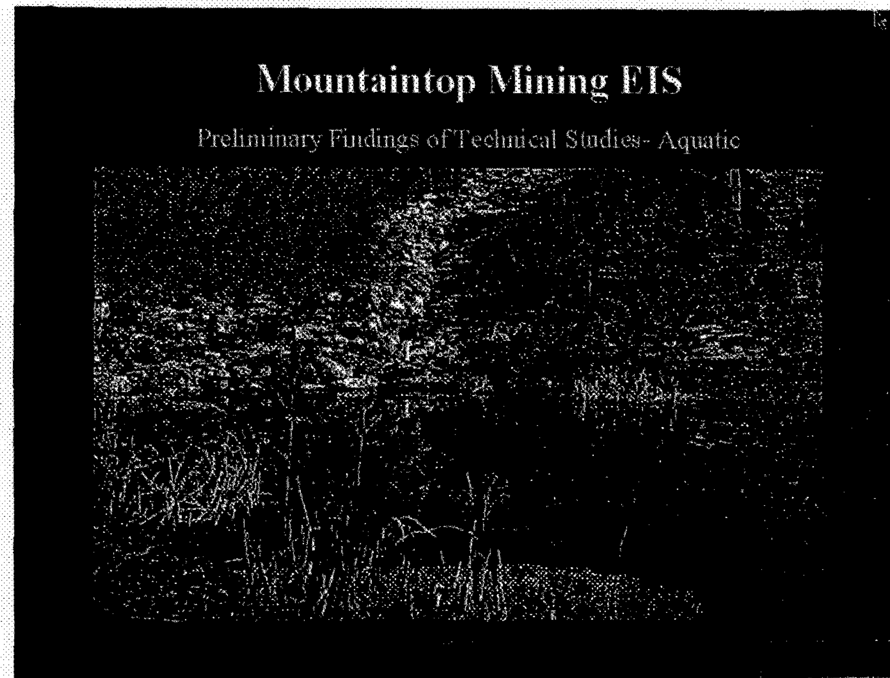
Preliminary Findings

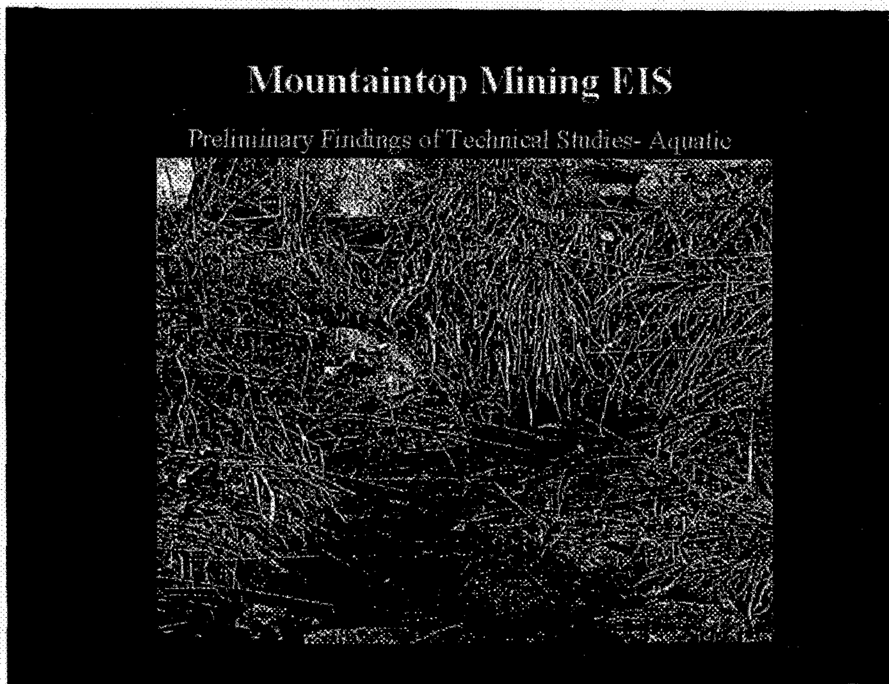
Mountaintop Mining EIS

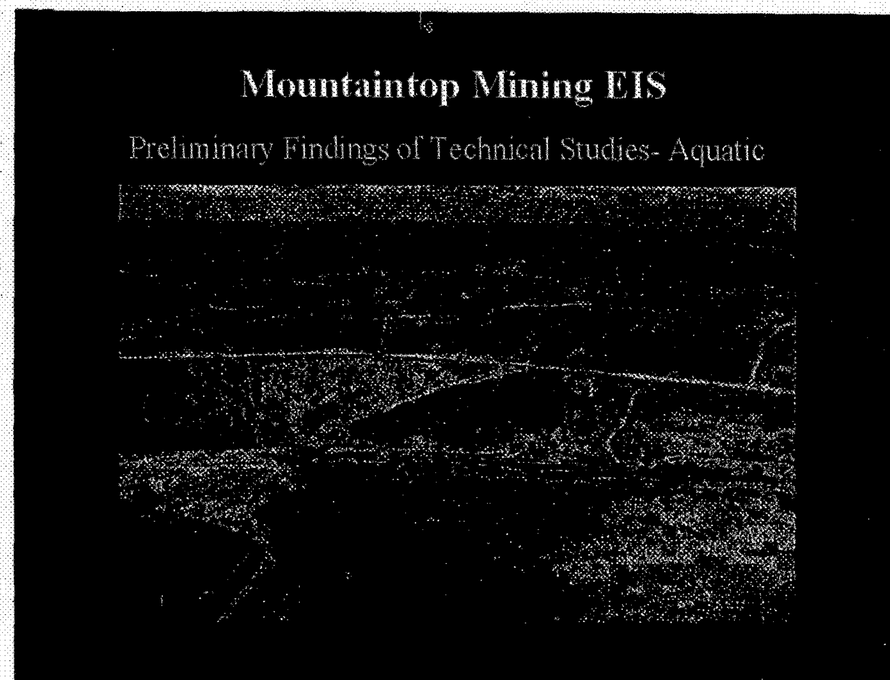
Preliminary Findings of Technical Studies- Aquatic

- One percent of all streams in the study area (560 out of 55,000 miles) have already been eliminated by valley fills.
- Macroinvertebrate indices indicate that stream segments located downstream of valley fills are being impaired (aquatic life use).
- Stream chemistry monitoring efforts show significant increases in conductivity, hardness, sulfate, and selenium concentrations downstream of MTM/VF operations.
- Because it is difficult to intercept groundwater flow, it is difficult to reconstruct free flowing streams at MTM sites.


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Aquatic


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Aquatic


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Aquatic


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Aquatic

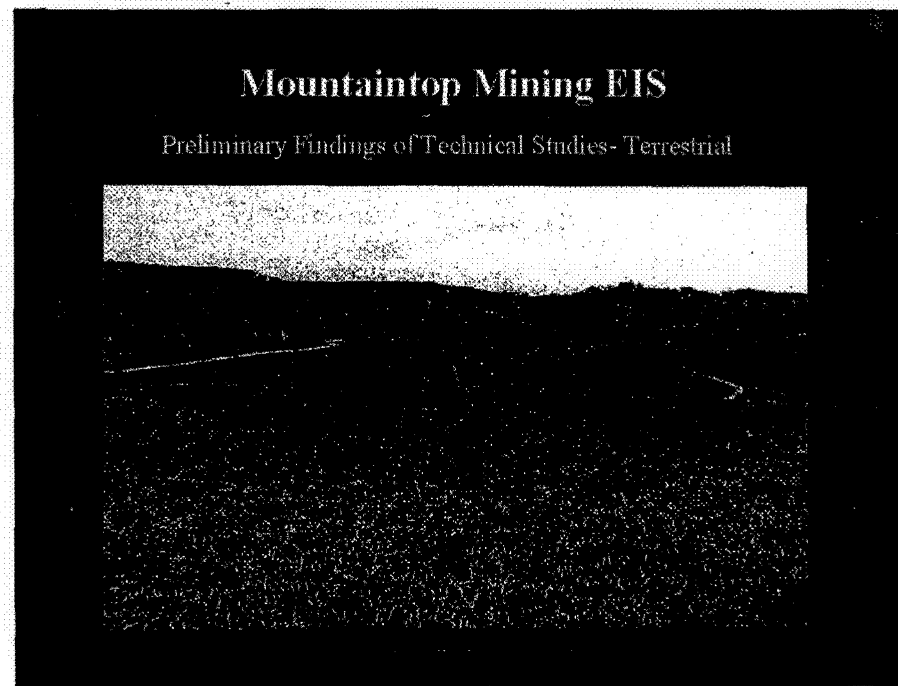
Mountaintop Mining EIS

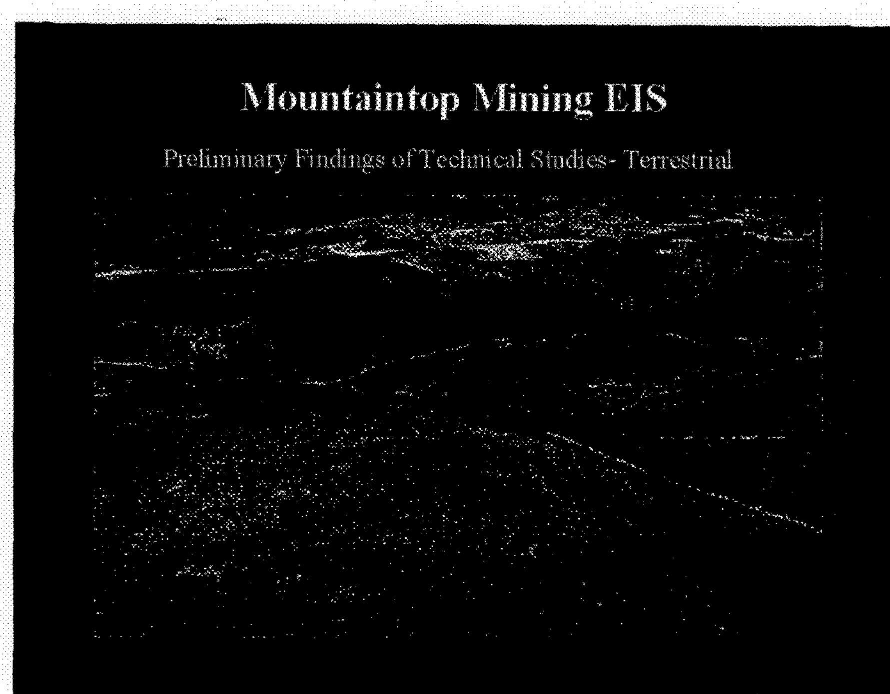
Preliminary Findings of Technical Studies- Terrestrial

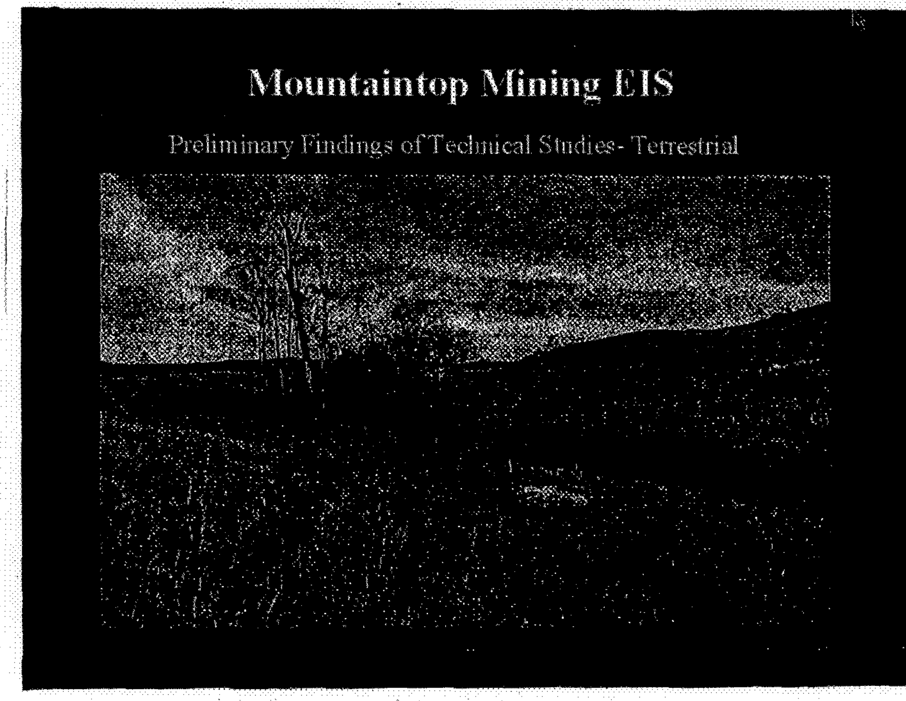
- The Appalachian Highlands is characterized by some of the best forest habitat in the world.
- Current reclamation practices are converting these forests to grassland, which may significantly impact neotropical migrant bird populations and other sensitive species if left unchanged.
- Mining companies can do more to minimize terrestrial impacts. Reclamation techniques have been developed over the past two years to promote reforestation, and the WV Legislature passed legislation in 2000 promoting the use of these reclamation techniques under the commercial forestry post mining land use category.

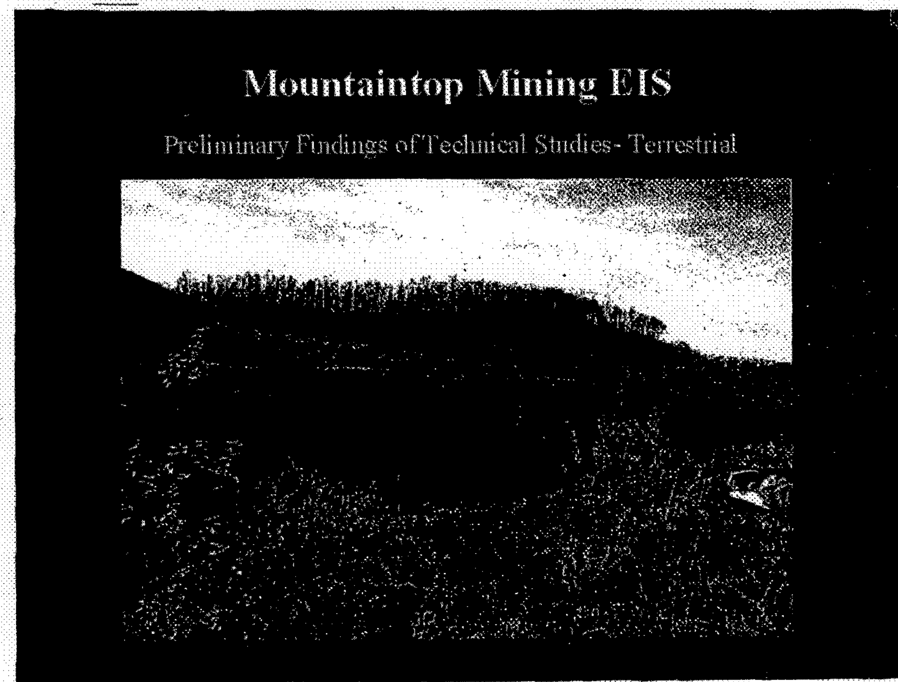
Mountaintop Mining EIS

Preliminary Findings of Technical Studies- Terrestrial


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Terrestrial

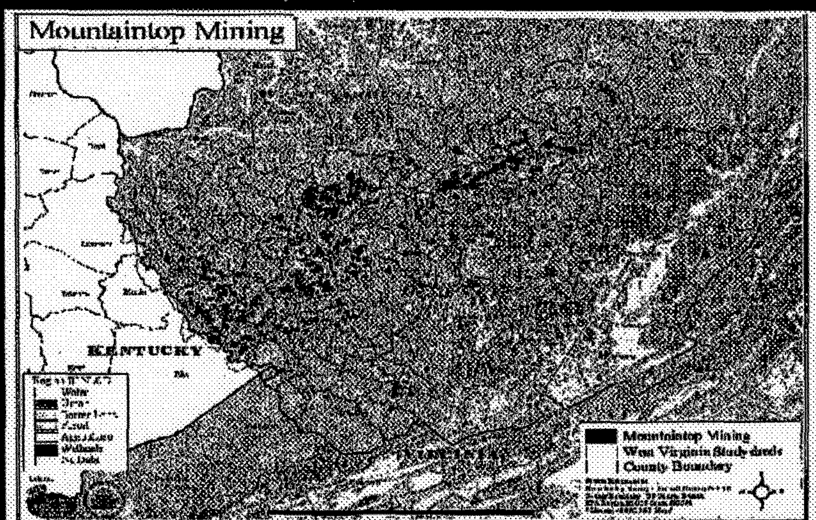

Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Terrestrial


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Terrestrial


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Terrestrial

Mountaintop Mining EIS

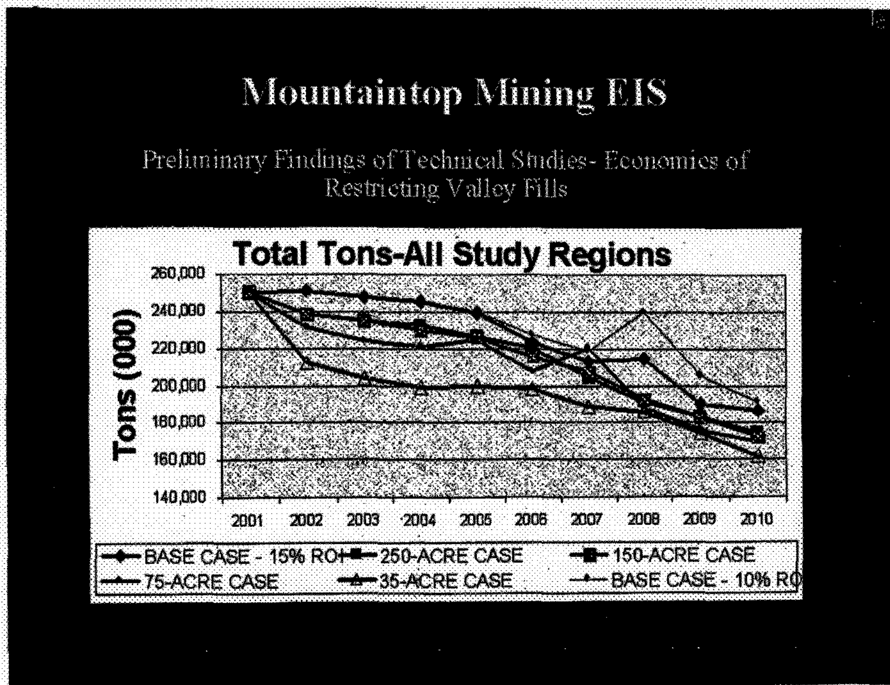
Preliminary Findings of Technical Studies- Terrestrial

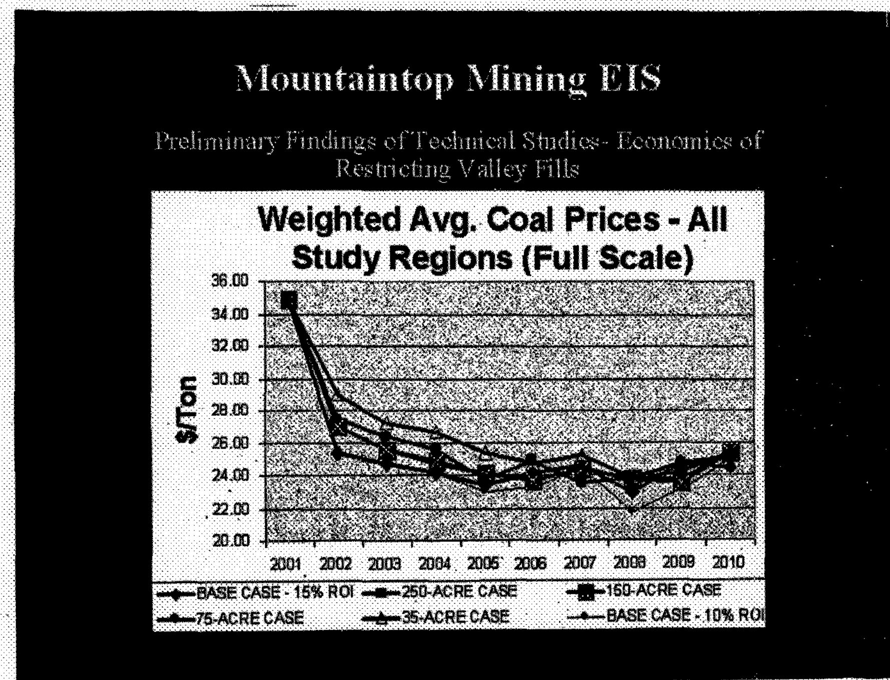


Mountaintop Mining EIS

Preliminary Findings of Technical Studies- Economics of Restricting Valley Fills

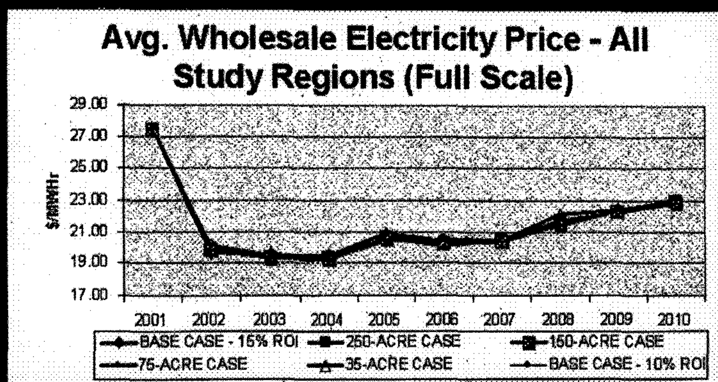
- Sufficient coal reserves appear to exist under the 250, 150, 75, and 35 acre restriction scenarios necessary to meet demand during the 10 year study period
- Limiting VFs to the ephemeral stream segment is likely to cause significant or total loss of the coal resource when that segment falls in a watershed less than 35 acres.
- Restricting valley fills to 250, 150, 75, or 35 acre watersheds will increase the price of coal by only $1/ton under each respective restriction scenario.
- Restricting valley fills to 250, 150, 75, or 35 acre watersheds will increase the price of electricity by only a few cents/MWHr under each respective restriction scenario.


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Economics of Restricting Valley Fills
Total Tons-All Study Regions
Tons (000)
260,000
240,000
220,000
200,000
180,000
160,000
140,000
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
BASE CASE - 15% ROI
250-ACRE CASE
150-ACRE CASE
75-ACRE CASE
35-ACRE CASE
BASE CASE - 10% RO


Mountaintop Mining EIS
Preliminary Findings of Technical Studies- Economics of Restricting Valley Fills
Weighted Avg. Coal Prices - All Study Regions (Full Scale)
$/Ton
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
BASE CASE - 15% ROI
250-ACRE CASE
150-ACRE CASE
75-ACRE CASE
35-ACRE CASE
BASE CASE - 10% ROI

Mountaintop Mining EIS

Preliminary Findings of Technical Studies- Economics of Restricting Valley Fills

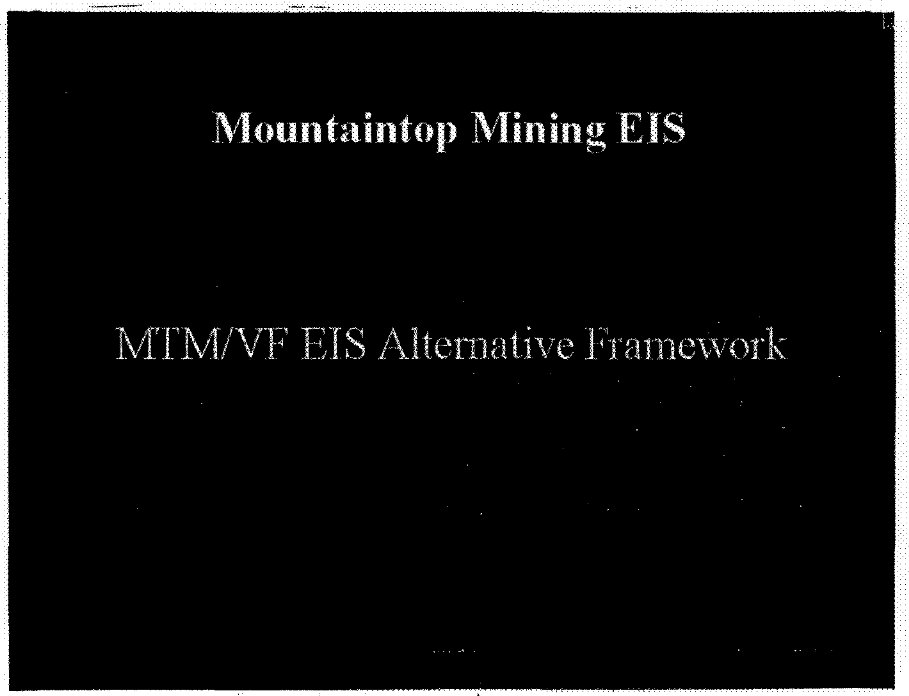


Mountaintop Mining EIS

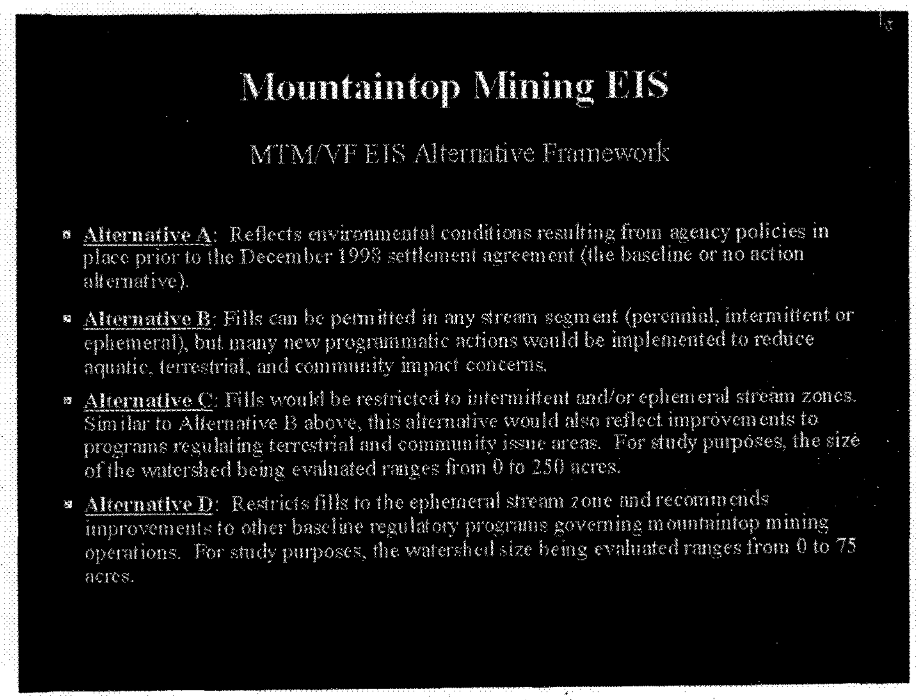
Preliminary Findings of Technical Studies- Economics

Out of 5858 fills permitted since 1985, the majority have been proposed in watersheds draining less than 250 acres:

	< 75 acres	75 -250 acres	> 250 acres
WV	59%	34%	7%
KY	81%	14%	5%
VA	70%	26%	4%
TE	79%	19%	2%



Mountaintop Mining EIS
MTM/VF EIS Alternative Framework



Mountaintop Mining EIS
MTM/VF EIS Alternative Framework
Alternative A: Reflects environmental conditions resulting from agency policies in place prior to the December 1998 settlement agreement (the baseline or no action alternative).
Alternative B: Fills can be permitted in any stream segment (perennial, intermittent or ephemeral), but many new programmatic actions would be implemented to reduce aquatic, terrestrial, and community impact concerns.
Alternative C: Fills would be restricted to intermittent and/or ephemeral stream zones. Similar to Alternative B above, this alternative would also reflect improvements to programs regulating terrestrial and community issue areas. For study purposes, the size of the watershed being evaluated ranges from 0 to 250 acres.
Alternative D: Restricts fills to the ephemeral stream zone and recommends improvements to other baseline regulatory programs governing mountaintop mining operations. For study purposes, the watershed size being evaluated ranges from 0 to 75 acres.

Mountaintop Mining EIS

MTM/VF EIS Alternative Framework

- ~70 actions were tentatively identified by the EIS Steering Committee to enhance:
  - inter-agency coordination
  - public health and safety
  - protect environmental values
- These actions involve new/revised:
  - policies
  - guidance
  - interagency agreements
  - regulations
  - laws

Mountaintop Mining EIS

Examples of Programmatic Action Items Developed to Minimize Impacts

- <u>**Action 7B**</u>: *CWA and SMCRA regulatory authorities will propose rules requiring* comprehensive water quality and biological monitoring, tiered to stream segment. The data will assist in the evaluation of direct and/or indirect effects and be used primarily to make permit decisions and to develop mitigation and/or compensation proposals.
- <u>**Action 25**</u>: *The Federal and/or state agencies will develop guidance, policies, or rules* providing consistent definitions of stream segments as well as field methods for delineating the segments.
- <u>**Action 47**</u>: OSM will develop guidelines for: 1) selecting appropriate growth medium to best support the intended PMLU; 2) reducing soil compaction of the growth medium; 3) using less competitive herbaceous ground cover; 4) selecting tree and shrub species suitable for the approved PMLU; 5) creating standards for measuring success; and 6) utilizing slash and non-harvested forested materials.
- <u>**Action 59**</u>: For those permit applications that include AOC variances and/or mountaintop removal mines, OSM and/or the state SMCRA regulatory authorities could consider developing guidance or policies for establishing financial assurance requirements (e.g., sureties or bonds) to assure development of the infrastructure necessary to support implementation of the approved PMLU.

Mountaintop Mining EIS

Current Issues/Options/Schedule

Mountaintop Mining EIS

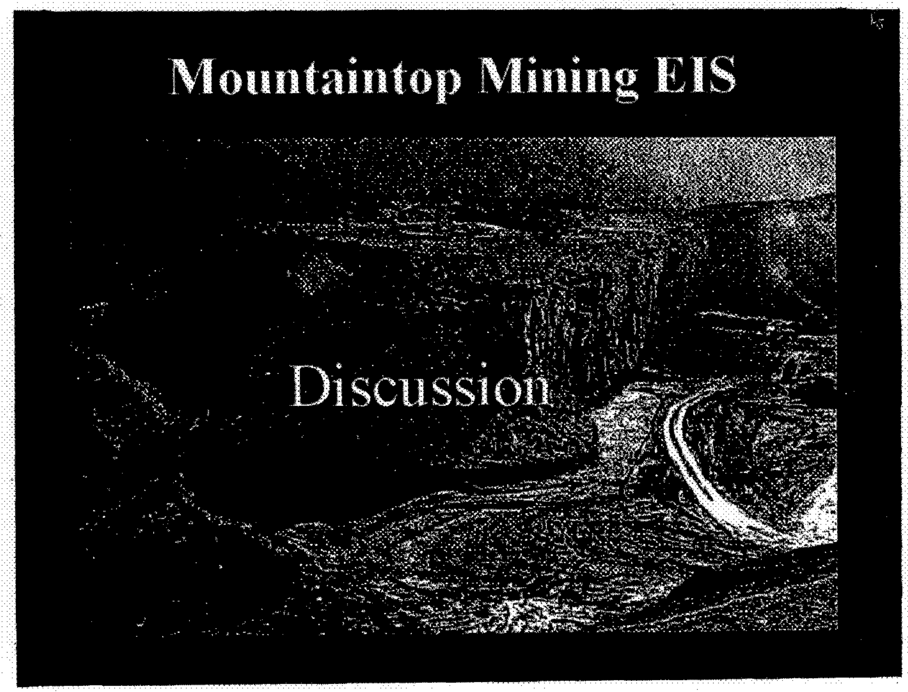
Options

- Publish the draft EIS without recommending a preferred alternative. OSM stream buffer rules could be proposed with options similar to the alternatives being proposed in the EIS. The final EIS and the final rule would select one of the options/alternatives/sets of actions following the public comment period.
- Publish the draft EIS with a statement that OSM prefers Alternative B while the other agencies prefer B, C, D or have no preference pending public comment.
- Publish the draft EIS with a consensus alternative. If Alternative B is selected, which relies upon the regulatory process to minimize impacts, a clear statement must be made that this process will be significantly different than the regulatory process being implemented prior to 1998. Region 3 also recommends that if Alternative B is selected, previously developed terrestrial and PMLU actions must be included as commitments within both the EIS and the OSM rulemaking proposal.

Mountaintop Mining EIS

Current Schedule

Working Draft EIS Submitted for Agency Concurrence	Late Spring 2002
Draft EIS Printing/Filing/Distribution	Summer 2002
Public Hearing	Late Summer 2002
Comment Period Ends	Fall 2002
Final EIS	TBD



William Hoffman
03/01/02 10:38 AM

To: Michael Castle/R3/USEPA/US@EPA
Subject: EIS Alternatives Pros & Cons

Mike:

Here is an electronic version of what we put together yesterday. It reads better if its launched. Let me know if any changes are needed. I will make copies for Tuesday.

Bill

Pros Cons.wp

William J. Hoffman (3ES30)
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

EXHIBIT 18

Selection Of A Preferred Alternative	
Pro	Con
• Provides public with sharpened focal point for review and comment • Narrows scope of OSM's Proposed Rulemaking	• EIS Status Report (January 1, 2001) stated that no preferred alternative would be selected prior to draft EIS • Depending upon alternative selected, will elicit significant negative response from either the environmental community or industry
Selection of Competing Preferred Alternatives by the Agencies	
Pro	Con
• Provides agencies latitude in selecting an alternative that aligns with their "mission" • Allows OSM's propose Rulemaking to proceed as they envision	• Conflicts with agreements made during settlement to present an aligned Federal position • Provides mixed message to the public
Selection of Alternative B (unrestricted watershed, project by project review)	
Pro	Con
• Relies on regulatory process to minimize impacts • Does not sterilize coal reserves (no broad takings issue)	• Will appear inconsistent with findings of tech studies, including economics, and with stated purpose of EIS to reduce impacts • Terrestrial, PMLU, and minimal impact threshold actions not yet sufficiently developed to select Alt B as an action alternative
Selection of Alternative C (Restricts fills to intermittent zone $\leq$ 250 acre watersheds)	
Pro	Con
• Most consistent with findings of tech studies • State SMCRA agencies could perform one stop permitting on majority of mining applications under SPGP	• Will push companies toward many small fills, which may have greater cumulative impact • Will sterilize several of the lower coal seams at mine sites and eliminate some sites from being economically viable, creating takings claims

Selection of Alternative D (Restricts fills to ephemeral zone ≤ 75 acre watersheds)	
Pro	Con
• Least direct impact on the aquatic ecosystem • Most support from the environmental community	• Will force companies toward many small fills, which may have greater cumulative impact • Will sterilize a significant number of coal seams at mine sites and eliminate many sites from being economically viable, generating numerous takings claims.

William Hoffman
03/07/02 08:56 AM

To: Rich Kampf/R3/USEPA/US@EPA
Subject: One Pager for Whitman/Norton Meeting

See attached- I think I got everything into one page.

Norton.wpd

William J. Hoffman (3ES30)
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

EXHIBIT 19

Mountaintop Mining/Valley Fill Environmental Impact Statement

Background:

- In response to a lawsuit filed in 1998, an Environmental Impact Statement (EIS) is currently being prepared by EPA, OSM, FWS, COE, and the State of West Virginia to evaluate programmatic actions to minimize impacts from mountaintop mining/valley fill operations in Appalachia. No agency has formally been designated as the "lead" agency. All are considered "co-leads" in the decision making process. The projected date for *completing the draft EIS is August 2002.*

Issues:

- SMCRA, CWA 402, and CWA 404 permits are required for mountaintop mining/valley fill operations. Many state agencies are currently delegated SMCRA and CWA Section 402 permitting authorities, but the Federal government (COE) currently issues CWA 404 permits in Appalachian States. OSM proposes to modify its SMCRA rules to incorporate regulatory procedures similar to those found in the CWA Section 404(b)1 Guidelines, thereby facilitating the development of a one-stop permitting framework within State SMCRA agencies. OSM has not yet shared the proposed rule change language with its partners in the EIS.
- To accommodate the proposed revisions to the SMCRA rules, OSM is recommending that Alternative B (project-by-project reviews, no set restrictions) be designated as the preferred alternative in the EIS. The agencies previously agreed not to designate a preferred alternative in the draft EIS pending receipt of public comment on the issue.

Talking Points:

- If Alternative B is to be selected, additional incentives to promote reforestation and to insure that post mining land use development occurs as envisioned should be included within both the EIS and the OSM rulemaking proposal. These incentives would minimize impacts identified in the EIS and minimize concerns that would otherwise be expected from the environmental community over the selection of Alternative B.
- EPA requests the opportunity to review and provide input to OSM's proposed rule changes prior to lending its support for either the new rules or for EIS Alternative B.
- A minimum impact thresh hold should be developed within the EIS for the purposes of resolving the controversy surrounding the COE Nationwide mining permit (NWP 21). This threshold would also clearly establish those projects over which States could assume one-stop permitting responsibility under a CWA 404 State Programmatic General Permit.
- The Council on Environmental Quality should be tasked to resolve any disputes that may arise between the Federal Agencies over the scope and/or direction of the EIS.

William Hoffman
03/12/02 03:46 PM

To: Michael Castle/R3/USEPA/US@EPA
Subject: Re: OSM Action Descriptions

Attached is the memo (with my response at the top) that Dave Hartos sent back in February in which he refers to the deletion of those four action items by "executive fiat". The action items were previously described in the document I sent you dated Oct 23????? We do not need to be wedded to the precise wording in those previous descriptions, but deleting them altogether (especially 57 & 59) is going a little too far.

William J. Hoffman (3ES30)
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

----- Forwarded by William Hoffman/R3/USEPA/US on 03/12/02 03:42 PM -----

William Hoffman
02/20/02 12:13 PM

To: Dave Hartos <DHARTOS@OSMRE.GOV>
cc: bcl@mme.state.va.us, Charles.K.Stark@hq02.usace.army.mil, Dave Hartos <DHARTOS@OSMRE.GOV>, dvandslinds@mail.dep.state.wv.us, jstump@gfnet.com, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, lov@mme.state.va.us, Mike Robinson <MROBINSO@OSMRE.GOV>, Paul.Rothman@mail.state.ky.us, Rebecca Hanmer/R3/USEPA/US@EPA, rhunter@mail.dep.state.wv.us, Kathy Hodgkiss/R3/USEPA/US@EPA, Rich Kampf/R3/USEPA/US@EPA, Donald Welsh/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA
Subject: Re: OSM Action Descriptions

Dave:

I think you did a great job of consolidating the "essence" of terrestrial action items 43, 45, 47, and 63 into 47. I do think the description should take a more aggressive position that this guidance will be developed however, consistent with the theme of Tier 2.

EPA and the other agencies, to the best of my knowledge, have not yet agreed to delete Actions 57, 58, 59, and/or 62 from the EIS entirely. EPA is especially concerned over the deletion of items 57 and 59, which are designed to assure that the PMLU for which a variance is issued actually happens. As the PMLU is supposed to be approved based upon satisfying a higher and better use, we believe these actions are necessary to assure that the higher and better use occurs. While OSM recommends deleting them by "executive fiat", this is still a democracy and we need to talk.

I am available all next week.

Bill

EXHIBIT 20

Cindy_Tibbott@fws.gov
03/25/02 11:14 AM

To: William Hoffman/R3/USEPA/US@EPA
Subject: Purpose & need/alternatives write-ups

FWS is back on-line, so we can return our fax machine to semi-retirement.

On one of our last calls, I was to make sure all of you had an electronic copy of the purpose and need section and alternatives write-up, so you can edit at will. Here they are..

(See attached file: I.A.Purpose of the EIS.wpd) (See attached file: alternativewriteup.wpd)

I.A.Purpose of the EIS.w alternativewriteup.wp

EXHIBIT 21

I. PURPOSE AND NEED FOR ACTION

A. Background

Surface coal mining in the Appalachian coalfield states of Kentucky, Tennessee, Virginia, and West Virginia is conducted by a variety of mining methods and in different topographic settings. For the purposes of this EIS, "mountaintop mining" will be considered to include all types of surface coal mining in the steep terrain of the central Appalachian coalfields. Removal of overburden and interburden (rock above and between coal seams) during mountaintop mining operations results in generation of excess spoil because the broken rock will not all fit back onto the mined area. The excess spoil is typically disposed of in stream valleys in engineered earthen and rock structures known as valley fills.

A number of federal and State agencies regulate mountaintop mining under the authority of several different statutes. The U.S. Office of Surface Mining (OSM) is responsible for the national administration of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), but OSM has delegated the SMCRA regulatory program to all of the Appalachian coalfield States except Tennessee. (For example, in West Virginia the SMCRA regulatory authority is the West Virginia Department of Environmental Protection (WVDEP)). The U.S. Army Corps of Engineers (COE) regulates the discharge of fill material into waters of the United States under Section 404 of the Clean Water Act (CWA). COE authorization of fills can occur either via a Nationwide Permit (for projects that individually or cumulatively have only minimal adverse effects on the aquatic environment) or via individual Section 404 permits. The U.S. Environmental Protection Agency (EPA) regulates point-source discharges to waters under Section 402 of the Clean Water Act, although this program has also been delegated to each of the Appalachian coalfield States. The U.S. Fish and Wildlife Service (FWS) administers the Endangered Species Act, and via the Fish and Wildlife Coordination Act, advises federal regulatory agencies on fish and wildlife resource issues associated with any federally permitted, constructed, or licensed water development projects, and land development projects that affect waters of the U.S.

Increased public and government agency concern about mountaintop mining operations and whether they were being properly regulated emerged in 1997 and 1998. It appeared that the number of these types of operations had increased in recent years in Appalachia, and that more and more valley fills were being proposed/built. Concerned about impacts to fish and wildlife habitats, FWS initiated an informal inventory of the amount of stream impacts resulting from valley fills and sediment ponds in West Virginia, Virginia, and Kentucky. FWS also brought their concerns to OSM and EPA, most notably in an interagency forum in 1997 hosted by EPA, called the Federal Regulatory Operations Group. Out of this meeting, an interagency working team was formed by OSM, EPA, COE, and FWS in early 1998. Several studies were designed to prepare a consistent fill inventory, and evaluate stream impacts, fill stability, and regulatory program inconsistencies in mitigation and other mining program requirements.

Press coverage of public issues with mountaintop mining surfaced beginning in August 1997, in television, periodicals, and newspapers, including *U.S. News and World Report*, ABC's "Night Line" program, as well as the Charleston (WV) *Gazette*, Washington *Post*, New York *Times*, Lexington (KY) *Herald-Leader*, and Louisville *Courier-Journal*. In 1998, OSM initiated an oversight evaluation of how the West Virginia, Kentucky, and Virginia SMCRA delegated programs were approving coal mines that proposed not to restore to "approximate original contour," a practice that results in more numerous and larger valley fills. Pursuant to Section 402 (National Pollution Discharge Elimination System permit) of the CWA, EPA began to object to the size and location of valley fills because of impacts to streams. EPA and FWS also questioned the applicability and use of the COE Nationwide Permit authority under CWA 404.

In June 1998, West Virginia Governor Cecil Underwood created the "Task Force on Mountaintop Mining and Related Practices" to study the effects of mountaintop mining. The task force was organized into three committees: 1) Impact to the Economy; 2) Impact on the Environment; and 3) Impact on the People. The findings of the task force were published in December 1998. The recommendations included:

- The need for more research on the environmental and economic effects of mountaintop mining.
- Establishment of a state office to regulate the impact of mountaintop removal mining on people.
- Establishment of a nationwide stream mitigation policy.
- Discontinuing of "fish and wildlife habitat" as a postmining land use (PMLU).
- Development of commercial forestland as a preferred PMLU.
- Rigorous enforcement of existing regulatory requirements, including water quality and approximate original contour (AOC) guidelines.

Meanwhile, in July 1998 the West Virginia Highlands Conservancy and several citizens filed a lawsuit against the West Virginia Department of Environmental Protection (WVDEP) and the U.S. Army Corps of Engineers (COE) (Bragg, *et al. v. Robertson, et al.*, Civ. No. 2:98-0636 S.D.W. Va), alleging that valley fills associated with surface coal mining operations resulted in the loss and degradation of West Virginia streams, and that CWA and SMCRA were being improperly applied. The plaintiffs argued that valley fills, both individually and cumulatively, caused more than a minimal impact to the "waters of the U.S.," and consequently were not eligible for COE authorization via a CWA Nationwide Permit. As part of this claim, the plaintiffs alleged that the COE also violated the National Environmental Policy Act (NEPA), by failing to analyze the adverse and cumulative environmental impacts of valley fills and surface mining activities in West Virginia. In addition, the plaintiffs contended that the practice of valley filling violates the SMCRA "stream buffer zone rule" (30 C.F.R. 816.57), which restricts surface mining operations within 100 feet of an intermittent or perennial stream.

In December 1998, the plaintiffs and the COE, EPA, OSM, FWS and the WVDEP agreed to settle the CWA portion of the case. The settlement agreement requires the agencies to "enter into an agreement to prepare an Environmental Impact Statement ("EIS") on a proposal to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills." Secondly, the settlement agreement established interim guidelines (pending completion of the EIS) for the evaluation of mountaintop mining permit applications in West Virginia, and requires the agencies to enter into a Memorandum of Understanding to establish an interagency coordination process "to ensure compliance with all applicable federal and state laws and guidance, improve the permit process, and minimize any adverse environmental effects associated with excess spoil created by mountaintop mining operations in West Virginia," thereby accomplishing a stated goal of "coordinated permit decisions that minimize adverse environmental effects."

To aid in the objective of increased scrutiny of permits, a *Memorandum of Understanding* (MOU) *Among the USOSM, USEPA, USCOE, USFWS, and WVDEP for the Purpose of Providing Effective Coordination in the Evaluation of Surface Coal Mining Operations Resulting in Placement of Excess Spoil Fills in the Waters of the United States* establishes a process for improving coordination in the review of permit applications. The entire MOU is provided in an appendix to this EIS. The signatory agencies entered into the agreement with the goals of enhancing cooperation and communication in order to ensure compliance with all applicable federal and state laws, improving time lines and predictability of the permit process, and minimizing adverse environmental impacts from surface coal mining operations resulting in placement of excess spoil fills in the waters of the United States. The experiences of the agencies resulting from the increased permit scrutiny have been considered in the development of this EIS. Many of the efforts in this so-called "interim permitting" period identified areas where the agencies, the regulated community, and the environment would benefit from coordinated or clarified procedures, better baseline data collection, improved analysis of potential impacts, and a different sequence of processes.

B. PURPOSE OF THE EIS

The Notice of Intent to prepare the EIS is provided in the Federal Register, dated February 5, 1999 (64 FR5778, 02/05/99). The stated purpose for this EIS in this Notice is "to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the Unites States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills (64 FR 5778, 02/05/99)." The EIS satisfies one of the requirements of the December 23, 1998 Settlement Agreement in the *Bragg* lawsuit described earlier.

Prior to the *Bragg* case settlement, the agencies had determined that comprehensive data on the environmental impacts of mountaintop mining and valley filling did not exist, and had initiated a number of studies to address those data gaps. The findings of those initial studies, as well as additional studies determined to be necessary after initiation of the EIS process, are discussed in detail in this EIS and were used in the development of the EIS alternatives.

C. PROPOSED ACTION

The EPA, COE, and OSM propose to promulgate final regulations and develop policies or guidance, as necessary, to establish an integrated surface coal mining regulatory program, under consonant application of the CWA and SMCRA. These regulations, policies, and/or guidelines will minimize, to the maximum extent practicable, adverse impacts to waters of the United States and prevent material damage outside the permit area; streamline the permitting process; and, to the extent feasible under present law, implement administration of a comprehensive CWA/SMCRA program by state authorities. This regulatory program will provide for a balance between the nation's need for energy and the protection of environmental resources that could be adversely affected by mountaintop mining and valley fill operations in the steep slope Appalachian coal fields. The joint SMCRA/CWA program goals envisioned by the rule making proposal will include appropriate mine planning and reclamation; clear regulatory definitions, impact thresholds and guidance on best management practices; adequate baseline data collection; sufficient impact analysis with avoidance and minimization considerations; and suitable levels of mitigation for unavoidable impacts.

IV. ALTERNATIVES

A number of environmental and community impact concerns were raised during the EIS scoping sessions and through the public comment process. Various technical studies, symposia, or workshops were conducted to evaluate these scoping concerns; as a result of the evaluation, the scope of the EIS was narrowed, as required by NEPA, to address the most significant issues. These issues have been grouped into eleven general categories:

1. Direct loss of streams and stream impairment
2. Restoration of aquatic ecosystems
3. Cumulative impacts to aquatic and terrestrial habitats
4. Effectiveness of mitigation
5. Threatened and endangered species
6. Blasting, dust, and fumes
7. Deforestation
8. Flooding
9. Benefits of reclaimed land
10. Scenery
11. Government efficiency

The EIS agencies evaluated the State and federal programs regulating steep slope mining activities to identify ways in which the programs could be improved to address the eleven issues and to better coordinate the SMCRA and CWA permit processes. Specific programmatic actions were formulated to address each of the issues, and were grouped into four sets of possible alternatives, labeled A through D, presented in Table XXX [(Mike's "mountaintop mining/valley fill EIS alternative framework overview")]. It should be noted that no alternative has been identified as a "preferred alternative" at this time. The preferred alternative and final set of recommended action items will not be determined until the final EIS is published.

The most significant distinction between the four alternatives is how each one addresses Issue 1, "Direct loss of streams and stream impairment." The question of what portions of a stream can be legally filled under SMCRA authority was central to the *Bragg v. Robertson* lawsuit. The District Court decision in that case established that the SMCRA stream buffer zone regulations at 30 CFR 816.57 and 817.57 do not allow mining activities (including valley fills) within 100 feet of intermittent or perennial streams. The Fourth Circuit Court of Appeals later vacated the District Court's decision, but on grounds unrelated to the applicability of the stream buffer zone rule. Because of the atmosphere of regulatory uncertainty surrounding this issue, and the importance of allowable valley fill size to mine viability and environmental impacts, the agencies developed the EIS alternatives around it. Each alternative proposes different changes to regulatory programs that determine the allowable extent of stream loss through valley filling. The amount of valley filling that is allowable will affect the amount of mining that can occur, which in turn will determine the environmental and economic consequences of selecting a given alternative.

Alternative A, the "no action" alternative, represents the SMCRA and CWA programs as they were being implemented prior to the *Bragg v. Robertson* settlement agreement in December 1998. At that time, there were essentially no limitations on the size, location, or number of valley fills authorized by the regulatory agencies. It is recognized that a number of significant program improvements have been accomplished while the EIS has been in progress, and that additional program changes are currently under consideration by State agencies that are not captured in Alternative A.

Alternative B, while not imposing any predetermined limits on size, location, or number of valley fills, would require a much more detailed analysis of alternatives and environmental impacts. Valley fills could be allowed in any segment of a stream, depending on a thorough, permit-by-permit evaluation of environmental impacts based on site-specific field data. In addition, applicants would have to conduct an alternatives analysis to demonstrate that they have avoided and minimized impacts to waters of the U.S. to the extent practicable. Mitigation within the same watershed would be required for unavoidable impacts.

Alternative C would restrict the location of valley fills to ephemeral and intermittent portions of streams. For purposes of predicting the environmental and economic consequences that would result if this alternative were selected, a 0- to 250-acre watershed size range was used to represent the maximum allowable valley fill size. Like Alternative B, permit applicants would be required to conduct baseline data collection and an alternatives analysis, and provide mitigation for unavoidable impacts.

Alternative D would restrict the location of valley fills to the ephemeral portion of streams. For purposes of predicting the environmental and economic consequences that would result if this alternative were selected, a 0- to 75-acre watershed size range was used to represent the maximum allowable valley fill size. Under this alternative, baseline data collection, alternatives analysis, and mitigation requirements would be less stringent.

Because confusion exists about the extent to which existing SMCRA and CWA regulations can legally permit the placement of excess spoil in streams, Alternatives B, C, and D would all require changes to regulations. OSM is proposing rulemaking to revise the stream buffer zone regulations (30 CFR 816.57 and 817.57) to allow the disposal of excess spoil from steep slope mining operations into streams provided the project has been authorized under the appropriate CWA Section 404 process. EPA and the COE would likewise change existing CWA Section 404 regulations to prohibit the placement of excess spoil in perennial streams (Alternative C) or in intermittent or perennial streams (Alternative D), and establish individual and cumulative "minimal effects" thresholds (Alternatives B, C, and D). The minimal effects thresholds would determine when projects would be eligible for authorization under the Nationwide Permit program and would not be required to apply for an Individual Permit.

In addition, many other programmatic actions are suggested that would reduce aquatic, terrestrial, and community impacts. The agencies specifically solicit comment on the need and appropriateness of all of the suggested action items.

William Hoffman
03/29/02 07:54 PM

To: Gary Bryant/R3/USEPA/US@EPA
Subject: Re: DRAFT Report MTM/VF Stream Chemistry

Very well put Gary! 66-0 seems pretty convincing to me, but I only had a couple of statistical courses in college. Don't get discouraged, we can expect more attacks on our findings as we get closer to press time!

Bill

Gary Bryant

Gary Bryant
03/27/02 04:16 PM

To: jstump@gfnet.com
cc: William Hoffman/R3/USEPA/US@EPA
Subject: DRAFT Report MTM/VF Stream Chemistry

Here is an electronic version.
If you have comments on the statistical validity of the comments on selenium, I would welcome them. I called Eric Perry after the call this morning and asked him to check if the statistical query he was looking at included the data from lab 1 and to let me know. He said he would get back to me by tomorrow. As you may have gathered, he had not actually looked at our report until the call this morning. The selenium data clearly show "hot spots" with higher concentrations of selenium in each of the five watersheds and located downstream of "Filled" sites ONLY. There are 66 violations of the stream water quality criteria identified and each is at a Filled site. No other category of site had violations of selenium! I don't believe anyone needs a statistician to prove that MTM/VF mining causes violations of stream criteria for selenium. On top of that, the WV Geologic Survey data indicate that the coals in that region are high in selenium.

Unfortunately, all of our statistical people are out of the office until next week.

finalDRAFTpart1.wp finalDRAFTpart2.wp

Gary Bryant

USEPA
1060 Chapline Street
Wheeling WV, 26003-2995
phone 304/234-0230 (FAX 0257)

EXHIBIT 22

William Hoffman 04/16/02 02:09 PM

To: Gregory Peck/DC/USEPA/US@EPA
Subject: Update

I put these bullets together to update the RA on where we are on the MTM/VF issue.

EISUpdateApril2002.wp

William J. Hoffman (3ES30)
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

EXHIBIT 23

MTM/VF EIS Status
April 15, 2002

It is our understanding that the Administrator was briefed last Monday regarding the fill rule and has indicated that she does not want to sign the rule until several actions are taken to demonstrate that EPA, COE, and OSM are working together to minimize the impacts, namely:

- That the SMCRA stream buffer rule be modified/strengthened to bring the proposal into alignment with EPA's Section 404(b)1 guidelines, and
- That the COE revisit NWP 21 in order to develop a minimum impact threshold to define when individual permit reviews will be undertaken for mining projects.

These issues align with the remaining issues concerning the selection of a preferred alternative in the MTM/VF EIS (Alternative B):

- Alternative B proposes that fills can be placed in any stream segment subject to a rigorous project-by-project environmental review process. Because this alternative relies on a rigorous project-by-project review process, EPA has stated that a minimum impact threshold must be developed for NWP 21 so this review process can be triggered.
- We have suggested that if OSM wishes to continue with the vision of creating a one-stop permitting platform within state SMCRA agencies, the stream buffer zone rule will need to be strengthened by incorporating a biological component into the material damage definition. This would create an adverse impact threshold for permits, and bring the proposal into alignment with EPA's Section 404(b)1 guidelines.

The EIS Steering Committee met last week in an attempt to resolve the issues. While some progress was made in attempting to define a review process for the Section 404 permits, the issue was not resolved. OSM is also still contemplating the approach they want to take with the SMCRA rule proposal (as it relates to adverse impact).

The EIS Steering Committee also discussed a plan for addressing the flaws in the economic study. The Committee agreed to go forward with existing study results, but to qualify the results as likely to have a greater impact on the industry than projected. Examples would be provided to demonstrate why these results are likely to occur, and other studies (Marshall University, mine tech team, etc) would also be used to demonstrate the adverse impacts that have been projected to occur from restricting fills. The flaws would be corrected in the final EIS, and if the findings are other than as expected, a supplemental EIS would be prepared in order to give the public the appropriate opportunity to comment. The only other option is to correct the flaws before issuing the draft EIS, which would delay its release a minimum of four additional months to Fall/Winter 2002.

CHAPTER IV. ALTERNATIVES

A. INTRODUCTION

A number of environmental and community impact concerns were raised during the EIS scoping sessions and through the public comment process. Various technical studies, symposia, or workshops were conducted to evaluate these scoping concerns; as a result of the evaluation, the scope of the EIS was narrowed, as required by NEPA, to address the most significant issues. These issues have been grouped into eleven general categories:

1. Direct loss of streams and stream impairment
2. Restoration of aquatic ecosystems
3. Effectiveness of mitigation
4. Cumulative impacts to aquatic and terrestrial habitats
5. Threatened and endangered species
6. Deforestation
7. Blasting, dust, and fumes
8. Flooding
9. Benefits of reclaimed land
10. Scenery
11. Government efficiency

The EIS agencies evaluated the State and federal programs regulating steep slope mining activities to identify ways in which the programs could be improved to address the eleven issues and to better coordinate the SMCRA and CWA permit processes.

To accomplish the goal of the proposed action described in Section A of Chapter I, the following alternatives were developed to consider the full range of response options available to the agencies under existing statutes.

Table IV.A-1. Mountaintop Mining Valley Fill EIS Alternative Summary	
Alternative A	No changes to the SMCRA and CWA programs in effect in 1998
Alternative B	Valley fills could be allowed not only in ephemeral and intermittent stream segments, but could possibly be located in perennial streams--dependent on a detailed, permit-by-permit baseline data collection and thorough, site-specific, significant adverse impact analyses--including consideration of alternatives for avoidance and minimization. Mitigation of unavoidable impacts would require in-kind replacement of aquatic functions and values within the watershed.
Alternative C	Valley fills could be located in ephemeral and intermittent streams. Permit-by-permit baseline data collection and site-specific alternatives analyses would be required (although not necessarily as rigorous as in Alternative B) to demonstrate that avoidance and minimization were considered. Mitigation options of unavoidable impacts would be somewhat more varied and thus more flexible than under Alternative A.
Alternative D	Valley fills could be located only in the ephemeral portion of streams. Permit-by-permit baseline data collection would be more limited than under Alternative B, and alternative analyses would be to demonstrate that minimization of downstream or indirect impacts were considered. Mitigation could include compensation in lieu of in-kind replacement of lost aquatic function and value.

EXHIBIT 24

B. ANALYSIS OF ALTERNATIVES

The most significant distinction between the four alternatives is how each one addresses Issue 1, "Direct loss of streams and stream impairment." The question of what portions of a stream can be legally filled under SMCRA authority was central to the *Bragg v. Robertson* lawsuit. The District Court decision in that case established that the SMCRA stream buffer zone regulations at 30 CFR 816.57 and 817.57 do not allow mining activities (including valley fills) within 100 feet of intermittent or perennial streams. The Fourth Circuit Court of Appeals later vacated the District Court's decision, but on grounds unrelated to the applicability of the stream buffer zone rule. Because of the atmosphere of regulatory uncertainty surrounding this issue, and the importance of allowable valley fill size to mine viability and environmental impacts, the agencies developed the EIS alternatives around it. Each alternative proposes different changes to regulatory programs that determine the allowable extent of stream loss through valley filling. The amount of valley filling that is allowable will affect the amount of mining that can occur, which in turn will determine the environmental and economic consequences of selecting a given alternative.

Alternative A, the "no action" alternative, represents the SMCRA and CWA programs as they were being implemented prior to the *Bragg v. Robertson* settlement agreement in December 1998. At that time, there were essentially no limitations on the size, location, or number of valley fills authorized by the regulatory agencies. It is recognized that a number of significant program improvements have been accomplished while the EIS has been in progress, and that additional program changes are currently under consideration by State agencies that are not captured in Alternative A.

Alternative B, while not imposing any predetermined limits on size, location, or number of valley fills, would require a much more detailed analysis of alternatives and environmental impacts. Valley fills could be allowed in any segment of a stream, depending on a thorough, permit-by-permit evaluation of environmental impacts based on site-specific field data. In addition, applicants would have to conduct an alternatives analysis to demonstrate that they have avoided and minimized impacts to waters of the U.S. to the extent practicable. Mitigation within the same watershed would be required for unavoidable impacts.

Alternative C would restrict the location of valley fills to ephemeral and intermittent portions of streams. For purposes of predicting the environmental and economic consequences that would result if this alternative were selected, a 0- to 250-acre watershed size range was used to represent the maximum allowable valley fill size. Like Alternative B, permit applicants would be required to conduct baseline data collection and an alternatives analysis, and provide mitigation for unavoidable impacts.

Alternative D would restrict the location of valley fills to the ephemeral portion of streams. For purposes of predicting the environmental and economic consequences that would result if this alternative were selected, a 0- to 75-acre watershed size range was used to represent the maximum allowable valley fill size. Under this alternative, baseline data collection, alternatives analysis, and mitigation requirements would be less stringent.

Because confusion exists about the extent to which existing SMCRA and CWA regulations can legally permit the placement of excess spoil in streams, Alternatives B, C, and D would all require changes to regulations. OSM is proposing rulemaking to revise the stream buffer zone regulations (30 CFR 816.57 and 817.57) to allow the disposal of excess spoil from steep slope mining operations into streams provided the project has been authorized under the appropriate CWA Section 404 process. EPA and the COE would likewise change existing CWA Section 404 regulations to prohibit the placement of excess spoil in perennial streams (Alternative C) or in intermittent or perennial streams (Alternative D), and establish individual and cumulative "minimal effects" thresholds (Alternatives B, C, and D). The minimal effects thresholds would determine when projects would be eligible for authorization under the Nationwide Permit program and would not be required to apply for an Individual Permit.

In addition, many other programmatic actions are suggested that would reduce aquatic, terrestrial, and community impacts. The agencies specifically solicit comment on the need and appropriateness of all of the suggested action items.

For studying the environmental and economic effects of these alternatives in Chapter V, Alternative D assumes the surrogate watershed size for ephemeral streams to be a drainage area less than 75 acres. Stated another way, the toe (i.e., the lowest elevation of the front face) of any valley fill authorized under Alternative D would be located at a point in a stream channel that drains no more than a 75-acre watershed. See Figure IV-1 depicting each alternative on one topographic map with the drainage areas outlined. For study purposes, the watershed size being evaluated for Alternative D ranges from 0-75 acres. Similarly Alternative C assumes valley fills authorized in watersheds no larger than 250 acres. For study purposes, the watershed size being evaluated for Alternative C ranges from 0- 250 acres. Alternatives A and B would have no upper limit on the drainage area allowable for valley filling, although the toe locations under Alternative B would be determined project-by-project based upon the commensurate site-specific aquatic values impacted and mitigated

Action 42, 43, 45, 47, 63: OSM, in cooperation with the states and research community, will develop guidelines identifying state-of-the-science, best management practices (BMPs) for: 1) selecting appropriate growth medium from available topsoil, weathered subsoil and underlying overburden, or topsoil substitute and development of the best reclamation plan to best support the intended post-mining land use (PMLU) and/or enhance natural succession or re-establishment of native riparian or wildlife habitat; 2) reducing soil compaction of the growth medium–particularly where trees are intended; 3) using less competitive herbaceous ground cover to encourage tree growth and control erosion; 4) selecting tree and shrub species suitable for the final-graded spoil and the approved PMLU; 5) creating permit-specific or programmatic standards for measuring the success for tree, shrub stocking, and ground cover; 6) utilization of slash and non-harvested forested materials; and 7) maximizing to the extent economically practicable, the commercial recovery of forest products prior to initiating mining activities. OSM will continue its reforestation initiative through education, training, technology transfer, and cooperation between OSM, states, industry, researchers, and landowners on the benefits and methods to effectively and economically reclaim to trees.

The EIS and other studies report concerns for forest fragmentation and ecosystem conversion from forestland to grassland. The literature concludes that reclamation with trees on mountaintop mining sites has not been particularly successful due to over-compaction, competition with trees from grasses and legumes planted for erosion control, and grazing wildlife. Research has also shown that mine sites revegetated with a growth medium of topsoil substitutes impede natural succession and re-establishment of similar habitat as pre-mining condition. However, the literature also demonstrates appropriate techniques are available to promote reforestation, where desired as the post-mining land use. Other successful reclamation techniques have successfully demonstrated wildlife enhancement measures.

Section 515 (b)(2) of the Surface Mining Control and Reclamation Act (SMCRA) requires operators to "restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses…." Section 515(b)(24) and the federal regulations at 30 CFR 816.97 and 817.97 also require operators to, the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values and to achieve enhancement of such resources where practicable.

While deforestation and fragmentation are concerns, SMCRA provides no mandate that mined land be returned to forest. SMCRA leaves the choice of PMLU to the landowner and mining company--so long as the use is higher or better than pre-mining conditions. The SMCRA program has not proscribed detailed techniques necessary to meet these reclamation performance standards because of the wide diversity of conditions throughout the nation's coalfields. However, reclamation science and practice have documented many successful techniques and methods for achieving revegetative success and enhancing wildlife and ecosystem re-establishment. A compendium of the "best science" in reclamation technology would be extremely useful to permit development and on-the-ground improvements.

A-281 / E-33

Benjamin Tuggle
05/17/02 08:11 AM

To: Diane Bowen/ARL/R9/FWS/DOI@FWS
cc: Robin NimsElliott/ARL/R9/FWS/DOI@FWS
Subject: Senior Executive Conference Call--3pm Tuesday 5/21

Diane,

This is a FYI, call State College and find out this is all about please. I'm going to be out next week so we have to put together a game plan to get us coverage. Thanks.

BNT
----- Forwarded by Benjamin Tuggle/ARL/R9/FWS/DOI on 05/17/2002 08:05 AM -----

"Mike Robinson" <MROBINSO@OSMRE.GOV>
05/16/2002 05:15 PM

[redacted]

To: <Castle.Michael@epa.gov>, <hodgkiss.kathy@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <Pack.Gregory@epamail.epa.gov>, <suriano.slains@epamail.epa.gov>, <Benjamin_Tuggle@fws.gov>, <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <Charles.K.Stark@hq02.usace.army.mil>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <James.M.Townsand@lrl02.usace.army.mil>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>
cc: "Al Klein" <AKLEIN@OSMRE.GOV>, "Dave Hartos" <DHARTOS@OSMRE.GOV>, "Jeff Coker" <JCOKER@OSMRE.GOV>
Subject: Senior Executive Conference Call--3pm Tuesday 5/21 ?

I'm attempting to follow up from our CEQ meeting discussion yesterday--i.e., where an issue resolution process was proposed to have the SESers of our respective federal agencies (and Matt Crum from WVDEP) meet with the Steering [redacted] Committee. This first meeting/call wouldn't be to resolve issues, but to develop a process to see how and when our executives want the Steering Committee to present the issues we can't seem to resolve.

[redacted]

Inasmuch as our principals may be meeting next Wednesday at the Deputy Secretary of Interior's office, I thought ~~it would be good~~ to at least say we had started developing the process for raising issues up for executive/principal direction back to us. I propose we use the same dial-in number per usual--877.216.4412, access code 866654#

I've been asked by Al Klein to contact your regional directors, administrators, ~~etc. and~~ see if we can have this subject call next week. I've already contacted Mamie Parker and Sam Hamilton's office for FWS; Matt Crum's office; Chip Smith at COE HQ, and EPA RIII Administrator's office. Most have seemed to be available so far, but still need confirmation on a few. I am also trying to get HQ Policy folks on the call (e.g., Mary Josie Blanchard, from OSM, Dan Wayland/Greg Peck (both OWOW)/Ann Miller (OPA) from EPA, Benjamin Tuggle (FWS), and whomever from the COE (Chip?). Stay tuned [redacted]

P.S. It has been suggested that we hold the meeting with Arch Coal and Potesta week after next in Wheeling--no date yet.

[redacted]

EXHIBIT 25

From: "Mike Robinson" <MROBINSO@OSMRE.GOV>
To: <dvandelinde@mail.dep.state.wv.us>
Date: Fri, May 17, 2002 6:13 AM
Subject: Re: Principals meeting

Dave, Matt--I received word (second hand through Glenda Owens) from Deputy Secretary Griles' office that the principals' meeting next Wednesday will be a conference call. While I have no further details regarding the time and length of the call, they said that Holly Hopkins, Steve Griles' assistant will be contacting WVDEP and the other agencies with the information. She's at 202.208.6593. If/when I hear more particulars, I'll pass them along.

>>> "DAVE VANDE LINDE" <dvandelinde@mail.dep.state.wv.us> 05/15/02 03:26PM >>>
Mike;
After speaking to Matt this morning it is my understading that neither Matt Crumm nor Mike Callaghan have received an invitation to the principals meeting yet. Will WVDEP be included in the meeting? I would like for them to get a little advance notice if they are expected to attend. Is it still set for the May 19th?

David L. Vande Linde
West Virginia Department of Environmental Protection
Division of Mining and Reclamation
10 McJunkin Rd
Nitro, West Virginia 25143-2506
Ph. (304) 759-0510; Fax (304) 759-0526
E-mail: dvandelinde@mail.dep.state.wv.us

CC: <mcrum@mail.dep.state.wv.us>, "Al Klein" <AKLEIN@OSMRE.GOV>, "Glenda Owens" <GOWENS@OSMRE.GOV>

Attachment(s):
Attachment File 1.822

EXHIBIT 26

11-8/6

U.S. Department of the Interior

OFFICE OF THE DEPUTY SECRETARY
1849 C Street, NW
Washington, DC 20240

Fax: (202) 208-1873
Phone: (202) 208-6291

DATE:	May 17, 2002	
TO:	Jeff Jarrett/Pat Steve Williams/Claretta Dominic Izzo/Valerie	Ben Grumbles/Lori Michael Callaghan/Jodie Bill Leary
FAX:	219-3106 208-6965 703-697-7401	564-0488 304-558-6576 456-6546
FROM:	Steve Griles, Deputy Secretary	

Number of Pages (including cover): 1

The purpose of this fax is to confirm that the 30-minute conference call to discuss the Mountain Top Mining/Valley Fill EIS is scheduled for Wednesday, May 22, 2002, at 2 p.m.

The call-in number is 202/482-7305 – the access code is 1057.

Each participant in the conference call needs to call 202/482-7305. When the system answers, you will hear a tone. ***During the tone*** enter the Access Code. Caller is now connected.

If you have any questions, please call Doris Johnston at 208-6291.

EXHIBIT 27

05/22/02 16:38 FAX 2025140557 ENRD/OAAG 001

U. S. Department of Justice

Environment and Natural Resources Division

Office of the Assistant Attorney General Washington, D.C. 20530

CONFIRMATION NUMBER: (202) 514-2701

FAX NUMBER: (202) 514-0557

NO. OF PAGES: 2 (INCLUDING COVER PAGE)

DATE: 5-22-02 / 5:30 pm

TO: STEVE GRILES

TELEPHONE NO.:

FAX NO.: 208-1873

FROM: John Cruden, DAAG 514-2718

MESSAGE:

STEVE- AS I PROMISED, ATTACHED IS THE SPECIFIC PARAGRAPH FROM THE 1998 AGREEMENT (APPROVED BY THE COURT) CONCERNING THE EIS.

I WILL FOX THE ENTIRE AGREEMENT TO YOU WHEN I RECEIVE IT.

PLEASE NOTIFY SENDER IMMEDIATELY IF YOU HAVE ANY PROBLEMS RECEIVING THESE PAGES.

EXHIBIT 28

05/22/02 16:36 FAX 2025140557 ENRD/OAAG 002

Cruden, John

From:	Young, Russell
Sent:	Wednesday, May 22, 2002 4:13 PM
To:	Cruden, John
Cc:	Grishaw, Letitia; Ward, Mary Beth; Nitczynski, Mark
Subject:	John -- Bragg settlement agreement language

Hre is the term we discussed from the 1998 settlement agreement:

7. The U.S. Environmental Protection Agency ("EPA"), the U.S. Army Corps of Engineers ("Corps"), the Office of Surface Mining ("OSM"), and the U.S. Fish & Wildlife Service ("FWS") (collectively the "Federal Agencies") and the State of West Virginia Department of Environmental Protection ("WVDEP") will enter into an agreement to prepare an Environmental Impact Statement ("EIS") on a proposal to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by the size and location of excess spoil disposal sites in valley fills. The parties intend that the EIS will be completed no later than 24 months after the effective date of this Settlement Agreement.

1

1

05/22/02 16:52 FAX 2025140557 ENRD/OAAG 001

U. S. Department of Justice

Environment and Natural Resources Division

Office of the Assistant Attorney General — Washington, D.C. 20530

CONFIRMATION NUMBER: (202) 514-2701

FAX NUMBER: (202) 514-0557

NO. OF PAGES: ______ (INCLUDING COVER PAGE)

DATE: 5-22-02 / 5:45 pm

TO: STEVE GRILES

TELEPHONE NO.:

FAX NO.: 208-1873

FROM: JOHN CRUDEN, DAAG

MESSAGE:

STEVE

ATTACHED ARE THE FOLLOWING:

- 1998 SETTLEMENT AGREEMENT
- 1999 MOU WITH EPA, OSM, COE, FWS, STATE
- PORTIONS OF DISTRICT COURT DECISION DISCUSSING SETTLEMENT AGREEMENT

U.S. DEPARTMENT OF JUSTICE
Environment & Natural Resources Division

John C. Cruden
Deputy Assistant Attorney General

MEDIATELY IF YOU HAVE ANY PROBLEMS

950 Pennsylvania Avenue, N.W. Room 2734 — Telephone 202-514-2718 — Fax 202-305-2573

Mike Robinson - Re: EIS Steering Committee Conference Call: Today (6/10) 1 p.m. Page 1

A-81

From: <Hoffman.William@epamail.epa.gov>
To: Mike Robinson <MROBINSO@OSMRE.GOV>
Date: Mon, Jun 10, 2002 1:47 PM
Subject: Re: EIS Steering Committee Conference Call: Today (6/10) 1 p.m.

Here is my list, which is just my stab at it. Mike Castle or others within EPA may have additional thoughts as we move along, but here's a stab at it. Based on what I've heard on the call so far concerning OSM's desire to pull actions dealing with improved data collection etc out of the EIS- and that it is now a CWA EIS rather than a SMCRA EIS- it sure seems like there are new issues that have arisen since the principles meeting a week or so ago.

(See attached file: EPA EIS Issues.wpd)

William J. Hoffman (3ES30)
Acting Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

Mike Robinson <MROBINSO@OSMRE.GOV>
06/10/02 10:28 AM

To: Michael Castle/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Cindy_Tibbott@fws.gov, dave_densmore@fws.gov, Charles.K.Stark@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, James.M.Townsend@lrh02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us
cc:
Subject: EIS Steering Committee Conference Call: Today (6/10) 1 p.m.

In preparation for next week's issue resolution meeting with senior executives, we need to develop an agenda and background material to get to everyone by week's end. Bill Hoffman, you indicated that you have a document outlining the issues developed for your management. If appropriate, and you are willing to share with everyone for the call, please forward to the gang.

For your consideration until the call: From the principals' discussion,

EXHIBIT 29

Mike Robinson - Re: EIS Steering Committee Conference Call: Today (6/10) 1 p.m. Page 2

I gather we may be back to the drawing board. CEQ believes we must first identify the purpose of this NEPA document (other than to fulfill the settlement agreement). I.e., what government actions do we want to occur to resolve the MTM controversy. These actions (e.g., what may specifically be intended by the agencies in a record of decision following the final EIS--not some indefinite "future" possible actions) will dictate the alternatives and thus the data necessary to analyze the environmental and economic effects of the alternatives.

I realize that some folks on the Steering Committee think that the alternatives we have are not appropriate. Well, it's time to suggest definitive "alternatives" to the alternatives if you don't like the ones we have now--based on some overall unified federal purpose to take actions to resolve the MTM controversy. For example, WVDEP has said the EIS should shift to be more programmatic--what does that translate into as far as federal actions and alternatives? Some have said the alternatives need to just be mining or no mining, others suggest, post-Haden II that fills "with a purpose" ought to be part of the framework. I think the federal government's position, post-Haden II is that we think the CWA and SMCRA do allow fills in WOUS--with proper analysis, avoidance, minimization, and mitigation when all else fails. So, what master plan of actions do we need to take to integrate the various federal jurisdictions into an efficient, coordinated decision making process? We probably have most of the actions identified, but not nailed down adequately. We've tried "difficulty of implementation," "watershed size," "stream segment," and discussed numerous other frameworks. We at OSM had some "fresh eyes" look at the current alternative framework and they thought we had two distinct categories of alternatives--those to coordinate decision making and those that minimize impacts. Can we have multiple alternatives? Could each agency have their own set?

What does this EIS need to accomplish? Coordinated decision making to minimize impacts to WOUS and other environmental resources.... Then the COE must clearly define the CWA 404 data/analyses (stream protocol and impact prediction) requirements; minimal impact threshold for NWP/IP demarcation; how to value streams and acceptable mitigation to offset unavoidable impacts? If EPA thinks the water quality changes from coal mining and other earth moving activities are unacceptable, what does EPA want to do to assure pollution-intolerant species are unimpacted? New WQ standards? If FWS believes Section 7 consultation/coordination aren't working and we don't want to have duplication of effort between SMCRA coordination and CWA 404 permit consultation, what is needed? The answers to these questions lead us to the appropriate alternative framework.

Once CWA and ESA framework to regulate coal mining are galvanized, then (and only then) can OSM attempt to be the "platform" for coordinated decision making. Until the government actions by each agency other than OSM are decided, our vision is off of the table and must become "future actions" that may necessitate rulemaking. We cannot change our buffer zone rule unless we know the CWA target. We can't collect 404(b)(1) guideline information/analyses until COE decides how to do something it has never done before as part of coal mining requirements for NWP or IPs.

Mike Robinson - Re: EIS Steering Committee Conference Call: Today (6/10) 1 p.m. Page 3

If our framework changes, then the data necessary to analyze the alternatives may change. We may not need to "fix" the economics and cumulative impact studies, but address these areas in some other manner. Our principals were supposedly pretty adamant that they don't want to spend $1 M to fix studies. Is there some other general approach to satisfy NEPA in these areas...Keep thinkin'.....

Please dial the normal conference number at 1pm today 877.216.4412, access code 866654#

CC: <Charles.K.Stark@hq02.usace.army.mil>, <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <rider.david@epamail.epa.gov>, <dvandelinde@mail.dep.state.wv.us>, <suriano.elaine@epamail.epa.gov>, <James.M.Townsend@lrl02.usace.army.mil>, <Katherine.L.Trott@hq02.usace.army.mil>, <hodgkiss.kathy@epamail.epa.gov>, <Castle.Michael@epamail.epa.gov>, <rhunter@mail.dep.state.wv.us>

Mike Robinson - EPA EIS Issues.wpd Page 1

EPA ISSUES- MTM/VF EIS

- There is no lead agency for the EIS. A lead agency should be designated and/or a dispute resolution process instituted to resolve issues.

- The phase 1 economics study may be flawed. This data has been used in subsequent studies (phase 2, GF economics analysis, and cumulative impacts analysis). If flawed, the subsequent inaccuracies in the phase 2, GF economics analysis, and CIA studies complicates any comparison or selection of alternatives, necessitating additional analyses prior to issuance of an EIS. Decisions must be made to either patch or qualify the current studies and put the draft EIS out while revisions are being made for the final EIS, or to delay issuance of the draft EIS until the revisions can be made. Additional funding will need to be secured to undertake the revisions.

- If Alternative B is to be selected, which promotes a more rigorous regulatory review process, a minimum impact threshhold must be developed for the purposes of triggering a more rigorous permit review process under CWA Section 404. This threshold could also be used to establish which projects States could assume one-stop permitting responsibility under a CWA 404 State Programmatic General Permit (SPGP). The direct and indirect aquatic impacts from MTM/VF operations are arguably more than minimal, complicating the NWP 21 issue and SPGP development.

- Post Mining Land Use (PMLU) studies suggest that, in general, post- mining development has not occurred as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned have been developed, and must be included as commitments within the EIS. These incentives are especially important if the ruling in the recent KY lawsuit is upheld.

- Cumulative terrestrial impacts from MTM/VF activities are considered to be significant, and have a high level of public interest. Incentives to promote reforestation have been developed and must be included as commitments within the EIS.

From: <Dave_Densmore@fws.gov>
To: <HOFFMAN.WILLIAM@epamail.epa.gov>, <rider.david@epa.gov>, <suriano.elaine@epa.gov>, <Diane_Bowen@fws.gov>, <KATHERINE_L._TROTT@HQ02.USACE.ARMY.MIL>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>, <dhartos@osmre.gov>, <mrobinso@osmre.gov>, <JCOKER@OSMRE.GOV>
Date: Wed, Jun 12, 2002 10:06 AM
Subject: FWS EIS ISSUES

Folks:

A quick summary of FWS "issues" for discussion and/or inclusion in next week's agenda. I put these in the form of questions as they might be portrayed on the agenda:

1. Purpose: Do we all agree that the Purpose of this document (in the NEPA sense) remains as stated in previous drafts? If we agree that it is, fundamentally, to "develop coordinated decisionmaking to minimize impacts," what is the relative emphasis placed on "decisionmaking" versus "minimizing impacts"?

2. Alternatives: Based on recent events, do we need to change the framework for EIS alternatives? Can we all agree on what it will be? If we agree on the framework, do we identify a preferred alternative in the DEIS, and which one will it be?

3. Nationwide Permit Thresholds: If we are going to identify an alternative that does no more than refine the permit process, but places no absolute restrictions on mining (ie, an Alternative "B" scenario), do we also include a 404 permitting process that recognizes that some projects have more than minimal effects, and therefore will require an individual permit? If so, what threshold will we use?

4. Terrestrial Impacts: At this point, the EIS alternatives/actions focus almost exclusively on regulating aquatic impacts, with essentially no proposals to minimize terrestrial (ie, forest) losses. Does OSM have the authority through SMCRA to minimize such effects by setting appropriate performance standards for mine design and reclamation?

5. Flaws identified in the GIS/economic/cumulative effects models: Do we stick to the planned August 2002 DEIS publication date, and include greatly qualified study results, or do we take 6-8 months longer and spend more money to run some fixes of these studies, and publish a more defensible document? Will changes to the alternatives framework affect this decision?

6. What process do we follow to resolve disagreements on any of the above?

Needless to say, we probably can't get through all of these in a day, so we will need to decide which of these (and those of the other agencies) might be controlling the process, and start there......

DD.

EXHIBIT 30

A-86

Al Klein - EPA Expectations

From: <Rider.David@epamail.epa.gov>
To: <DHARTOS@OSMRE.GOV>
Date: 6/14/2002 7:03 AM
Subject: EPA Expectations
CC: <Hodgkiss.Kathy@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <Rider.David@epamail.epa.gov>, <dave_densmore@fws.gov>, <Charles.K.Stark@hq02.usace.army.mil>, <Katherine.L.Trott@hq02.usace.army.mil>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>, Al Klein <AKLEIN@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, Mike Robinson <MROBINSO@OSMRE.GOV>, <Suriano.Elaine@epamail.epa.gov>

Dave Hartos,
In response to your request for Agency major expectations for the agenda:

We fully support the present purpose statement.

EPA Expectations of the EIS

- Cumulative terrestrial impacts from MTM/VF activities are considered to be significant, and have a high level of public interest.
Incentives to promote reforestation have been developed and must be included as commitments within the EIS.
Post Mining Land Use (PMLU) studies suggest that, in general, post-mining development has not occurred as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned have been developed, and must be included as commitments within the EIS. These incentives are especially important if the ruling in the recent KY lawsuit is upheld.
Nationwide Permit Thresholds: We feel NWP 21 minimal impact thresholds to delineate surface coal mining excess spoil discharges in waters of the U.S. (individually and cumulatively) are required.
Consistent definitions of stream segments (ephemeral, intermittent, perennial) and field methods for delineating the segments are necessary.
A CWA and SMCRA permit coordination process should be instituted through formal MOU to evaluate joint permitting interests on a watershed basis.

Current Contracts:
It is my understanding that the current contracts end on 8/27/02. New work could be added only if a modification is processed by mid-July (there has to be reasonable opportunity to be able to complete the work by 8/27/02). A 90-day "extension" possibility (to 11/27/02) is a continuity-of-service-clause which means the work that could have been performed within the contract period was delayed due to circumstances beyond the control of either the contractor or EPA. There are no prospects to extend beyond 11/27/02 and any new contracts are uncertain at this time.

EXHIBIT 31

file://C:\Documents%20and%20Settings\aklein\Local%20Settings\TEMP\GW}00007.HTM 7/14/2003

(1014)

William Hoffman
06/14/2002 10:54 AM

To: dhartos@osmre.gov, mrobinso@osmre.gov, Dave_Densmore@fws.gov, Cindy_Tibbott@fws.gov, rhunter@mail.dep.state.wv.us, dvandelinde@mail.dep.state.wv.us, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, Charles.K.Stark@HQ02.USACE.ARMY.MILI
cc: Kathy Hodgkiss/R3/USEPA/US@EPA, Michael Castle/R3/USEPA/US@EPA, Rich Kampf/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA
Subject: EPA Expectations/Disputed Actions

This supplements/amends Dave Rider's previous submission:

EPA Expectations

EPA continues to support the original purpose for the EIS as stated in the Federal Register Notice of Intent. Our expectation is for the EIS to evaluate the environmental effects of mountaintop mining/valley fill activities, and to develop specific programmatic responses designed minimize or avoid the impacts that have been identified.

Disputed Actions

- Cumulative terrestrial impacts from MTM/VF activities are considered to be significant, and have a high level of public interest. Incentives to promote reforestation have been developed and must be included as commitments within the EIS.
- Post Mining Land Use (PMLU) studies suggest that, in general, post- mining development has not occurred as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned have been developed, and must be included as commitments within the EIS. These incentives are especially important if the ruling in the recent KY lawsuit is upheld.
- Nationwide Permit Thresholds: We believe NWP 21 minimal impact thresholds to delineate surface coal mining excess spoil discharges in waters of the U.S. (individually and cumulatively) are required.

EIS Contract Status

The current period of performance on the current EIS Delivery Orders (2) expire on 8/27/02. New work/dollars can be added to one of those Delivery Orders if a modification is developed by July 1, 2002 and processed by mid-July (there has to be reasonable opportunity to be able to complete the work by 8/27/02). A 90-day "extension" possibility to 11/27/02 exists if it can be shown that the work was delayed due to circumstances beyond the control of either the contractor or EPA. There are no prospects to extend beyond 11/27/02 under the existing EPA NEPA contract and the date for entering into a new "mission" contract is uncertain at this time.

William J. Hoffman (3ES30)
Acting Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency

EXHIBIT 32

(855)

Steven Neugeboren
06/18/2002 11:56 AM

To: Elaine Suriano/DC/USEPA/US, Susan Lepow/DC/USEPA/US, Cathy Winer/DC/USEPA/US, Gregory Peck/DC/USEPA/US, John Goodin/DC/USEPA/US, James Havard/DC/USEPA/US
cc:
Subject: Agenda and handout for 6/18 SES Issue Resolution Mtg. on MTM/VF EIS

This is the first I"ve heard of a meeting this week on mountaintop mining. I"m on travel all week (checking messages during a break). Elaine and Greg/John - could you please let cathy winer and susan lepow know the context and details for this meeting. thanks.

Elaine Suriano
06/17/2002 03:27 PM

To: Steven Neugeboren/DC/USEPA/US@EPA
cc:
bcc:
Subject: Agenda and handout for 6/18 SES Issue Resolution Mtg. onMTM/VF EIS

FYI - info to be discussed on 6/18.

Elaine Suriano
Office of Federal Activities
Environmental Scientist
Ph-202/564-7162, Fx-564-0072

US EPA (2252-A)
1200 Penna Ave., NW
Washington DC 20460-0001
----- Forwarded by Elaine Suriano/DC/USEPA/US on 06/17/02 03:26 PM -----

Mike Robinson <MROBINSO@OSMRE.GOV>
06/14/02 02:10 PM

To:Michael Castle/R3/USEPA/US@EPA, Rich Kampf/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Cindy_Tibbott@fws.gov, dave_densmore@fws.gov, diane_bowen@fws.gov, mamie_parker@fws.gov, Charles.K.Stark@hq02.usace.army.mil, Karen.Durham-Aguilera@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, James.M.Townsend@lrl02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, mcrum@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Al Klein <AKLEIN@OSMRE.GOV>, Dave Hartos <DHARTOS@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, Mary Josie Blanchard <MBLANCHA@OSMRE.GOV>cc:Subject:Agenda and handout for 6/18 SES Issue

EXHIBIT 33

Resolution Mtg. onMTM/VF EIS

Please see attached WP document in preparation for next week's meeting, as discussed in earlier (6/10 12:39 p.m.) e-mail.

6.18 Issue Res Mtg.wpt

DRAFT - This document is a pre-decisional draft document that has been prepared merely for discussions among the agencies preparing the MTM/VF EIS. This document should not be released under the FOIA in that it will (1) confuse the public and (2) stymie open dialogue between government staff who are jointly preparing the MTM/VF EIS.

Mountaintop Mining/Valley Fill Environmental Impact Statement
Senior Executive Issue Resolution Meeting
Interior South Building Room 332
June 18, 2002

PROPOSED AGENDA

9:00 a.m. Introductions

9:10 a.m. Purpose of Meeting

- Issue Resolution
- DEIS Direction
- Alternative Framework
- Lead Agency

9:15 a.m. Obligation under *Bragg* Settlement Agreement to Continue with the EIS

9:20 a.m. Agency Expectations for DEIS Accomplishments

9:50 a.m. Likely Criticism of DEIS by Public

- Public expectations for solutions and better definition of regulatory concepts after 3+ years not met
- May criticize for not addressing all mining activities or all resource impacts
- Does not drive quicker implementation of needed government actions to solve MTM controversy (will require time and $ for additional studies and NEPA documents)

10:00 a.m. Issues with Existing Alternative Framework

- No Steering Committee consensus
- Flawed technical studies
- Disagreement within Steering Committee on scope of analysis
- Haden II decision

Mountaintop Mining/Valley Fill Environmental Impact Statement
Senior Executive Issue Resolution Meeting
Interior South Building Room 332
June 18, 2002

PROPOSED AGENDA (cont'd.)

10:15 a.m. Proposed New Alternative Framework

- Summary Description of Concept (see handout)
- Discussion of Baseline (no action) Alternative
  - ✓ Pre-Haden I decision (majority position)
  - ✓ Post-improvements (new NWP 21, Fill Rule, etc.)
- Advantages of the new framework:
  - ✓ Retains work to date without reopening scoping
  - ✓ Allows completion of EIS in shorter time frame
  - ✓ Should not require additional contracting resources
  - ✓ Relies on EIS studies as *indicators* for preferred alternatives instead of seeking *absolutes* requiring additional study
  - ✓ Provides for each action agency to select areas for implementing improvements
- Disadvantages of new framework:
  - ✓ A minority of members feel that the new framework does not meet the NEPA requirements by providing a contrasting choices among several clear and distinct viable alternatives

10:45 a.m. Areas of Potential Disagreement on New Alternative Framework

- Option 1 - Appear in Alternative B, but is action agency's decision to place in Alternative C
- Option 2 - Action agency's decision whether to appear at all (in Alternative B)
- Option 3 - Actions in Alternative C are based on majority vote
- Actions were there is no statutory authority
- Brief description of terrestrial, post mining land use and AML funds use actions where disagreement exists

11:05 a.m. EIS Leadership Role

Mountaintop Mining/Valley Fill Environmental Impact Statement
Senior Executive Issue Resolution Meeting
Interior South Building Room 332
June 18, 2002

PROPOSED AGENDA (cont'd.)

11:15 p.m. EIS Schedule

- Schedule in consideration of logistics, court decisions and public expectations
- Contractual Concerns

11:30 a.m. Next Steps

- Formalization of Issue Resolution Process
- EIS Steering Committee Assignments
- Evaluate Schedule for Principals' Meeting (if necessary)
- Schedule Next Issue Resolution Group Meeting

12:00 p.m. Adjorn; Working Lunch to Continue Discussion; Lunch Break; or Convene Steering Committee for Follow-up Discussion

HANDOUT FOR SES/STEERING COMMITTEE ISSUE RESOLUTION MEETING

I. Refresh on Teleconference Meeting Decisions

Mountaintop Mining/Valley Fill
Environmental Impact Statement
Issue Resolution Process Conference Call
May 21, 2002--3:00 p.m.

MEETING NOTES--Page 1

Roll Call/Introductions

Statement of conference call objective-Initiate Issue Resolution Process

Formation of issue resolution working group (the group on this call is too large to be effective); what size group should engage?

Decision—1 SES voting members from each agency with support from:
- EIS Steering Committee (EISSC);
- 1 NEPA member from EPA, OFA;
- Facilitator preferable

Process Discussion:

- Reaching consensus/majority?
  Decision—consensus approach; one vote per agency for decision making on issue resolution (all decisions are subject to principal ratification)

- How are issues presented/resolved?
  Decision—
  - EISSC prepares position papers
  - EISSC presents position papers to SES/Policy group
  - EISSC answers questions/discusses; can convene to SC meeting in breakout room (if necessary); available for call-back

Mountaintop Mining/Valley Fill
Environmental Impact Statement
Issue Resolution Process Conference Call
May 21, 2002--3:00 p.m.

MEETING NOTES--Page 2

- SES/Policy Group discusses issues; develops executive direction or assignment to EISSC for more analysis, documentation, or development of issue paper for principals; conveys to EISSC next steps

- How soon/often/where to meet?
  Decision—
  - 1st meeting; face-to-face off-site meeting (allow enough time for EISSC to develop position papers, SES/Policy members to clear calendars)
  - Subsequent meetings, TBD [monthly conference call or as need determined by EISSC??]

Range of Issues:

- Technical study limitations (e.g., missing pieces, fix flaws now/later, $$$, etc.)
- Significance of technical study findings (indicators v. "bright lines," etc.)
- Appropriate alternative framework (contrast, what's baseline, Haden ruling, etc.)
- Adequacy of study findings to support alternatives
- Actions in dispute (cumulative terrestrial, PMLU, AML funding, fill v waste, etc.)
- Use of DEIS for NEPA compliance for agency actions (OSM rules, NWP21, WQ standards, etc.)
- Preferred alternative (consensus, agency choice, etc.)
- EISSC ground rules for operation (leadership, facilitation, membership, voting, FOIA release coordination, etc.)
- EIS Schedule

Next steps—wait for Principals

Adjourn

II. Why are we doing this EIS in light of recent events?

The December 23, 1998, settlement agreement voluntarily entered into by the U.S. Army Corps of Engineers (COE), West Virginia Department of Environmental Resources (WVDEP), and the plaintiffs in the lawsuit captioned Bragg, et al. v. Robertson, et al., Civ. No. 2;98-0636 (*Bragg*, S.D.W.Va.) settled all claims brought against the Federal defendant (i.e. the COE) for their alleged failure to carry out their statutory duties under the Clean Water Act (CWA) and the National Environmental Policy Act ("NEPA"). Even though, a similar lawsuit (Kentuckians for the Commonwealth, Inc. v. Rivenburgh Civ. No. 01-0770 (*KFTC*, S.D. W.Va.)) was filed against the COE by a new set of plaintiffs' and a summary judgement for the plaintiffs was granted by the court, there is no breach of the December 23, 1998, settlement agreement and the parties continue to be obligated by the terms of the agreement.

Paragraph 7 of the December 23, 1998, *Bragg* settlement agreement established long-term relief by committing the U.S. Environmental Protection Agency (EPA), the COE, the Office of Surface Mining (OSM), the U.S. Fish and Wildlife Service (FWS) and WVDEP to prepare an Environmental Impact Statement (EIS) on a proposal to "consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to water of the United States and fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills." On February 9, 1999, the agencies announced their intention to do an EIS in accord with the stated purpose of the December 23, 1998, agreement.

Overall, the recent events (i.e. the court's decision in *KFTC*; publication of the "fill" rule by the COE and EPA; and the reauthorization of Nationwide Permit 21) have not changed the purpose of the EIS as described in the December 23, 1998, settlement agreement and February 9, 1999, Federal Register notice. However, the EIS Steering Committee acknowledge that the alternative framework as depicted by the January 2001 version of the internal draft EIS document should be revised to move away from categorizing alternatives primarily based on fill restrictions and moving towards a more flexible framework to address a host of issues uncovered by the EIS studies and to fulfill needs of each of the agencies involved as part of the EIS.

III. Issues with Existing Alternative Framework

The following is an overview description of the current problematic alternative framework from the June 2002 internal working copy of the DEIS.

Table IV-1 Mountaintop Mining / Valley Fill EIS Alternative Summary	
Alternative A	No changes to the SMCRA and CWA programs in effect in 1998
Alternative B	Depending on the outcome of a detailed, permit-by-permit baseline data collection; thorough, site-specific, significant adverse impact analyses; and, consideration of alternatives for avoidance and minimization, valley fills could be allowed in ephemeral, intermittent, and perennial stream segments. Mitigation of unavoidable impacts would require in-kind replacement of aquatic functions and values within the watershed.
Alternative C	Valley fills could be located in ephemeral and intermittent streams. Permit-by-permit baseline data collection and site-specific alternatives analyses would be required (although not necessarily as rigorous as in Alternative B) to demonstrate that avoidance and minimization were considered. Mitigation options for unavoidable impacts would be somewhat more varied and thus more flexible than under Alternative B.
Alternative D	Valley fills could be located only in the ephemeral portion of streams. Permit-by-permit baseline data collection would be more limited than under Alternative B, and alternative analyses would demonstrate that minimization of downstream or indirect impacts were considered. Mitigation could include compensation in lieu of in-kind replacement of lost aquatic function and value.

Consensus does not exist among the agencies on this framework. Some agencies believe that the technical studies do not provide adequate data and analyses to support selecting an alternative based on watershed size restrictions. Several key technical studies needed to support the existing alternative framework are flawed and can only serve as indicators for environmental and economic consequences. Much additional time and money would be required to correct these deficiencies. Some agencies question the scope of analysis of the DEIS, suggesting that the purpose of the EIS is to evaluate not just fills, but the impacts of MTM as well. Others have been concerned about the lack of analysis on mining through streams, coal waste and other MTM impacts on WOUS. Several agencies feel that the focus of the current alternatives is weighted too heavily toward aquatic impacts and too light on terrestrial impacts. Finally, the recent Haden II decision in *KFTC* undermines the basic assumptions of the alternative framework by bringing into question the applicability of CWA 404 regulatory program for all but certain types of valley fills.

IV. Agency Expectations for EIS Accomplishments

The following statements were provided by each co-lead agency as a brief summary of what the respective agency believes is important in considering any new direction for this EIS or its alternative framework.

Fish & Wildlife Service

"FWS fully supports the stated purpose of the MTM/VF EIS; namely, 'to consider developing agency policies, guidance, and coordinated agency decision making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and fish and wildlife resources affected by mountaintop mining operations....'. The EIS should evaluate and inform agency decision makers and the public on the effects of mountaintop mining practices. This EIS should also serve as the starting point for regulatory agency actions that will result in the full utilization of their authorities to improve decision making and minimize the adverse environmental effects of these practices."

Environmental Protection Agency

"EPA continues to support the original purpose for the EIS as stated in the Federal Register Notice of Intent. Our expectation is for the EIS to evaluate the environmental effects of mountaintop mining/valley fill activities, and to develop specific programmatic responses designed minimize or avoid the impacts that have been identified."

Disputed actions which EPA believes should be addressed by the EIS:

"Cumulative terrestrial impacts from MTM/VF activities are considered to be significant, and have a high level of public interest. Incentives to promote reforestation have been developed and must be included as commitments within the EIS. Post Mining Land Use (PMLU) studies suggest that, in general, post-mining development has not occurred as envisioned when variances are requested from the requirements to return the land to a condition capable of supporting its prior use. Actions to ensure that PMLU development occurs as envisioned have been developed, and must be included as commitments within the EIS. These incentives are especially important if the ruling in the recent KY lawsuit is upheld."

EPA believes that the EIS should result in clear Nationwide Permit thresholds:

"We believe NWP 21 minimal impact thresholds to delineate surface coal mining excess spoil discharges in waters of the U.S. (individually and cumulatively) are required."

West Virginia Department of Environmental Protection

"Filling regulatory gaps to accomplish coordinated, consistent, efficient decision making in the regulation of mining operations to effectively protect the environment. Specific items of concern are:

1) interpretation/application of buffer zone rule
2) fill material definition
3) using ESA to prevent duplication of efforts
4) coordinated decision making, and
5) timely process to resolve differences between agencies"

Army Corps of Engineers

The COE believes the following issues should be addressed by the EIS:

"1. GIS-based Environmental/Economic Impact Model – interagency working group determined that it is flawed because it over estimates the economic impacts of regulation, and under estimates impacts to aquatic resources [not ready to support decision making; credibility issue also]

2. Stream Impact Analyses – macrobenthic and fisheries studies inconclusive; chemistry study identified potential issues associated with selenium but more study is needed to consider distance, time, amounts; limited data/sampling sets thus far; not ripe for impact assessment or decision making)

3. Scope of Analysis [critical issue for the Corps]

- Corps scope of analysis is limited to the aquatic environment – we do not regulate mining per say, and it is inappropriate to try to flex the Corps jurisdiction up-slope (OSM needs to change their regulations to better address terrestrial and social impacts)
- DEIS currently only evaluates alternatives focused on the aquatic environment – this is only half the answer – alternatives need to be formulated that address terrestrial and social impacts that are not the Corps responsibility; right now there is redundancy in "waters" and a void up-slope (OSM needs to change their regulations to better address terrestrial and social impacts)
- OSM staff reported at a May 15, 2002, meeting at CEQ that alternatives were developed in consideration of the authorities, funding, and existing programs of the agencies. Army pointed out and EPA and CEQ seemed to agree that the NEPA documents should identify broad ranges of alternatives, including alternatives that recommend new or modified authorities, funding increases, or program changes.

4. Need to Complete the DEIS –The use of this document to Army and the Corps, if it does not include evaluations of all of the environmental impacts of Mountaintop Mining/Valley Fills, is minimal. We are proceeding with developing consistency within our agency on 1) waters of the U.S. jurisdictional extent, 2) a stream assessment protocol, 3) mitigation requirements and 4) minimal and cumulative impacts thresholds. Unless this document can serve as an umbrella document that can be tiered off of under NEPA, it does not serve a function for our agency. The Corps will not agree to a set size restrictions on the use of NWP 21, but is working diligently on consistency for its use.

5. Preferred Alternative – The draft letter from Mr. Griles (DOI) to the Principals of the Steering Committee focuses on the issue of whether or not the DEIS should identify a preferred alternative, and recommends that "at a minimum, this requires identification of a preferred alternative". Based on issues 1-4 summarized above, it is premature to make this very important decision.

BOTTOM LINE: DEIS is not acceptable to Army in its current state. The GIS-based model should be redone, additional analysis on selenium impacts should be accomplished, and terrestrial alternatives need to be identified and evaluated in accordance with NEPA. Army recommends delaying release of the DEIS until these actions are completed (8-12 months?)."

Office of Surface Mining

- "Provide a defined, efficient, and stable regulatory framework to assure compliance with the Clean Water, Surface Mining Control and Reclamation, and Endangered Species Acts Finalize the MTM/VF EIS so that the *Bragg* settlement agreement is satisfied/ and closed out and that necessary programmatic changes can actually be implemented by the agencies to realize on the ground improvements and eliminate the current atmosphere of regulatory uncertainty.
    - Avoids, minimizes and mitigate impacts to aquatic and other environmental resources, to the extent allowed by federal law, while still providing for the nation's considerable energy needs.
    - Clarifies CWA statutory and regulatory concepts such as impact thresholds, how to value streams, and acceptable mitigation practices that will offset unavoidable impacts
    - Provide, where possible within SMCRA authority, OSM regulatory requirements consistent with the CWA
    - Coordinates implementation of agency permitting and oversight programs so as to eliminate redundant reviews of proposals by different agencies where statutory or regulatory requirements overlap.
    - Assures best science is utilized to document the significance of impacts objectively for agency decision making"

V. Proposed EIS Alternative Framework

The EIS Steering Committee has tentatively agreed to an alternative framework, consisting of three alternatives:

No Action Alternative (A)- Administering the respective programs in accord with the programs' controls and interagency decision making processes in place prior to December 23, 1999. (This baseline may be open for discussion because of some agencies' implementation of regulatory changes since 1998 to address MTM/VF issues).

Alternative B - (Most Environmentally-Protective Alternative) From the 60+ actions that have been identified so far to reduce impacts identified by the technical studies conducted for the EIS, this alternative would represent the suite of actions that would result in the most environmentally-protective alternative (i.e., restricting fills to the ephemeral zone, development of PMLU criteria and bonding requirements to assure planned development occurs, development of improved reforestation techniques where reforestation is the approved PMLU, improved permit review and coordination procedures, etc.(See footnote 1). Note that the most environmentally-protective alternative excludes economics and administrative difficulty from consideration.

Alternative C (Agencies' Preferred Alternative) - From the 60+actions that have been identified so far to reduce impacts, the suite of actions that have been determined to be most efficient and effective ways of improving the regulatory programs to address scoping concerns. This suite of actions takes economic and administrative considerations into account. The technical studies will provide indicators in support of analysis of the relative environmental and economic effects of Alternative B actions and justification for selection of preferred actions for Alternative C. Action agency(ies) may be afforded deference on whether or if a particular method of action implementation is listed under this Alternative C[1].

1

Subordinate Issue - The question was raised whether all 60 possible actions should be listed in Alternative B or whether the agency with ultimate responsibility of implementing an action should have the right to reject an action outright?

Of the 60 possible actions currently being considered, some may be more viable than others in addressing EIS scoping issues. Some agencies on the EIS Steering Committee may even view a small minority of actions as counterproductive. I.e., an action may make a problem worse instead of improving the regulatory program; or, there may be fundamental Constitutional legal issues, such as takings implications, which make an action inadvisable. NEPA does not support presenting unreasonable alternatives.

DRAFT - This document is a pre-decisional draft document that has been prepared merely for discussions among the agencies preparing the MTM/VF EIS. This document should not be released under the FOIA in that it will (1) confuse the public and (2) stymie open dialogue between government staff who are jointly preparing the MTM/VF EIS.

The EIS Steering Committee recommends that the preferred Alternative C (suite of preferred actions) be identified in the draft EIS, which will be released to the public. Based on public comments, the suite of preferred actions may change:

- actions identified but not selected in Alternative B may be added to the suite of recommended actions;
- some actions may be deleted from the preferred suite; and
- other actions may be modified

The timing and means of implementation of the individual action recommendations will be the responsibility of the action agency(ies). Agency implementation of actions may require additional information (study and/or analysis) and NEPA compliance to supplement the information in the MTM/VF EIS.

What are the advantages of the proposed EIS alternative framework?

- ☐ Individual actions will be selected on their merit; opposed to attempting "lump" many unrelated actions under a single alternative.
- ☐ The importance of any one EIS study become less important than the overall indications presented by all studies. No additional studies or supplement of additional studies will be needed.
- ☐ Minimal delays in moving forward with draft EIS.
- ☐ Maintains current list of actions in a "repackaged" framework, which will mute somewhat public perception that the DEIS has been radically altered from draft versions released and widely circulated
- ☐ General agreement among the EIS agency representatives on the revised framework.
- ☐ Deference to the action agency, if decided, limits Steering Committee disagreement.

What are the disadvantages of the proposed framework?

- ☐ A minority of members feel that the new framework does not meet the NEPA requirements by providing a contrasting choices among several clear and distinct viable alternatives

---

On the other hand, other agencies on the EIS Steering Committee feel that all 60 possible actions have some potential merit and full disclosure will show that a wide range of solutions were considered as potential government actions in the EIS. The Alternative B analysis will show why a particular action is not listed in the preferred suite of Alternative C.

John Goodin
06/20/2002 08:44 AM

To: Clay Miller/DC/USEPA/US
cc: Brende Mallory/DC/USEPA/US@EPA, John Lishman/DC/USEPA/US@EPA
Subject: EIS

Kathy Hodgkiss (R3 WDD) has committed to weekly phone calls at 9:00am on Thursdays with the WD to keep coordination tight

---

We've moved! Please note that all my contact information except my e-mail address has changed. Effective March 11, 2002, I can be reached at:

phone: 202-566-1373
fax: 202-566-1375

mailing address:
Wetlands Division (4502T)
US Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

street address:
EPA West -- Room 6105R
1301 Constitution Avenue, N.W.
Washington, D.C. 20004
----- Forwarded by John Goodin/DC/USEPA/US on 06/20/02 08:43 AM -----

Gregory Peck
06/20/02 08:26 AM

To: John Goodin/DC/USEPA/US@EPA, Clay Miller/DC/USEPA/US@EPA
cc:
Subject: EIS

This train is leaving the station so if we have any issues we better get them raised very soon. Can we talk about this today or tomorrow?

Thanks
----- Forwarded by Gregory Peck/DC/USEPA/US on 06/20/02 08:24 AM -----

William Hoffman
06/19/02 04:16 PM

To: "Stump, Jennifer M." <jstump@GFNET.com>, Andy Mozynski/DC/USEPA/US@EPA
cc: Elaine Suriano/DC/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, mrobinso@osmre.gov, Charles.K.Stark@hq02.usace.army.mil, Dave_Densmore@fws.gov, dvandelinde@mail.dep.state.wv.us, Michael Castle/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
Subject: Re: out of office

Jennifer/Andy:

At our meeting on Tuesday, we agreed on the attached revised framework for the EIS, and the Steering Committee will be meeting in Pittsburgh July 1-3 to refine. Alternative A continues to be the baseline or no-action alternative, B is the most environmentally protective alternative suite of actions (discounting administrative ease and/or economic considerations), and C would be the agencies preferred alternative suite of action items. The action items would be listed by environmental issue area much as we did for the current arrangement. I presume Alternative C will be very similar to the current B; and that B will be a collection of actions that the agencies agree are the most restrictive/protective measures (restricting to the ephemeral zone, enhanced monitoring, in-basin/in-kind mitigation, etc etc). All sixty+ possible actions would be described as potential actions in the body of the alternatives analysis, would be analyzed

EXHIBIT 34

separately in the EIS, and would end up in either Alt B or C, or would be dismissed by the agencies.

For planning purposes, DO 4002's new Task 3 will probably direct GF to: a) Attend a meeting (or call) with the Steering Committee during the week of July 8th so the new alternative structure can be laid out more formally; b) Reorganize the EIS using the new alternative construct provided by the Agencies during the July meeting; c) Submit a revised working draft during the week of August 12th; d) Receive comments and/or meet with the Agencies during the week of August 19th to revise the document; and, e) submit a concurrence copy by August 27th.

It is my understanding that if the contractor can't meet the dates due to circumstances beyond its control (the agencies don't get the alternative structure or their comments to the contractor in a timely manner), the period of performance can be extended past August 27th.

Andy- is this enough for you to get the new Task going contractually? I am out until Monday. Elaine can probably help clarify this if you can't reach me. Stay tuned everyone!

Bill

RevisedAlternativesStructure.w

William J. Hoffman (3ES30)
Acting Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

"Stump, Jennifer M." <jstump@GFNET.com>

"Stump, Jennifer M." <jstump@GFNET.com
>
06/19/02 10:05 AM

To: William Hoffman/R3/USEPA/US@EPA
cc:
Subject: out of office

Hi, want to give you a heads up. If you need anything from me before July 1, please get in touch with me today or early tomorrow. I will be out of the office for a project in Alaska starting Friday June 21. I will be in the field without my laptop. I will not be checking e-mail until July 2. I will try periodically to check my voice mail messages but this will be sporadic.

Jennifer Stump
GANNETT FLEMING, INC.
207 Senate Ave. Camp Hill, PA 17011
Phone: (717) 763-7212, ext. 2885
Fax: (717) 763-7323

<u>Proposed EIS Alternative Framework</u>

No Action Alternative - Administering the respective programs in accord with the program controls and interagency decision making processes in place prior to December 23, 1999. (This baseline may be open for discussion because of some agencies' implementation of regulatory changes since 1999 to address MTM/VF issues). Under this alternative, the impacts of mountaintop mining/valley fill operations would be described based upon the technical studies conducted to date by the agencies.

Alternative B - (Environmentally Preferable Alternative) From the 60+ actions that have been identified so far to reduce impacts identified by the technical studies conducted for the EIS, this alternative would represent the suite of actions that would result in the <u>least</u> environmental impact (ie- restricting fills to the ephemeral zone, development of PMLU criteria and bonding requirements to assure planned development occurs, development of improved reforestation techniques where reforestation is the approved PMLU, improved permit review and coordination procedures, etc). Note that the environmentally preferable alternative excludes economics and administrative difficulty from consideration. It is simply the environmentally preferable alternative.

Alternative C (Agencies' Preferred Alternative) - From the 60+actions that have been identified so far to reduce impacts, the suite of actions that have been determined to be most efficient and effective ways of improving the regulatory programs to address scoping concerns. This suite of actions takes economic and administrative considerations into account. The technical studies will provide indicators in support of analysis of the relative environmental and economic effects of Alternative B actions and justification for selection of preferred actions for Alternative C.

The EIS Steering Committee recommends that the preferred Alternative C (suite of preferred actions) be identified in the draft EIS, which will be released to the public. Based on public comments, the suite of preferred actions may change:

a. actions identified but not selected in Alternative B may be added to the suite of recommended actions;
b. some actions may be deleted from the preferred suite; and
c. other actions may be modified

The timing and means of implementation of the individual action recommendations will be the esponsibility of the action agency(ies). Agency implementation of actions may require dditional information (study and/or analysis) and NEPA compliance to supplement the ıformation in the MTM/VF EIS.

064

Kathy Hodgkiss
06/27/2002 08:39 AM

To: Elaine Suriano/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, John Goodin/DC/USEPA/US@EPA
cc:
Subject: Mock-up of Proposed new Alternative Framework

Kathy Hodgkiss, Acting Director
Environmental Services Division
U.S. EPA Region 3
215/814-3151

----- Forwarded by Kathy Hodgkiss/R3/USEPA/US on 06/27/02 08:35 AM -----

William Hoffman
06/27/02 06:23 AM

To: Kathy Hodgkiss/R3/USEPA/US@EPA, Rider.David@EPA.GOV@EPA, Somerville.Eric@EPA.GOV@EPA
cc: Donald Welsh/R3/USEPA/US@EPA, Voltaggio.Tom@EPA.GOV@EPA, Kampf.Rich@EPA.GOV@EPA
Subject: Mock-up of Proposed new Alternative Framework

For the call this morning, this matrix is pretty close to representing how the actions would look under the new framework. Some of the actions from B may still need to get pulled into C (and it appears that OSM still has a problem with including some of them into B). This will be flushed out next week in Pittsburgh.

Dave Rider said he saw a presentation yesterday on the KY stream assessment protocol that the COE is floating as the tool for determining if NWP21 applies and said it looked pretty good. This makes me more comfortable with the wording of those related actions in the matrix.

Have fun on the call today. I will be on a treadmill getting injected with isotopes. Sound like more fun than you'll be having on the call!

William J. Hoffman (3ES30)
Acting Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

----- Forwarded by William Hoffman/R3/USEPA/US on 06/27/02 06:13 AM -----

Mike Robinson
<MROBINSO@OSMRE.GOV>
06/26/02 02:46 PM

To: Michael Castle/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cindy_Tibbott@fws.gov, dave_densmore@fws.gov, jstump@gfnet.com, Charles.K.Stark@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, gconrad@imcc.isa.us, James.M.Townsend@lrl02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Paul.Rothman@mail.state.ky.us, bci@mme.state.va.us, lsv@mme.state.va.us
cc: Al Klein <AKLEIN@OSMRE.GOV>, Dave Hartos <DHARTOS@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, John Craynon <JCRAYNON@OSMRE.GOV>, Jeffrey Jarrett <JJARRETT@OSMRE.GOV>, Mary Josie Blanchard <MBLANCHA@OSMRE.GOV>, Stephen Sheffield <SSHEFFIE@OSMRE.GOV>
Subject: Mock-up of Proposed new Alternative Framework

Attached is our promised preliminary attempt to take a reasonable facsimile of existing actions from the June 2002 Alternative (Chapter IV) from the G-F CD of the DEIS and "repackage" them in the recently-proposed framework sanctioned for trial by the SES Issue Resolution Group. Please review the approach and be prepared to discuss the document or other options at our meeting next Monday here in Pittsburgh.

Also consider when you think about this document that there are (at least) a couple or three other ways to present the Alternatives framework. As discussed with CEQ on Monday, the Baseline (pre-1998) presented in the attached document could be merged as part of Alternative A, representing "where we've been" and "where we are now;" or, the example No Action Alternative A could be merged with Alternative C to represent "where we are now" and "where we are going." The other approach was as described by Dinah Bear in the Spotted Owl case--a two-step approach: the baseline becomes an alternative (although generally infeasible) upon which to compare the no action (Alt A), and Alt's B and C are compared to A. If you followed that explanation, congratulations! If not, we'll sort it out next week.

Please note that the former "Tier III" actions are italicized and the "disputed actions" are in bold.

RevisedActionMatrix4Alt.June2f

EXHIBIT 35

Mountaintop Mining/Valley Fill EIS Alternative Framework

(June 26, 2002 v.)

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Fill Restrictions				
Direct Stream Loss				
Between 1985 and 2001 ~650 miles of ~55,000 miles of intermittent and perennial streams in the EIS study area were directly covered by valley fills.	COE basis for authorizing fills with Nationwide Permit (NWP) 21 is the SMCRA permit. OSM historically interpreted the "stream buffer zone" regulation to not apply to the "footprint" beneath excess spoil fills. No specific minimal impact threshold established to delineate NWP and individual permit (IP) process.	COE reviews proposals to fill "waters of the United States" (WOUS) to determine if the extent of fill may be authorized under the NWP 21 or an IP, considering site-specific stream functional values, avoidance, minimization, and mitigation ("no net loss") to offset unavoidable impacts. OSM interprets the "stream buffer zone" regulation to not apply to the "footprint" beneath excess spoil fills and defers to decisions by COE on fill authorizations. COE utilizes, as a general rule, based on a regional permit condition, fills draining a watershed of 250 acres to establish the demarcation of NWP 21 eligibility. Site specifics cumulative impacts or fills in larger watersheds would require an CWA 404 IP, but would also require mitigation of unavoidable impacts.	Clean Water Act Section 404 authorities, found at 40 CFR 230.10 and/or 231.1, prohibit the placement of excess spoil in WOUS. OSM will propose to modify or issue new rules regarding incursions in WOUS consistent with CWA requirements. No minimal impact threshold would be required, as fills would not be authorized under CWA 404.	COE reviews proposals to fill "waters of the United States" (WOUS) to determine if the extent of fill may be authorized under the NWP 21 or an IP, considering site-specific stream functional values, avoidance, minimization, and mitigation ("no net loss") to offset unavoidable impacts. OSM will propose to modify or issue new rules regarding incursions in WOUS consistent with CWA requirements. The COE, following data collection and experience based on the general regional condition (250-acre) minimal impact threshold, will establish refined minimal impact thresholds (individually and cumulatively) for use in determining the applicability of NWP 21 or IP application and review.
Stream Impairment				

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Studies indicate that MTM / VF increases mineralization of streams: evidenced by a rise in sulfates, specific conductance and other parameters. This may also cause a biologic shift from pollution-intolerant to pollution-tolerant macro-invertebrates and fish species.	EPA or the appropriate State agency require coal companies to monitor all point source discharges from MTM / VF sites in accordance with NPDES program. Generally physical parameters monitored include flow, pH, iron (Fe), aluminum (Al), manganese (Mn), and total suspended solids (TSS). Discharge limits are based on 40 CFR 434 (treatment standards), and applicable State or Federal water quality standards.	EPA and the COE have developed, in cooperation with OSM and the states, stream monitoring protocols to document the conditions pre-mining (baseline), during-, and post-mining where mining proposals with fills in watersheds greater than 250 acres or valley fills where past fills cover more than 25% of the watershed.	Because fills would not be authorized in WOUS, monitoring requirement would be limited to those criteria appropriate for assessing the indirect effects of MTM/VF on the downstream aquatic ecosystem.	EPA will continue to evaluate the effects of mountaintop mining operations on stream chemistry and biology. As appropriate, EPA will develop and propose criteria for additional chemicals or other parameters (e.g. biological indicators) that would support a modification of 40 CFR 434, or applicable State or Federal water quality standards.

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Stream Impairment (cont'd.)				
	SMCRA agencies require coal companies to submit pre-permit baseline data to document, under seasonal conditions, the pre-mining conditions of streams and water bodies that could be affected by mining. Monitoring of streams and point source discharges continue after the SMCRA permit is issued. Baseline and post-permit approval information contains, at a minimum, data on total suspended solids (TSS), total dissolved solids or specific conductance, pH, total iron (Fe), and total manganese (Mn). Acidity and alkalinity data is provided if there is a potential for acid mine drainage. Point sources are monitored in accordance with NPDES parameters.	While no modification of OSM baseline water quality/quantity requirements have occurred, companies seeking CWA 404 approval are collecting and submitting the EPA protocol information as part of the SMCRA permitting process in WV.	OSM will change pre-application, during-mining, and post-mining monitoring requirements to consistently reflect any changes in CWA rules, policies, or guidelines.	OSM will change pre-application, during-mining, and post-mining monitoring requirements to consistently reflect any changes in CWA rules, policies, or guidelines.
Fill Minimization				

Page 3 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
The quantity of spoil that is necessarily excess is not affirmatively demonstrated as part of fill minimization, nor has the siting of valley fills been based on the most environmentally protective practicable alternative.	CWA Section 404 program requires that the applicant demonstrate that placement of fill into "water of the United States" is necessary after avoiding, minimizing, and mitigating unavoidable impacts. Applications must include an analysis of "upland" alternatives out of streams. However, COE deferred judgement, assuming SMCRA permit considered fill necessity and minimization criteria. SMCRA requires that all mine spoil necessary to achieve backfill the mined area to approximate original contour (AOC) or variations to AOC to support the post mining land use be returned to the mined area. OSM defers final judgment to the appropriate SMCRA authority as to whether these requirements have been achieved. State SMCRA agencies do not require a demonstration that excess spoil has been avoided or minimized.	COE independently reviews information contained in SMCRA permit application to determine whether the CWA Section 404 requirements for necessity and minimization have been satisfied. OSM encouraged states to develop protocols for fill minimization. WVDEP implements AOC+. Tennessee develops fill minimization policy. OSM assists Virginia and Kentucky develop a fill minimization process.	No fill minimization necessary, inasmuch as fills prohibited in WOUS.	COE will establish policy or guidelines on what analyses are sufficient to demonstrate avoidance and minimization of fill placement in WOUS. OSM will develop guidance, policy, or initiate rule making, consistent with CWA requirements, to account for excess spoil and backfill volume material balance. Program changes will require that the SMCRA permit application include an alternative analysis of all potential locations for excess spoil fills in the permit and adjacent areas to ensure excess spoil placement in WOUS has been minimized to the maximum extent practicable.

Page 4 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Stream Habitat, Aquatic Functions, Groundwater				

Page 5 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
There is inadequate guidance how to delineate and assign value to aquatic resource functions for the purposes of impact prediction, avoidance and minimization decisions, and compensatory mitigation requirements.	COE NWP issuance based on SMCRA permit approval. Mitigation not required by COE, but varied compensatory required by states.	Ecological function and value assessed based on the surrogate water quality information collected in the SMCRA permit and applicant's submission of data following EPA/COE chemical/biological parameter monitoring protocol. Best professional judgement used to determine acceptable mitigation on a project-specific basis.	No guidance required to assign value to aquatic resource functions because fills prohibited in WOUS.	The COE will work with EPA and the states to establish uniform, science-based methods for assessing ecological function and value for purposes of permit decision-making and determining mitigation requirements; and for designating specially protected areas (such as listed species habitats, stream reaches supporting naturally diverse and high quality aquatic populations; sole or principal drinking water source aquifers).
Various state and federal programs have different ways of defining stream characteristics and the field methods for delineation; this has resulted in confusion among the regulators, the regulated community, and the public.	The COE uses the defined "bed and bank" and "ordinary high water mark" method for field determination of WOUS.	The COE uses the defined "bed and bank" and "ordinary high water mark" method for field determination of WOUS.	The COE, working with OSM and state agencies, will develop guidance, policies, or institute rule making for consistent definitions of stream characteristics as well as field methods for delineating the characteristics. The COE will define "bed and bank" determination protocols so assessments by COE, other federal agencies, applicants, and other stakeholders can be consistently applied in the field to determine WOUS.	The COE, working with OSM and state agencies, will develop guidance, policies, or institute rule making for consistent definitions of stream characteristics as well as field methods for delineating the characteristics. The COE will define "bed and bank" determination protocols so assessments by COE, other federal agencies, applicants, and other stakeholders can be consistently applied in the field to determine WOUS.
	SMCRA program utilizes stream segment (ephemeral, intermittent, perennial) definitions. State definitions for stream characteristics differ widely.	SMCRA program utilizes ephemeral, intermittent, and perennial definitions to describe stream characteristics.	OSM will revise or add regulations and/or develop guidance on stream characteristics and/or field monitoring protocols to make the SMCRA program consistent with CWA requirements.	OSM will revise or add regulations and/or develop guidance on stream characteristics and/or field monitoring protocols to make the SMCRA program consistent with CWA requirements.
	[Note: the baseline or no-action alternative do not have descriptions of the existing or past programs with respect to the Tier III actions. Should we create them?]		*[Note: Italicized action are former "Tier III" actions]* *OSM and EPA could consider whether incorporating additional requirements for groundwater impact (quantity and quality) analysis are warranted. Protocols might be developed for determining the minimal impact thresholds for groundwater impacts.* *OSM could work with the states to develop a guidance manual encompassing appropriate engineering and environmental considerations and practices to ensure that sediment ponds are placed as close as possible to the toe of valley fills, as required by 30CFR §816.46(c)(1)(ii) or the equivalent state regulation.*	

Page 6 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
		Offset Unavoidable Impacts		
Effectiveness of Mitigation				
Effectiveness of compensatory mitigation projects to make up for loss of stream habitat and aquatic functions is unknown. Mitigation determinations are inconsistent from state to state. No set values have been established to compensate for aquatic functions impacted and no yardstick for mitigation ratios exist.	COE defers compensatory mitigation for coal mining activities to state water quality authorities. Mitigation is associated with state water quality certification (CWA 401) of proposed CWA 404 permit. Thresholds and mitigation requirements vary from state to state but usually involvement to payment for loss of streams as opposed to restoration of stream habitat and aquatic functions. No CWA performance bond required. SMCRA requires on-site mitigation and performance bonds are posted to assure reclamation is accomplished.	COE releases NWP 21 requiring District Engineer to consider mitigation (restoration of aquatic function and values on- or off-site) to offect <u>all</u> cases of unavoidable impacts. BPJ used to determine adequate mitigation rations and types. No mitigation scales or values established. No CWA performance bond required. SMCRA bonds cover on-site mitigation only.	CWA mitigation not required, as no fills permitted in WOUS. CWA bonding for mitigation not required, as no fills permitted in WOUS. *<u>[Note: This Tier III action would not be required if fills are prohibited in WOUS, however it could be a desired action by COE in Alt. C.]</u> CWA regulatory authorities will assess aquatic ecosystem restoration methods for mined lands and promote demonstration sites. COE will also work with academia and industry to develop a "best management practices or BMPs" manual for restoration or replacement of aquatic resources--including detailed information on the delineation, protection, mitigation, restoration and replacement of streams, riparian zones, and related ecological resources.*	COE will require mitigation/compensation ranging from in-basin and in-kind to replace impacted aquatic habitat values in perennial streams to compensatory mitigation possible as impacts affect only ephemeral streams. COE will establish permit inspection schedules and establish financial liability (e.g., bonding and/or insurance) to assure reclamation and mitigation/compensation projects are completed successfully. Once mitigation requirements arte established, OSM and the COE could work to coordinate SMCRA and CWA requirements to establish financial liability (e.g., bonding and/or insurance) to assure reclamation and mitigation/compensation projects are completed successfully.
		Minimizing Environmental Effects of Multiple Surface Coal Mining Permits within a Cumulative Impact Area		
Cumulative Impacts				

Page 7 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Cumulative Impacts: Over 1% of steep slope Appalachian coalfield headwater streams have been eliminated by valley filling. A reduction of interior forest tracts could jeopardize T&E songbirds and other mammal and herptofaunal species. Past mining changed forested ecosystem to successional habitat, which could take hundreds of years to return to forested and native species habitat.	The COE is required by NEPA to consider the cumulative effects on the human environment prior to granting CWA 404 IPs. TMDLs guide NPDES for impaired streams on CWA 303(d) list. SMCRA regulatory agencies consider the cumulative hydrologic effects (quantity and quality) of the proposed mining operations, past mining operations, and all anticipated operations in the decision wether to issue a SMCRA permit.	The COE is required by NEPA to consider the cumulative effects on the human environment prior to granting CWA 404 Ips. TMDLs guide NPDES for impaired streams on CWA 303(d) list. SMCRA regulatory agencies consider the cumulative hydrologic effects (quantity and quality) of the proposed mining operations, past mining operations, and all anticipated operations in the decision wether to issue a SMCRA permit.	CWA regulatory authorities will establish a rebutable presumption that at least one headwater stream per tributary system must be preserved or reconstructed in a natural condition in order to maintain a contribution to downstream aquatic energy needs. TMDLs guide NPDES for impaired streams on CWA 303(d) list. SMCRA regulatory agencies consider the cumulative hydrologic effects (quantity and quality) of the proposed mining operations, past mining operations, and all anticipated operations in the decision wether to issue a SMCRA permit. If Congressional authority established, cumulative terrestrial impacts will be considered in permit decisions.	CWA regulatory authorities will establish a rebutable presumption that at least one headwater stream per tributary system must be preserved or reconstructed in a natural condition in order to maintain a contribution to downstream aquatic energy needs. TMDLs guide NPDES for impaired streams on CWA 303(d) list. SMCRA regulatory agencies consider the cumulative hydrologic effects (quantity and quality) of the proposed mining operations, past mining operations, and all anticipated operations in the decision wether to issue a SMCRA permit.

Page 8 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Minimizing Environmental Effects of Multiple Surface Coal Mining Permits within a Cumulative Impact Area (cont'd)				
Cumulative Impacts (cont'd)				

Page 9 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
If increases in reforestation and native habitat reclamation do not occur, future mining may affect as much as 10% (500,000 acres) of the forested WV ecosystem (5,900,000 acres, or 88% of the current land use) in WV. Past mining affected more than 300,000 acres and current mining affects around 243,000 acres in WV (part of the 12% non-forested land use).			*COE and EPA will prepare a guidance document to assure that applicants provide adequate information for use in NEPA compliance with respect to the required cumulative impact assessments of mining and other non-mining types of watershed disturbances.* *State and Federal regulatory authorities could explore development of an electronic permit application system, feeding a national, digital data system to support the permit application process--containing all state and federal baseline data/analysis requirements.* *Watershed planning groups could be promoted, including all stakeholders, to advise agencies on abandoned mine-land reclamation, mining concerns, land use aspirations, etc. Mining companies could be encouraged to establish more consistent and effective outreach with citizens and local communities in watersheds affected by their operations.* *EPA and the states could sponsor research to evaluate sediment discharges from timber harvesting and road building/use as they combine or compare with mining.* *CWA authorities will establish "total maximum daily loads" (TMDLs) under the Clean Water Act for pollutants affecting watersheds in mountaintop mining areas. In addition to mining, both point and non-point source pollutant discharges from similar industrial and agricultural activities such as timbering, road building and other construction that contribute similar pollutants in a watershed would be regulated.* *OSM could consider rulemaking on contemporaneous reclamation provisions to ensure that these provisions are adequate to minimize both the extent of disturbance at any one time and the time period for which a*	

Page 10 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Minimizing Environmental Effects of Multiple Surface Coal Mining Permits within a Cumulative Impact Area (cont'd)				
Cumulative Impacts (cont'd)				
			SMCRA and CWA regulatory authorities could encourage reclamation of previously mined areas as a possible offset to civil penalties. *Create "land trusts," mitigation "banking" of pristine areas, or other creative mitigation techniques (such as AML reclamation, carbon sequestration credits, etc.) to offset mining impacts.*	
Best Management Practices				
Deforestation				

Page 11 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Effects of MTM/ F and resulting deforestation/forest fragmentation on plants and wildlife Large mountaintop mining operations typically utilize grass species for quick erosion control. This type of vegetation, combined with compaction, inhibits the growth of trees-either where forestry is the planned PMLU or when natural succession invasion by woody species occurs. Natural succession is further impeded because there are large expanses of grassland species between forest edge, for which invasion of native seed sources cannot eclipse but over many hundreds of years. Topsoil substitution does not result in salvaging organics from native topsoil, which further restricts replacement of native seed sources.	Non-harvested forest material is burned or buried. Topsoil substitution will predominate on MTM/VF operations. OSM and State regulatory authorities work with academia, industry and others to promote the benefits and the best technology for growing trees on reclaimed mines sites. Best management practices are incorporated into technical guidance distributed to the coal industry to encourage proper soil handling techniques to avoid over compaction, to identify the best growth medium for growing trees, and optimal revegetation techniques to avoid competition by selecting appropriate herbaceous cover and to promote the growth of commercially viable trees and native hardwoods.	WV, KY, and VA have successful reforestation guidelines. OSM's reforestation initiative is seeking incentives for and identifying impediments to reclamation with trees. OSM and State regulatory authorities work with academia, industry and others to promote the benefits and the best technology for growing trees on reclaimed mines sites. Best management practices are incorporated into technical guidance distributed to the coal industry to encourage proper soil handling techniques to avoid over compaction, to identify the best growth medium for growing trees, and optimal revegetation techniques to avoid competition by selecting appropriate herbaceous cover and to promote the growth of commercially viable trees and native hardwoods.	If Congressional authority established, reclamation with trees would be deemed the preferable land use where forestry was the pre-mining condition unless documentation provided to demonstrate alternative uses created improved economic or environmental benefit. OSM will develop BMP manuals on growth medium segregation, forestry reclamation, and other terrestrial habitat improvements. OSM will also continue the reforestation initiative with education, training, technology transfer, and cooperation between OSM, states, industry, researchers, and landowners on the benefits and methods to effectively and economically reclaim to trees. *State fish and wildlife agencies, in cooperation with FWS, could revise State fish and wildlife plans, if necessary, and develop guidance and training to promote biological sustainability and re-introduction of native plants (including hardwoods and fruit trees).*	OSM, in cooperation with the states and research community, will develop guidelines identifying state-of-the-science, best management practices (BMPs) for: 1) selecting appropriate growth medium from available topsoil, weathered subsoil and underlying overburden, or topsoil substitute and development of the best reclamation plan to best support the intended post-mining land use (PMLU) and/or enhance natural succession or re-establishment of native riparian or wildlife habitat; 2) reducing soil compaction of the growth medium--particularly where trees are intended; 3) using less competitive herbaceous ground cover to encourage tree growth and control erosion; 4) selecting tree and shrub species suitable for the final-graded spoil and the approved PMLU; 5) creating permit-specific or programmatic standards for measuring the success for tree, shrub stocking, and ground cover; 6) utilization of slash and non-harvested forested materials; and 7) maximizing to the extent economically practicable, the commercial recovery of forest products prior to initiating mining activities. OSM will continue its reforestation initiative through education, training, technology transfer, and cooperation between OSM, states, industry, researchers, and landowners on the benefits and methods to effectively and economically reclaim to trees.

Page 12 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Best Management Practices (cont'd.)				
Blasting				
Effects of MTM on communities, homes, water wells, and quality of life.	OSM and the states implement public health and safety requirements of the SMCRA program on blasting and fugitive dust.	OSM conducts routine oversight and research on blasting issues that may identify regulatory improvements.	OSM could provide updated guidance manuals, analytical tools, and training for state regulatory program staff and certified blasters to heighten the understanding and evaluation of seismic and air blast considerations in protecting nearby structures and minimizing nuisance or annoyance. State regulatory authorities could consider expanded blaster certification and training programs and dedicating blasting specialists if complaint levels warrant.	OSM implements any regulatory program improvements identified by oversight or research findings.
Potential health risks of airborne dust and fumes from blasting	EPA is responsible for Clean Air Act implementation regarding air quality.	EPA is responsible for Clean Air Act implementation regarding air quality.	EPA and the state air quality authorities will evaluate current regulatory programs for controlling dust and blasting fumes and develop Best Management Practices (BMPs) as a means of effectively controlling these emissions outside of the permit area under specified physical/meteorological conditions.	EPA and the state air quality authorities will evaluate current regulatory programs for controlling dust and blasting fumes and develop Best Management Practices (BMPs) as a means of effectively controlling these emissions outside of the permit area under specified physical/meteorological conditions.
Flooding				
Effects from MTM/VF on flooding of downstream communities	A quantifiable flooding analysis is not usually submitted in SMCRA or CWA permit applications. However, SMCRA requires the PHC address flooding. Different approaches for assessment occur in Appalachian states. COE relied on SMCRA permit for issuance of NWP 21.	COE uses 100-year storm for flood analysis. OSM uses 25-year storm for flood analysis; states and industry use varying methods to address flooding in PHC. WVDEP, working with the COE and OSM, developed surface water analysis requirements for applicants to demonstrate during- and post-mining peak runoff will not contribute to mining. OSM and COE evaluating approaches for establishing guidelines for consistent SMCRA and CWA analysis of flooding potential.	COE, working with OSM and the states will develop guidelines for calculating peak discharges for design precipitation events and evaluating flooding risk. OSM will revise regulatory requirements, issue policies or guidelines to implement appropriate data collection and analyses to demonstrate surface coal mining operations do not contribute to flooding-consistent with CWA requirements.	OSM and COE will develop guidelines for calculating peak discharges for design precipitation events and evaluating flooding risk. OSM will revise regulatory requirements, issue policies or guidelines to implement appropriate data collection and analyses to demonstrate surface coal mining operations do not contribute to flooding-consistent with CWA requirements.

Page 13 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Best Management Practices (cont'd.)				
Community Benefit				

Page 14 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Ability of reclaimed mined land to provide an environmental, economic or social benefit to coal field communities.	SMCRA and implementing regulations require demonstration that MTM operation post-mining land use is acceptable to land owner and constitutes an equal, higher, or better land use (depending on the final mining configuration–e.g., AOC, steep slope AOC variance, or MTR). The reclaimed mine site must be capable of supporting the intended use, but not create the actual land use prior to bond release.	SMCRA and implementing regulations require demonstration that MTM operation post-mining land use is acceptable to land owner and constitutes an equal, higher, or better land use (depending on the final mining configuration–e.g., AOC, steep slope AOC variance, or MTR). The reclaimed mine site must be capable of supporting the intended use, but not create the actual land use prior to bond release. An OSM 2000 policy clarifies the requirements for obtaining an AOC steep slope variance or eligibility for MTR based on SMCRA 515(c) and (d) and the implementing regulations.	**[Disputed Action] Job Loss Mitigation: Appropriate and allocate AML Trust Fund balance for Appalachian States, and to the maximum extent practicable, distribute AML funds via grants to entities hiring unemployed miners to conduct AML projects.** **[Disputed Action] SMCRA regulatory authorities could evaluate the development of incentives for transferring large tracts of reclaimed land held by mining and land holding companies to private citizens, local governments, or other entities to stimulate residential and business development.** *OSM and the States could consider ways to improve communication and coordination among government regulators, officials charged with economic development, local government officials, residents, environmental representatives, and coal companies, to integrate land use planning.* *When appropriate, SMCRA and CWA regulatory authorities could consider ways to encourage coal mine operators to use a mediation or alternative dispute resolution (ADR) and facilitated discussions to improve communication and address stakeholder concerns.* *SMCRA and CWA regulatory authorities could evaluate possible means to increase outreach to citizens adjacent to or potentially affected by proposed or approved mining operations for the purpose of explaining opportunities for input into application review, complaint filing and resolution.* *CWA and SMCRA regulatory authorities could consider developing ways to encourage use of land forming reclamation techniques to mimic natural landscape.*	

Page 15 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Best Management Practices (cont'd.)				
Community Benefit				
			[Disputed Action(s)] SMCRA regulatory authorities should consider developing specific guidance, policies, or requirements for acceptable post-mining land use demonstrations where steep slope variances from the approximate original contour (AOC) or mountaintop removal projects are sought. This guidance would be in concert with OSM's June 2000 policy "Exceptions to Approximate Original Contour Requirements for Mountaintop Removal Operations and Steep Slope Mining Operations" (PMLU policy.) The guidance could establish financial assurance requirements (e.g., sureties or bonds) to assure development of the infrastructure necessary to support implementation of the approved PMLU. This guidance could establish site criteria necessary for each category of post-mining land use (infrastructure specifications, site preparation performance standards, crop or forestry yield targets, normal/typical animal husbandry practices, industrial classification expectations etc.). This action could be implemented by conducting program review of the regulatory authorities' programs to analyze their existing contemporaneous reclamation provisions and ensuring that provisions are adequate to minimize the amount of time a disturbed area remains unreclaimed. OSM could cite program deficiencies where state programs are judged deficient.	
Protection of T&E Species in Compliance with the Endangered Species Act				
Threatened and Endangered Species				

Page 16 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
ESA requires every NEPA action to contain a biological assessment (BA) of the preferred alternative. The BA must conclude that the preferred alternative will not jeopardize T&E species or critical habitat. If FWS review of the BA cannot reach this finding, formal consultation under ESA Section 7 and development of a biological opinion (BO) are required. The final EIS cannot be published until accord with the FWS is reached on an preferred alternative consistent with ESA.	Protections of the ESA apply and state coordination in fulfilling protective measures will occur in accord with the 1996 BO by FWS on the SMCRA program. Every "federal action" (COE CWA 404 permit) will be in compliance with ESA consultation requirements.	Protections of the ESA apply and state coordination in fulfilling protective measures will occur in accord with the 1996 BO by FWS on the SMCRA program. Every "federal action" (COE CWA 404 permit) will be in compliance with ESA consultation requirements. FWS and OSM jointly developed a national training course on the requirements of the 1996 BO on the SMCRA program to explain FWS, OSM, and state regulatory authority responsibilities under the ESA.	COE, OSM, EPA, and the state regulatory authorities will: 1) consult with FWS on proposed SMCRA and CWA program changes associated with MTM/VF activities; and 2) develop coordination procedures and protective measures to ensure that future mining projects are carried out in full compliance with the Endangered Species Act.	COE, OSM, EPA, and the state regulatory authorities will: 1) consult with FWS on proposed SMCRA and CWA program changes associated with MTM/VF activities; and 2) develop coordination procedures and protective measures to ensure that future mining projects are carried out in full compliance with the Endangered Species Act.
Coordinated Decision Making for CWA, SMCRA, and ESA Authorization of Surface Coal Mining				
Government Efficiency				

Page 17 of 18

Issue	Baseline (1998)	Alternative A (No Action Alternative (2002))	Alternative B (Most Environmentally Protective Alternative)	Alternative C (Preferred Alternative)
Redundant permitting processes and inconsistent treatment of CWA 404 requirements occur between COE Districts, and EPA Regions. ESA compliance checks occur within SMCRA and CWA process. CWA revisions required by the COE result in commensurate modification of approved SMCRA permits. Duplication of permitting, inspection, and enforcement resources within SRA and COE creates cost-inefficiencies. Only some states have pre-application meetings--which do not typically occur with federal agencies.	CWA and SMCRA permitting will occur at COE and/or state regulatory authorities. ESA coordination with SRA and consultation with COE. Pre-application meetings would occur only intermittently and a larger number of permit deficiencies would occur during review as a result of federal agency comments.	In WV, under the terms of the *Bragg* settlement agreement, COE, EPA, OSM, FWS and WVDEP are coordinating review of any permit with valley fills. Process improvements, including coordinated decision making since 1998 to streamline processes, rely on shared data, and eliminate duplication of effort, where possible.	The SMCRA regulatory authority will be encouraged to obtain CWA 404 program responsibility. A CWA and SMCRA permit coordination process will be instituted (e.g., through a formal MOA) to coordinate permit data submissions and review, with the objective of minimizing agency duplication of effort, eliminate paperwork and other regulatory burdens on applicants, as well as improving environmental decisions by evaluating mutual interests in anticipated permit requests on a watershed basis. The MOA will emphasize agency participation on a regular basis in pre-application meetings with industry in order to minimize permit deficiencies during the formal application review process to the extent practicable.	The SMCRA regulatory authority will be encouraged to obtain CWA 404 program responsibility. A CWA and SMCRA permit coordination process will be instituted (e.g., through a formal MOA) to coordinate permit data submissions and review, with the objective of minimizing agency duplication of effort, eliminate paperwork and other regulatory burdens on applicants, as well as improving environmental decisions by evaluating mutual interests in anticipated permit requests on a watershed basis. The MOA will emphasize agency participation on a regular basis in pre-application meetings with industry in order to minimize permit deficiencies during the formal application review process to the extent practicable.

Page 18 of 18

A-101

Cindy Tibbott
07/31/02 01:51 PM

To: "Mike Robinson" <MROBINSO@OSMRE.GOV>
cc: bcl@mme.state.va.us, Castle.Michael@epa.gov, Charles.K.Stark@hq02.usace.army.mil, dave_densmore@fws.gov, "Dave Hartos" <DHARTOS@OSMRE.GOV>, dvandelinde@mail.dep.state.wv.us, gconrad@imcc.isa.us, Hoffman.William@epamail.epa.gov, James.M.Townsend@lrl02.usace.army.mil, "Jeff Coker" <JCOKER@OSMRE.GOV>, jstump@gfnet.com, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, lsv@mme.state.va.us, Paul.Rothman@mail.state.ky.us, rhunter@mail.dep.state.wv.us, rider.david@epa.gov, suriano.elaine@epa.gov, "Vann Weaver" <VWEAVER@OSMRE.GOV>
Subject: Re: Revised alternatives framework

As promised, we have developed an additional alternative (Alternative 4) that provides for a restriction scenario, creating an "environmentally preferred" alternative.

The first page of the attached WordPerfect document is a rationale behind Alternative 4 and prints on 8 1/2 x 11 paper. The next three pages are the revised alternatives framework, and print on 8 1/2 x 14 paper.

73102Alternative4.wpc

EXHIBIT 36

Rationale for FWS "Alternative 4" (i.e., why this is not an alternative that can't be chosen)

- Provides predictability for the regulated community and the public
- Creates a true "level playing field" across states
- Greatly reduces the role of subjective judgments in the process, thereby relieving the burden on the Corps and State agencies from litigation risk
- Reduces the Corps' workload
- Acknowledges that CWA and SMCRA really are consistent with each other in their requirements (SMCRA is not superceding the CWA in any way)
- Avoids setting undesirable CWA precedents (weakening the application of the antidegradation policy and the spirit and intent of the CWA itself; allowing out-of-kind mitigation to buy down impacts that are clearly more than "minimal"; allowing the issuance of NWPs for activities that are clearly more than "minimal"; issuing individual permits for activities that clearly cause "significant degradation")
- Most closely responds to the adverse aquatic and terrestrial impacts documented by the EIS studies
- Industry has demonstrated that it can still mine coal even if fills are restricted to the ephemeral zone (Beech Fork)
- An action item is proposed (although it's currently one of our disputed action items) that would mitigate job losses in the MTM region

Advantages to the EIS/NEPA process:

- Provides balance in the EIS for the rest of the (permissive) alternatives
- Allows the use of the 35-acre scenario in the EIS, giving us at least one alternative whose effects can actually be quantified in terms of environmental and economic consequences
- Most closely corresponds to the adverse aquatic and terrestrial impacts documented by the EIS studies

DRAFT - MTM/VALLEY FILL EIS ALTERNATIVES

	No Action 2002 Programs	Alternative 1	Alternative 2	Alternative 3	Alternative 4
SMCRA	SMCRA regulations require that all mine spoil be returned to the mined area in order to return the land to approximate original contour (AOC), with the exception that spoil material in excess of that needed to achieve AOC or certain post mining land uses will be placed in excess spoil valley fills.	Revise SMCRA regulations to require the applicant demonstrate that the volume of excess spoil material has been minimized to the maximum extent practicable.	Revise SMCRA regulations to require the applicant demonstrate that the volume of excess spoil material has been minimized to the maximum extent practicable.	Revise SMCRA regulations to require the applicant demonstrate that the volume of excess spoil material has been minimized to the maximum extent practicable.	
	The stream buffer zone rule generally prohibits mining activities closer than 100 feet from perennial and intermittent streams unless the regulatory authority determines that there will be no adverse effects to water quantity and quality and other environmental values, and the contributions of sediment the activities will not violate State or Federal water quality standards. OSM interprets that the "footprint" of the fill is not restricted by the buffer zone rule.	Delete the stream buffer zone rule and maintain the condition that all necessary environmental permits, including the CWA 404 permit, must be secured as a condition of the SMCRA permit.	Replace the stream buffer zone rule with requirements for an alternatives and environmental impact analyses mirroring that required by the CWA 404.	Replace the stream buffer zone rule with requirements for an alternatives and environmental impact analyses mirroring that required by the CWA 404.	Apply stream buffer zone rule as written. If conflicts exist with other regulations that seem to allow filling in the stream buffer zone, OSM will revise those other regulations or issue interpretive guidance.
CWA	COE uses 250-acre watershed threshold to determine whether filling activities are processed under NWP or IP in WV Outside of WV, COE, in consultation with other agencies, makes decision regarding NWP/IP processing on a project specific basis (NWP 21 exists for coal mining activities)	COE would eliminate the 250-acre threshold and replace it with the following: "filling activities in ephemeral streams may be processed under NWP but filling activities in intermittent or perennial streams will require processing under an IP"	COE will replace the 250 acre upper threshold with an impact protocol for determining NWP / IP status and will consider the SMCRA alternative and fill minimization analyses in its determination whether to process a permit via the NWP or IP for fills	COE eliminates 250-acre threshold. COE will give considerable deference to the SMCRA agency's determination that the operation will have no more than a minimal impact on waters of the United States in its determination of whether to process the application as a NWP or IP.	Apply antidegradation policy as written (existing uses of waters of the US must be maintained and protected). Because valley fills eliminate all existing uses, valley filling in intermittent and perennial streams violates the antidegradation policy and states cannot issue a Section 401 water quality certification necessary for issuance of a Corps permit. Fills with a purpose in ephemeral stream reaches would be eligible for state 401 certification and NWP 21 authorization by the Corps.
	Corp continues to develop stream protocol to determine the value of streams and applicable mitigation	Corp uses standards for minimization and alternative analysis as well the stream protocol now under development to determine the value of streams and applicable mitigation	Corp uses standards for minimization and alternative analysis as well as the stream protocol now under development to determine the value of streams and applicable mitigation	Corp uses standards for minimization and alternative analysis as well as the stream protocol now under development to determine the value of streams and applicable mitigation	Corp uses standards for minimization and alternative analysis as well as the stream protocol now under development to determine the value of streams and applicable mitigation
	COE requires mitigation on all new permits	COE requires mitigation consistent with stream protocol on all permits	COE requires mitigation consistent with stream protocol on all permits	COE considers all mitigation incorporated in the SMCRA permit and if necessary requires additional mitigation beyond permit boundaries	COE considers all mitigation incorporated in the SMCRA permit and if necessary requires additional mitigation beyond permit boundaries
Other	Independent collection/analysis of SMCRA and CWA data	Harmonize SMCRA and CWA stream impact data requirements	Harmonize SMCRA and CWA alternatives and stream impact data requirements	Develop joint SMCRA/CWA application	Develop joint SMCRA/CWA application
	EIS on ad hoc basis, but only for IPs	COE will do an EIS for most IPS but not NWPs	COE will develop specific guidance / regulations as to when EIS required for IPs	COE will develop specific guidance / regulations as to when EIS required for IPs	
	Individual 401certifications only for Ips	Individual 401certifications for IPs	Individual 401certifications for IPs	Individual 401certifications for IPs	

			Coordinate with States to encourage development of State program general permits (SPGP)		Coordinate with States to encourage development of State program general permits (SPGP)

A-102

From: Mike Robinson
To: Bowen, Diane; Castle, Mike; Conrad, Greg; Crum, Matthew; Densmore, Dave; Hamilton, Sam; Hodgkiss, Kathy; Hoffman, Bill; Hunter, Russ; Kampf, Rich; Lambert, Butch; Parker, Mamie; Peck, Greg; Rider, Dave; Rothman, Paul; Stark, Kirk; Suriano, Elaine; Tibbott, Cindy; Townsend, Jim; Trott, Kathy; VandeLinde, Dave; Vincent, Les; Welsh, Don
Date: Tue, Aug 13, 2002 11:06 AM
Subject: Draft Proposed EIS Alternative Framework--Aquatic Actions; SES Issue Resolution Call

Follow-up note: Even though we have no response as of yet from the COE about their availability for the the proposed issue resolution conference call, I suggest that we go ahead with the call tomorrow at 10:30 a.m. EDT. If the COE is available, I'm sure that they will tap in to the discussion. Please use the dial-in number 877.216.4412 and enter access code 866654#.

Also, attached is the latest alternative framework, with additions and edits as proposed by FWS.

NOTE TO COE: The other agency executives are trying to nail down their calendars for the upcoming issue resolution call on the alternative framework. Wednesday at 10:30 is the preference. Can someone from the COE please let us know who will be participating from the COE on the conference call and what the COE position is on the existing framework.

P.S. to everyone--Dave Densmore indicated that he would be proposing a modified Alternative 4 this afternoon for discussion with the executives that reintroduces the concept on establishing a restriction with the CWA 404 program on the basis that disharges beyond ephemeral streams cause significant degradation.

Attached is the latest version of proposed Alternatives 1-4 with everyone's edits received to date.

Note to COE--the EPA and FWS Steering Committee members agree that this version represents an accurate portrayal of possible viable contrasting alternatives--although not necessarily that their executives and principals will agree with their positions (i.e., they can not speak to their agencies' ultimate position on the alternatives).

OSM agreed to disagree on Alternative 4 and take the framework forward for ratification/revision by the SES and/or Principals. OSM disagreement stems from our belief (supported by SMCRA Section 702 and past DC. Circuit Court decisions on OSM attempts at regulations to establish water-related standards) that SMCRA must defer to the CWA standards regarding activities affecting waters of the US. If Alternative 4 stated that the CWA "backstopped" the SBZ rule with some basis for restricting fills to ephemeral, either through 402, 404, or otherwise (e.g. anti-degradation, fills in perennial or intermittent streams cause significant degradation, advance veto authority, etc.), OSM might be able to support the alternative. As with FWS and EPA, I cannot speak for my agency, but merely give my opinion of what I think my executives and principals might say about the framework.

WVDEP abstained from an opinion on the framework and agreed to wait and see the type of alternative framework that ensues from the issue resolution process.

Since you COE folks couldn't be on the call, the other agencies would like to know where the COE stands with this proposal--thumbs up, thumbs down, or neutral? If thumbs down, what aspect of the alternatives can you not accept and why? We understand that you may not have briefed your principal or executives, but can you tell us what you think they might say about the framework? Knowledge of where the COE stands (along with positions above stated on the call by each agency) will allow us to brief our executives in preparation for an issue resolution call next week. Please respond asap.

Resolving the framework is key to moving forward with the EIS schedule. Two dates/times are proposed for the call: Wednesday, August 14 at 10:30 am or Thursday, August 15th at 2:30 p.m. Can your executives or their designee participate? It appears that the other 4 agencies can do a call on either date, but a preference for Wednesday seems to be emerging. Please rsvp, as to your agency's availability for

EXHIBIT 37

the call.

We will use the normal dial -in number (877.216.4412, 866654#) for the call next week.

The primary agenda focus will be to see if consensus can be reached on the the alternative framework. If time permits, we may discuss the need to have another call on several other topics relevant to finishing the draft EIS (e.g., EIS completion process, issue resolution/communication process, need for additional study, disputed actions, schedule, etc.).

CC: Coker, Jeff; Klein, Al

MTM/VALLEY FILL EIS ALTERNATIVES
August 13, 2002 version
DRAFT--Deliberative--DO NOT RELEASE (Page 1)

Authority	No Action 2002 Programs	Alternative 1	Alternative 2	Alternative 3	Alternative 4
SMCRA	SMCRA regulations require that all spoil be returned to the mined area in order to return the land to approximate original contour (AOC)-- with the exception that spoil material in excess of that needed to achieve AOC or certain post mining land uses may be placed in excess spoil valley fills.	Revise SMCRA regulations to require the applicant demonstrate, to the maximum extent practicable, that the volume of excess spoil material has been minimized and that the fill sites proposed have avoided and minimized adverse impacts to waters of the United States.	Revise SMCRA regulations to require the applicant demonstrate, to the maximum extent practicable, that the volume of excess spoil material has been minimized and the fill sites proposed have avoided and minimized adverse impacts to waters of the United States.	Revise SMCRA regulations to require the applicant demonstrate, to the maximum extent practicable, that the volume of excess spoil material has been minimized and the fill sites proposed have avoided and minimized adverse impacts to waters of the United States.	Revise SMCRA regulations to require the applicant demonstrate, to the maximum extent practicable, that the volume of excess spoil material has been minimized and the fill sites proposed have avoided and minimized adverse impacts to waters of the United States.
	The stream buffer zone rule limits mining activities within 100 feet of or through perennial and intermittent streams-unless the regulatory authority finds that there will be no adverse effects to water quantity/quality and other environmental values of the stream, and that the activities will not cause or contribute to violation of State or Federal water quality standards. OSM interprets the "footprint" of valley fills as not restricted by the buffer zone rule.	Delete the stream buffer zone rule, and maintain that all necessary environmental permits, including the CWA 404 permit, must be secured as a condition of the SMCRA permit.	Replace the stream buffer zone rule with requirements for an alternatives and environmental impact analysis mirroring that required by CWA § 404.	Replace the stream buffer zone rule with requirements for an alternatives and environmental impact analysis mirroring that required by CWA § 404.	Interpret the stream buffer zone rule to apply to the footprint of the fill in intermittent or perennial streams. If conflicts exist with other SMCRA regulations that have been interpreted as allowing such fills, revise those regulations or issue interpretive guidance.

MTM/VALLEY FILL EIS ALTERNATIVES
August 13, 2002 version
DRAFT--Deliberative--DO NOT RELEASE (Page 2)

Authorit y	No Action 2002 Programs	Alternative 1	Alternative 2	Alternative 3	Alternative 4

MTM/VALLEY FILL EIS ALTERNATIVES
August 13, 2002 version
DRAFT--Deliberative--DO NOT RELEASE (Page 3)

CWA	COE applies regional conditions for NWP 21, with 250-acre watershed general threshold, as an interim measure, to determine whether valley fill activities are processed under NWP or IP.	COE eliminates the 250-acre watershed threshold and proposes regional conditions to limit NWP 21 authorization to ephemeral stream segments.	COE replaces the 250-acre watershed threshold for IPs with an impact protocol threshold for determining NWP/IP applicability. COE considers SMCRA alternative and fill minimization analyses in determining whether to process a permit via the NWP or IP for valley fills.	COE eliminates 250-acre watershed threshold for IPs. COE defers, to maximum extent allowable, to SMCRA agency's determination that the operation will have no more than a minimal impact on waters of the United States when determining whether to process the application as a NWP or IP.	EPA and COE issue regulatory guidance that, based on the factual determinations made in the EIS regarding direct impacts, downstream impairment, and the impracticability of available mitigation, fills in intermittent and perennial stream reaches are presumed to cause or contribute to significant degradation, pursuant to the 404(b)(1) Guidelines. Permit applicants who can demonstrate that their fills will not significantly degrade intermittent or perennial stream reaches would be eligible for an individual permit. Fills in ephemeral stream reaches would be eligible for NWP 21 authorization by the COE. If COE determines, through their stream protocol, that the values of affected ephemeral streams are high, and/or cannot be compensated, or if the cumulative effects are more than minimal, an individual permit will be required. COE will revise NWP regulations to reflect limits on authorization for NWP 21.

MTM/VALLEY FILL EIS ALTERNATIVES
August 12, 2002 version
DRAFT--Deliberative--DO NOT RELEASE (Page 4)

	COE develops stream protocol to determine the functional value of streams and applicable mitigation	COE implements a regional stream assessment protocol and develops mitigation requirements.	COE defers, to the maximum extent allowable, to SMCRA minimization and alternative analysis, implements a regional stream assessment protocol, and develops mitigation requirements.	COE defers, to the maximum extent allowable, to SMCRA minimization and alternative analysis	For NWPs, COE defers, to maximum extent allowable, to SMCRA minimization and alternatives analysis.
	COE requires mitigation on all new permits.	COE requires mitigation, consistent with stream protocol, on all permits	COE requires mitigation, consistent with stream protocol, on all permits	COE considers all mitigation incorporated in the SMCRA permit and, if necessary, requires additional mitigation beyond permit boundaries, consistent with stream protocol.	COE considers all mitigation incorporated in the SMCRA permit and, if necessary, requires additional mitigation beyond permit boundaries, consistent with stream protocol.
Other	Independent collection/analysis of SMCRA and CWA data.	Harmonize SMCRA and CWA stream impact data requirements.	Harmonize SMCRA and CWA alternatives and stream impact data requirements.	Develop joint SMCRA/CWA application.	Develop joint SMCRA/CWA application.
			Coordinate with States to encourage development of state programmatic general permits (SPGP).		Coordinate with States to encourage development of state programmatic general permits (SPGP).

DRAFT - DELIBERATIVE PROCESS - PRE-DECISIONAL

Alternatives Matrix for the Draft MTM/VF PEIS
July 14, 2002

ISSUE: The interagency Executive Committee for the PEIS evaluating MTM/VF met by conference call today to address the USFWS recommendation to add a fourth alternative. The group decided to retain the current three-alternative approach and work within the Steering Committee to accommodate, as effectively as possible, the USFWS recommendations into existing Alternative 1.

BACKGROUND:

- The interagency Steering Committee developing the MTM/VF PEIS is moving towards the adoption of a revised, three-alternatives framework as the basis for progressing with the PEIS. (a copy of the Alternatives Matrix under discussion is attached)
- When the revised three-alternatives framework was proposed, the USFWS recommended that a fourth alternative be added to the framework, which is also attached. The Steering Committee requested that the Executive Committee consider this recommendation and decide whether a fourth alternative was appropriate.
- After discussion among the agencies today, including representatives from OSM, FWS, EPA, Corps, and the WVDEP, the Executive Committee decided to proceed under the three-alternative approach. In reaching this decision, the agencies also agreed that there are valuable aspects of the FWS proposal that should be further considered by the Steering Committee for incorporation within existing Alternative 1.

NEXT STEPS:

- Although it is not FWS preference to proceed with only three alternatives, they agreed to take the lead in drafting potential revisions to existing Alternative 1 that incorporate key aspects of their recommendations and reflect the interagency concerns raised in today's discussion. The revised Alternative 1 will be discussed at the next meeting of the Steering Committee scheduled for August 20th. The Executive Committee directed the Steering Committee to complete the revisions to the Alternative Framework by the end of next week. If Steering Committee consensus cannot be reached on revision to Alternative 1 that satisfy FWS concerns, FWS has indicated there intention to elevate this issue for final resolution.
- The agencies also agreed to provide the Principals' Committee with this summary of today's Executive Committee discussion.

Attachment: 8/14/02 Draft Alternatives Matrix

From: <Peck.Gregory@epamail.epa.gov>
To: Mike Robinson <MROBINSO@OSMRE.GOV>
Date: Thu, Aug 15, 2002 5:40 PM
Subject: Executive Committee Discussion

Attached is the final draft version of the summary of the Executive Committee Discussion refelecting comments I received. Please let me know asap if there is something that does not faithfully refelect either the discussion or your comments. I'll plan to get this to the Principals in advance of their scheduled call tomorrow.

I apologize for not turning this around sooner. I'll reiterate that Mike R. does this better than me!

(See attached file: Execcomm.8-14.wpd)

CC: Al Klein <AKLEIN@OSMRE.GOV>, <bcl@mme.state.va.us>, <Charles.K.Stark@hq02.usace.army.mil>, <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <rider.david@epamail.epa.gov>, <diane_bowen@fws.gov>, <welsh.donald@epamail.epa.gov>, <dvandelinde@mail.dep.state.wv.us>, <suriano.elaine@epamail.epa.gov>, <gconrad@imcc.isa.us>, <hamilton_sam@fws.gov>, <James.M.Townsend@lrl02.usace.army.mil>, Jeff Coker <JCOKER@OSMRE.GOV>, <Katherine.L.Trott@hq02.usace.army.mil>, <hodgkiss.kathy@epamail.epa.gov>, <lsv@mme.state.va.us>, <mamie_parker@fws.gov>, <mcrum@mail.dep.state.wv.us>, <Castle.Michael@epamail.epa.gov>, <Paul.Rothman@mail.state.ky.us>, <rhunter@mail.dep.state.wv.us>, <kampf.rich@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>

Attachment(s):
Attachment File 1.wpd
Attachment File 2.822

DRAFT - DELIBERATIVE PROCESS - PRE-DECISIONAL

Alternatives Matrix for the Draft MTM/VF PEIS
July 14, 2002

ISSUE: The interagency Executive Committee for the PEIS evaluating MTM/VF met by conference call today to address the USFWS recommendation to add a fourth alternative. The group decided to retain the current three-alternative approach and work within the Steering Committee to accommodate, as effectively as possible, the USFWS recommendations into existing Alternative 1.

BACKGROUND:

- The interagency Steering Committee developing the MTM/VF PEIS is moving towards the adoption of a revised, three-alternatives framework as the basis for progressing with the PEIS. (a copy of the Alternatives Matrix under discussion is attached)
- When the revised three-alternatives framework was proposed, the USFWS recommended that a fourth alternative be added to the framework, which is also attached. The Steering Committee requested that the Executive Committee consider this recommendation and decide whether a fourth alternative was appropriate.
- After discussion among the agencies today, including representatives from OSM, FWS, EPA, Corps, and the WVDEP, the Executive Committee decided to proceed under the three-alternative approach. In reaching this decision, the agencies also agreed that there are valuable aspects of the FWS proposal that should be further considered by the Steering Committee for incorporation within existing Alternative 1.

NEXT STEPS:

- Although it is not FWS preference to proceed with only three alternatives, they agreed to take the lead in drafting potential revisions to existing Alternative 1 that incorporate key aspects of their recommendations and reflect the interagency concerns raised in today's discussion. The revised Alternative 1 will be discussed at the next meeting of the Steering Committee scheduled for August 20th. The Executive Committee directed the Steering Committee to complete the revisions to the Alternative Framework by the end of next week. If Steering Committee consensus cannot be reached on revision to Alternative 1 that satisfy FWS concerns, FWS has indicated there intention to elevate this issue for final resolution.
- The agencies also agreed to provide the Principals' Committee with this summary of today's Executive Committee discussion.

Attachment: 8/14/02 Draft Alternatives Matrix

EXHIBIT 38

A-125

Dave Densmore
08/21/02 03:28 PM

To: Cindy Tibbott/R5/FWS/DOI@FWS
cc: Benjamin Tuggle/ARL/R9/FWS/DOI@FWS, Castle.Michael@epa.gov, Hoffman.William@epamail.epa.gov, James.M.Townsend@lrl02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, Mamie Parker/R5/FWS/DOI@FWS, mcrum@mail.dep.state.wv.us, rider.david@epa.gov, Sam Hamilton/R4/FWS/DOI@FWS, suriano.elaine@epa.gov, Benjamin Tuggle/ARL/R9/FWS/DOI@FWS
Subject: Explanation for Proposed Modification of Alternative #1

As promised, attached for your further consideration and discussion during tomorrow's conference call is the rationale for our proposed modification of Alternative #1 in the three-alternative framework. Please let *me know if you have questions.......DD.*

MTM Modified 3-Alt.wpc

Cindy Tibbott

Cindy Tibbott
08/20/02 09:44 AM

To: Mamie Parker/R5/FWS/DOI@FWS, Sam Hamilton/R4/FWS/DOI@FWS, Benjamin Tuggle/ARL/R9/FWS/DOI@FWS, Dave Densmore/R5/FWS/DOI@FWS, Castle.Michael@epa.gov, rider.david@epa.gov, suriano.elaine@epa.gov, Hoffman.William@epamail.epa.gov, Peck.Gregory@epamail.epa.gov, Charles.K.Stark@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, James.M.Townsend@lrl02.usace.army.mil
cc: hodgkiss.kathy@epamail.epa.gov, mcrum@mail.dep.state.wv.us, "Al Klein" AKLEIN@OSMRE.GOV
Subject:

Correction to the 3-alternative matrix. Obviously, under Alternative 1's CWA section, the second item is supposed to read that intermittent and PERENNIAL streams will be identified as "generally unsuitable" for valley fills. Sorry to have confused everyone...

3altaquaticmatrix 081902.wp

Background on FWS Proposed Modifications to Alternative 1

- Subpart I of the 404(b)(1) Guidelines (Planning to Shorten Permit Processing Time) describes a process whereby EPA and the permitting authority (e.g., the Corps) may identify sites which will be considered as "areas generally unsuitable for disposal site specification" prior to receipt of a permit application.

- The basis for designating areas unsuitable for disposal is the "...likelihood that use of the area in question for dredged or fill material disposal will comply with..." the Guidelines. However, this "advance identification" of areas unsuitable for fill is not a veto or advance denial; in fact, the regulations state "[t]he identification of areas that generally will not be available for disposal site specification should not be deemed as prohibiting applications for permits to discharge dredged or fill material in such areas." Applicants are not prohibited from applying for a permit, and the Corps is not prevented from issuing a permit.

- The advance identification process is used as a tool to inform potential applicants about the relative ease or difficulty they can expect in applying for a permit to fill within the designated waters, and consequently serves as an incentive to design projects in such a way as to avoid and minimize impacts to those waters.

- Advance identification of disposal areas is also an area-wide planning process that provides the public and potential permit applicants with information on the functions and values of streams and other waters, creates greater regulatory *predictability* by providing an indication of factors to be considered in permit reviews, and assists other local planning efforts. A large number of advance identification and special area management plans based on such advance identifications have been implemented nationwide.

- The Clean Water Act action proposed for inclusion in Alternative 1 would identify intermittent and perennial stream reaches as "generally unsuitable" for valley fills. In so doing, EPA and the Corps are signaling that, as a general matter, valley fills beyond the ephemeral reach are not likely to meet the requirements of the Guidelines. Given MTM/VF EIS findings on the (previously little-understood) value of headwater streams; the degradation of aquatic life and water quality within and downstream of valley fills; the "persistence and permanence of the effects" (factors the Guidelines say should be given special emphasis); and the anticipated difficulty in developing meaningful compensatory mitigation for these impacts, the "unsuitable" designation is appropriate and logical.

- Under Alternative 1, the Corps would process permits for fills in ephemeral streams in the coalfields region through a nationwide (NW21) or regional general permit. For permit applications to place overburden in intermittent or perennial stream reaches in this region, the Corps would consider site-specific information to determine if the project complies with the Guidelines. The site-specific characteristics would be clearly stated in an EPA/Corps public notice advertising the advance identification. For example, a proposed fill in a stream classified as "poor" or "impaired" based on a biological assessment of benthic invertebrate communities, and for which restoration of the water quality or physical problems causing the impairment is not practicable, would be eligible for an individual permit. In other cases, an individual permit could be issued to fill a stream that is classified as "good" biologically if the applicant proposes in-kind compensatory mitigation in the form of stream restoration and protection within the same watershed (e.g., at the HUC 11 level). For other fills in intermittent or perennial streams (e.g., road crossings, stream diversions, etc.), permits would continue to be processed as before.

EXHIBIT 39

(880)

William Hoffman
09/10/2002 10:52 AM

To: mrobinso@osmre.gov, dhartos@osmre.gov, Dave_Densmore@fws.gov, Cindy_Tibbott@fws.gov, Paul.Rothman@mail.state.ky.us, lsv@mme.state.va.us, dvandelinde@mail.dep.state.wv.us, Ray George/R3/USEPA/US@EPA, gconrad@imcc.isa.us, jstump@gfnet.com, rhunter@mail.dep.state.wv.us, Tom Stenkamp/R3/USEPA/US@EPA, James.M.Townsend@LRL02.usace.army.mil, Elaine Suriano/DC/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, Charles.K.Stark@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, James.M.Townsend@LRL02.usace.army.mil, Gregory Peck/DC/USEPA/US@EPA, Teresah@Lrh.usace.army.mil, aklein@osmre.gov, Michael Castle/R3/USEPA/US@EPA, jcoker@osmre.gov
cc: John Goodin/DC/USEPA/US@EPA, Clay Miller/DC/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Subject: Steering Committee Meeting/Conference Call Summaries

Attached you will find:

1. A meeting summary prepared by Gannett Fleming reflecting the decisions reached at the EIS Steering Committee Meeting held in Pittsburgh on September 4-5, 2002, and

2. Notes from our September 9, 2002 conference call reflecting: a) the Steering Committee's position on the need for a third party review of the economic studies; b) the EIS schedule; c) budgetary needs to complete the EIS; and d) communications.

If you see anything that seems inaccurate, please let me know ASAP!

Bill

EIS Meeting 09 04 02.wp EIS Conference Call 090902.w

EXHIBIT 40

September 9, 2002 EIS Steering Committee Conference Call

Members Present: Kathy Trott, Jim Townsend, Jeff Coker, Dave Hartos, Dave VandeLinde, Russ Hunter, Dave Densmore, Dave Rider, John Forren, Bill Hoffman, Elaine Suriano

Discussion Topics

1. Independent Review of Economic Studies

The discussion revolved around: a) whether the flawed Phase I and II economic studies should be included in the appendices of the EIS with the other completed technical studies, and b) whether an independent review is necessary to confirm the flaws identified by the agencies.

a. The reason for not revising the flawed Phase I and II economic studies centers on the fact that the studies are no longer essential for portraying the differences between the alternatives being analyzed in the EIS. The committee agreed that the studies would have been relevant had the original restriction alternatives proven to be viable alternatives, but since they are not viable, revising the studies is not essential for the completion of the EIS.

Even though the studies are no longer essential for portraying the differences between the alternatives being analyzed in the EIS, and even though they are flawed, it is the recommendation of the EIS Steering Committee that they be included in the Appendix with a detailed explanation of their technical deficiencies and why they are not being revised (ie- they are no longer essential to the completion of the EIS).. Since the studies were released under FOIA, the Steering Committee believes that not including them in the Appendix would raise questions concerning the integrity of the document.

b. The EIS Steering Committee does not see added value for this EIS in securing a third party review to confirm the flaws in the Phase I and II economic studies. The agencies have sufficient technical expertise to identify and describe the deficiencies to the discerning public. The economic studies could be reviewed independently from the EIS if the Principals' determine the need to satisfy legal or public perception concerns.

2. EIS Schedule

• Contractor Provides DEIS to EIS Steering Committee	November 2002
• Interagency Review and Concurrence	December 2002
• GPO Printing	January 2003
• Release EIS	February 2003
• Public Meeting/Hearing	March 2003
• Comment Period Ends	May 2003
• Compile/Sort Comments	July 2003

- Prepare Response Document — January 2004
- Prepare FEIS — March 2004
- Prepare Record of Decision — May 2004

3. Budget Needs

100k	Update aquatic statistical studies using information on ages of fills, sizes of fills, new landcover/landuse information, etc.
125k	Additional GIS work to digitize permits and landcover in VA and KY; and to create stream coverages
500k	Contractual needs- compile/sort comments; provide additional analyses; attend and provide information at public meetings/hearings; prepare FEIS
150k	Third party review of Phase I and II economic studies
75k	Plaintiff's experts per settlement agreement

4. Communications

The EIS Steering Committee believes there is a need (with DOJ concurrence) to create another Bulletin describing the current status of the technical studies. The technical studies have been described in previous Bulletins and periodic progress reports have been published on the EPA website, but the status of the studies has not been updated for several years. This Bulletin would describe which studies have been reviewed and finalized, which studies are considered flawed and unreliable; and which studies are still in progress. Placement of the completed studies onto the EPA web site to mitigate new FOIA requests was discussed and dismissed.

The EIS Steering Committee agreed to channel all questions regarding the EIS to the EPA press office, attention Bonnie Smith, at 215 814-5543 or Smith.Bonnie@epa.gov.

Mike Robinson - Executive Conference Call Agenda--9/23/02, 9-10 am — Page 1

A-14

From: Mike Robinson
To: MTM/VF EIS Steering Group/Executives
Date: Fri, Sep 20, 2002 3:12 PM
Subject: Executive Conference Call Agenda--9/23/02, 9-10 am

Attached you will find an agenda and information on each topic for Monday's call. Please try and read this document before the call to expedite the discussion. Sorry this is so late in the day, but other duties called.....

While the format may not follow Mike Castle's suggestions precisely, I believe that all of the information he was looking for on background, issues, justifications, and Steering Committee recommendations are largely captured. I did not have time to prepare specific pro/cons on particular decisions, but I believe that the discussion provided will assist in logical/informed decisionmaking.

Because we only have one hour on Monday, I would be most appreciative if you would begin to call in before 9 am, so that we may start promptly at 9. I will open the lines for the call around 8:55 am. Reminder--to connect for the call: dial 877.216.4412 and enter access code 866654# to join.

Talk to you Monday. Have a great weekend!

Michael K. Robinson
Chief, Program Support Division
Appalachian Regional Coordinating Center
Office of Surface Mining
US Department of the Interior
(412) 937-2882 fax (412) 937-3012
3 Parkway Center
Pittsburgh, PA 15220

EXHIBIT 41

Mike Robinson - Sept23Execmeetingagenda.wpd Page 1

MTM/VF EIS Executive Meeting Agenda
September 23, 2002 Conference Call
Draft–Deliberative–Pre-Decisional--Do Not Distribute–Page 1

9:00-9:05 a.m. (NOTE: Participants: Steering/Executive Committee members)
Introductions; objective of call; and adoption/revision of agenda

Objective of call: *To maintain the current February 2003 DEIS publication schedule (see agenda item on schedule below), the EIS Steering Committee (SC) must receive executive ratification or revision of recent SC decisions about EIS alternatives, schedule, technical study disposition, funding, and communication.*

9:05-9:10 a.m. Process Explanation: Executive Review
Decision Needed by 9/30: Approval of EIS Alternatives

Background: *The executives instructed the SC to attempt to construct the alternatives for the EIS in a framework based largely on coordinated decision making for SMCRA and CWA--with no alternative restricting fills. The SC, again based on executive direction, incorporated an action proposed by FWS into the alternatives that would utilize the advance ID process to establish a rebutable presumption precluding fills in any intermittent and perennial streams. EPA and COE stated the FWS concept was not consistent with the historical implementation of and legal challenges to the ADID rule. A revised action to use ADID to deter fills in streams with certain characteristics and high value was included in the alternatives.*

The alternative framework is the heart of the DEIS and key to SC construction of the "consequences" section. The draft Chapter IV (alternatives) was sent to the executives for review and comment on Friday 9/20, by e-mail. The SC requests feedback from the executives by 9/30/02 to enable finalization of the alternatives so that DEIS preparation can proceed according to the schedule. Disputed actions are highlighted in the draft Chapter IV for a final executive decision on inclusion or deletion.

9:10-9:16 am Decision Needed: Executive Ratification of EIS Schedule

Background: *A cabinet level official has stated that release of the DEIS will occur in February 2003 and the principals and executives have underscored this objective. The SC developed a schedule and implemented contracting changes to achieve this target. The schedule is extremely aggressive and must be accompanied by agency commitments of appropriate levels of resources (staff and funds) to meet the intermediate deadlines supporting the overall schedule. There are some gaps in EIS data for which the SC has begun developing designs or performing ancillary analyses that will not be ready within the current DEIS schedule (see agenda discussion on funding, below). However, some concern has been expressed in the NEPA context that failure to include the data in the DEIS might possibly result in the need for a supplemental EIS--if comments on the gaps are received following public review. The SC generally views these gaps as not strongly relevant to informed alternative analysis by the public, and thus, not a limiting factor to publication of the draft on schedule.*

EIS Schedule:

- Contractor Provides DEIS to EIS Steering Committee — November 2002
- Interagency Review and Concurrence — December 2002
- GPO Printing — January 2003
- Release DEIS — February 2003
- Public Meeting/Hearing — March 2003
- Comment Period Ends — May 2003
- Compile/Sort Comments — July 2003

Mike Robinson - Sept23Execmeetingagenda.wpd Page 2

MTM/VF EIS Executive Meeting Agenda
September 23, 2002 Conference Call
Draft–Deliberative–Pre-Decisional--Do Not Distribute–Page 2

- Prepare Response Document — January 2004
- Prepare FEIS — March 2004
- Prepare Record of Decision — May 2004

9:16-9:26 am Decision Needed: Executive concurrence with justification for (and identification of) funding

Background: *The issue of limiting or qualified technical studies has been discussed by agency heads, who requested the SC inform the need for additional funding to complete the EIS. The items below represent the SC estimates at this time of areas requiring additional monies.*

$150k **Third party review of Phase I and II Economic Studies.** *Data from these studies have been represented as factual to Federal District Court in plaintiff's briefs; and cited in the media as conclusive findings of the government. The agencies confirmed serious limitations with the findings and are proceeding to develop the EIS without relying on the information--other than for providing very general indications. The studies are now irrelevant to analyzing the alternatives, but were, if not flawed, relevant to alternatives previously under consideration and released to the public under FOIA. The SC believes, if the studies are not included in the DEIS (with appropriate qualification), that public confusion and controversy over the omission would arise during the comment period. The SC does not feel the studies require independent review prior to publication of the DEIS, and believe the findings can be dismissed by credible agency qualifications statements in the document. While independent review may add credence to supporting the SC conclusions of the value of the studies, the SC defers to the executives as to the necessity of such expense and the timing, if done. The time necessary to conduct third party review, because of high probability of a CR for FY 2003 funding, as well as the necessary contracting processes, would preclude meeting the February 2003 DEIS deadline. An independent review could be included in the FEIS. The executives may also wish to consider, if the review is performed, whether addressing the studies' reliability must be linked to the EIS process.*

$100k **Update Aquatic Statistical Study using information on ages/sizes of fills and other mining/human disturbances.** *EPA's Cincinnati laboratory prepared the existing WV stream statistical evaluation that concluded strong correlation between mining and downstream impacts. However, the report identifies data gaps, resulting in inconclusive findings regarding cause and effect. OSM is performing GIS mapping to indicate watershed disturbances upstream of monitoring stations to allow analysis of possible reasons for surface water mineralization and benthic organism shifts occurring below mined sites as compared to conditions in reference streams. However, EPA's laboratory (or a contractor) will require funding to perform the additional statistical review of the original study findings in light of the newly gathered information. This effort can not be completed within the next 30-60 days, and thus can not be included in the DEIS. The SC recommends approval of funding for this effort.*

$125k **Additional GIS work for Cumulative Impact Study (CIS) analysis in WV, TN, VA, and KY.** *The GF draft CIS was based on flawed economics study information and limited to the WV portion of the EIS study area. The SC agrees that the CIS should encompass all states in the EIS study area. Kentucky digital footprints of surface mining permits; runoff accumulation modeling of stream flow path lengths; and, interpreted current satellite*

882

MTM/VF EIS Executive Meeting Agenda
September 23, 2002 Conference Call
Draft--Deliberative--Pre-Decisional--Do Not Distribute--Page 3

imagery (vintage 2002) for WV, KY, TN, and VA do not exist. To complete a CIS with consistent data sets and analysis can not be performed by the Dec. 2002 DEIS finalization due date. [Note: The current approach for the CIS was a result of a 3-2 split by the SC. EPA and FWS voted against the approach because the CIS does not project specific locations of future mining. FWS believed future mining locations by watershed should be prepared. OSM, COE, and WVDEP concluded that identifying specific locations for future mining was not advisable, feasible, or necessary as exhibited by the flawed Phase I Economics results and the inability to consider certain crucial mine planning factors using GIS analysis. This cost estimate is based on the SC 3-2 majority decision and does not propose to delineate specific potential future mining locations.] *The SC recommends approval of funding for this effort.*

$500k **EIS Preparation Contract.** Contractual needs to compile/sort comments; provide additional analyses; attend and provide information at public meetings/hearings; prepare FEIS. *Preparation of the DEIS will consume all remaining dollars in the GF contract by 1/03. No additional funding can be applied to the contract. The contract cannot be extended. EPA does not yet have a renewed "blanket" NEPA support contract. The SC recommends approval of funding for this effort.*

$75k **Plaintiffs' experts review/analysis.** *The December 23, 1998 settlement agreement called for the agencies to use subject matter experts in development of the EIS. As the EIS is finalized and responses to comments assimilated, the plaintiffs' experts are likely to be involved. Contracting vehicles are not funded to cover experts' expenses. The SC recommends approval of funding for this effort.*

9:26-9:30 p.m. Decision Needed: Executive concurrence with decision for all media inquiries to be addressed by EPA Region III public affairs; [Bonnie Smith, at 215 814-5543 or Smith.Bonnie@epa.gov]

Background: *To assure that information on the MTM/VF EIS was stated consistently (as opposed multiple versions from each agency), the SC agree to create a central point of contact for inquiries. The SC also agreed to prepared a "Bulletin 5," to be posted on the EPA Region III web site to provide the public status of the various technical studies and the ratified EIS schedule. The last Bulletin (#4) was posted in November 2000.* [NOTE: EPA has concerns with this approach to be discussed with the Executive Committee.]

9:30-10:00 a.m. (NOTE: Participants limited to Executive Committee members; SC leaves the call) Executive Committee discussion

10:00 a.m. Adjourn Call

Gregory Peck
09/30/2002 05:03 PM

To: John Goodin/DC/USEPA/US@EPA, Clay Miller/DC/USEPA/US@EPA
cc:
Subject: FWS Comments on Chapter IV

Looks like FWS is conceding the alternatives framework?
----- Forwarded by Gregory Peck/DC/USEPA/US on 09/30/2002 05:02 PM -----

William Hoffman
09/30/2002 04:43 PM

To: Kathy Hodgkiss/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, John Goodin/DC/USEPA/US@EPA, Clay Miller/DC/USEPA/US@EPA, Palmer Hough/R4/USEPA/US@EPA
cc:
Subject: FWS Comments on Chapter IV

FYI

William J. Hoffman (3ES30)
Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995
----- Forwarded by William Hoffman/R3/USEPA/US on 09/30/02 04:42 PM -----

Dave_Densmore@fws.gov
09/30/02 04:23 PM

To: mrobinso@osmre.gov, aklein@osmre.gov, William Hoffman/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, Michael Castle/R3/USEPA/US@EPA, Katherine.L.Trott@HQ02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us
cc: Mamie_Parker@fws.gov, Benjamin_Tuggle@fws.gov, Cindy_Tibbott@fws.gov
Subject: FWS Comments on Chapter IV

Attached are FWS comments on Chapter IV. These comments are primarily intended to summarize the views of both our Steering and Executive Committee members on the proposed framework, as it is explained in this chapter. Although the comments are not especially favorable (we gave it half a star), we do not intend to argue this issue further. DD.

(See attached file: MTM EIS Chapter IV.wpd)

David Densmore
Supervisor, Pennsylvania Field Office
U.S. Fish and Wildlife Service
315 S. Allen St., Suite 322
State College, PA 16801-4850
(814) 234-4090 x233 FAX: (814) 234-0748

MTM EIS Chapter IV.wpd

EXHIBIT 42

FWS Comments on 9/20/02 Draft of Chapter IV (Alternatives)

The Fish and Wildlife Service has reviewed the September 20 draft of Chapter IV for the MTM/VF EIS. We previously proposed a four-alternative scenario that included consideration (not selection) of at least one alternative to restrict, or otherwise constrain, most valley fills to ephemeral stream reaches by employing the significant degradation or advance identification (ADID) provisions of the 404(b)(1) Guidelines. Our intent was to provide for consideration of at least one alternative that "developed agency policies, guidance, and coordinated decision-making processes" and minimized the impacts of mountaintop mining and valley filling on waters of the U.S. and fish and wildlife resources; a two-part goal established by the settlement agreement that we believe the three-alternative approach failed to accomplish. Our proposed approach was subsequently voted down within the Executive Committee in part because a decision appears to have been made that even relatively minor modifications of current regulatory practices are now considered to be outside the scope of the EIS process. The current three-alternative framework was adopted, but incorporated only a very limited ADID concept that does not meet our objectives. The September 20 draft retains the deficiencies contained in the previous three-alternative framework, and the full draft of Chapter IV confirms our concerns. Therefore, we continue to object to the use of this approach. However, since the agencies are proceeding based on adoption of this approach, we do not believe that elevating this issue for higher level review would be helpful or productive. The following general comments are intended to provide you only with our sense of how problematic the proposed alternatives framework has become.

Now that the basic concept has been more fully elaborated in the September 20 write-up, it is painfully obvious to us that there are no differences between the three action alternatives that can be analyzed in a NEPA context. Table IV-2 (Comparison of Alternatives) underscores this fundamental shortcoming: Each of the three action alternatives offers only meager environmental benefits (thus a "two-star rating," as with a budget hotel or B movie), and there is no difference between them -- even in their degree of meagerness. The relative economic effects of these alternatives are similarly indistinguishable. The reader is left wondering what genuine actions, if any, the agencies are actually proposing.

Table IV-1 states that the alternatives would "*minimize*" the adverse effects of mountaintop mining and valley fill construction; the "analysis of alternatives" section states that "all three alternatives will result in greater environmental protection that will fulfill the agencies EIS objectives." As we have stated repeatedly, it is the Service's position that the three "action" alternatives, as currently written, cannot be interpreted as ensuring any improved environmental protection, as stipulated in the settlement agreement, let alone protection that can be quantified or even estimated in advance for purposes of a NEPA analysis. Without providing clear indications of how the Corps would evaluate projects and reach decisions through either the nationwide permit or individual permit processes, and how the SMCRA agency would make its decisions under Alternative 3, the public will not be able to deduce whether impacts to waters under any of these alternatives would be any different than the no action alternative. Furthermore, the results of implementing individual action items whose "actions" do not produce an outcome ("will continue to evaluate," "will work with the states to establish," "will continue to assess," "will continue to refine"), and of developing "Best Management Practices" whose use will be voluntary, are not likely to effect quantifiable, or even recognizable, improvements in environmental protection.

As we have already discussed *ad nauseum*, NEPA regulations describe the Alternatives section as "the heart of the environmental impact statement" which, in combination with the Affected Environment and Environmental Consequences sections, should "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Even after considering the necessarily broad, programmatic nature of this document, we have clearly failed to meet these standards.

The EIS technical studies carried out by the agencies -- at considerable taxpayer expense -- have documented adverse impacts to aquatic and terrestrial ecosystems, yet the proposed alternatives presented offer no substantive means of addressing these impacts. The alternatives and actions, as currently written, belie four years of work and the accumulated evidence of environmental harm, and would substitute permit process tinkering for meaningful and measurable change. Publication of a draft EIS with this approach, especially when the public has seen earlier drafts, will further damage the credibility of the agencies involved.

From: <Forren.John@epamail.epa.gov>
To: Dave Hartos <DHARTOS@OSMRE.GOV>
Date: Fri, Oct 4, 2002 3:04 PM
Subject: Re: Reminder: Comments on Draft Chapter IV Rewite Up Due Today (Oct4th)

Dave:

Attached below are my comments, both in MS Word and Wordperfect. Bill Hoffman has not had the chance to review these comments, however. Please let me know if you have questions. I will be out of the office Monday through Wednesday but can be reached through my cell phone (215-275-5345). Thanks.

John

(See attached file: PDEIScmtsJF.doc)(See attached file: PDEIScmtsJF.wpd)

Dave Hartos
<DHARTOS@OSMRE.GO To: John Forren/R3/USEPA/US@EPA,
William
V> Hoffman/R3/USEPA/US@EPA, David
Rider/R3/USEPA/US@EPA,
Elaine Suriano/DC/USEPA/US@EPA, Cindy_Tibbott@fws.gov,
10/04/02 10:42 AM dave_densmore@fws.gov, jstump@GFNET.com,
Katherine.L.Trott@HQ02.USACE.ARMY.MIL,
James.M.Townsend@lrl02.usace.army.mil,
dvandelinde@mail.dep.state.wv.us,
rhunter@mail.dep.state.wv.us, Jeff Coker
<JCOKER@OSMRE.GOV>, Mike Robinson
<MROBINSO@OSMRE.GOV>
cc:
Subject: Reminder: Comments on Draft Chapter IV Rewite Up Due Today (Oct 4th)

Dear Steering Committees et al.,

Just a reminder that comments from you or your executives is due to me today. Thanks!!

dave

CC: <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <rider.david@epamail.epa.gov>, <dvandelinde@mail.dep.state.wv.us>, <Suriano.Elaine@epamail.epa.gov>, <James.M.Townsend@lrl02.usace.army.mil>, <JCOKER@OSMRE.GOV>, <jstump@GFNET.com>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <MROBINSO@OSMRE.GOV>, <rhunter@mail.dep.state.wv.us>, <Hoffman.William@epamail.epa.gov>, <Hodgkiss.Kathy@epamail.epa.gov>

Attachment(s):
Attachment File 1.doc
Attachment File 2.wpd
Attachment File 3.822

EXHIBIT 43

John Forren's comments on the Alternatives Section

These comments are based on my review of the Alternatives Section and the DEIS in general:

GENERAL COMMENTS

1. It has been explained to me that the Principals have made their decision regarding the set of alternatives carried forward for detailed analysis and we must move forward from there. While I fully understand the need to move forward, I do feel compelled to identify some vulnerabilities as I see them so that we can be prepared for the potential reactions from the commentators and litigators.

2. Lead federal agency. There should be a solid explanation in the EIS as to why EPA is the lead federal agency and not OSM or the Corps. Granted, EPA shares regulatory authority relative to 404 with the Corps but in terms of the bulk of the day-to-day regulatory responsibility for mountaintop mining activities, OSM or the Corps would clearly be the lead from a public perspective. We need to be prepared for such comments.

3. Range of Alternatives. The range of alternatives should be based on the purpose and need for the action. Granted, we have to abide by the consent decree but because this is a DEIS and citizens have standing to sue under NEPA, we need to ensure we satisfy the spirit and intent of NEPA, particularly and especially from a process standpoint where courts have often granted relief to plaintiffs against the federal government. As I understand the general purposes, the action is intended to address regulatory deficiencies and environmental impacts. The regulatory piece seems to be adequately addressed throughout these alternatives but it will not be clear to the public that any concrete steps are being proposed among the alternatives that address directly the environmental impacts.

   The alternatives in the preliminary DEIS released to the public under FOIA have already set expectations that there will be similar concrete alternatives to address environmental impacts in the final DEIS. On its face, the set of alternatives studied in detail in this DEIS do not represent the full range of alternatives and we should explain why this set of alternatives is unlike the set released under FOIA. It's one thing to include such alternatives in the DEIS and not choose one as a preferred alternative or not choose one as the selected action in the Record of Decision. It's another thing altogether to generate alternatives that may give the appearance we're obscuring and de-emphasizing the ones that address directly environmental impacts.

   This is the kind of a NEPA process issue that can leave us legally vulnerable and we should therefore shore up the language of the existing alternatives with concrete actions that address directly environmental impacts while still holding true to the directives handed down from the principals. Otherwise, we are potentially vulnerable to a public perception that the federal government has spent all this time, effort, and millions of tax dollars to arrive at set of alternatives that focuses on better permit coordination between SMCRA and 404. We need to make more clear how each of the alternatives, and the data and analyses generated as part of the EIS, not only addresses the regulatory process issues but the environmental impacts as well.

   The alternatives as written are too soft. There is too high a potential for reviewers to focus on the sense that the agencies will strive to do this or try to do that. There will be an expectation that if a particular alternative will result in clear definitive actions.

4. Alternatives Not Carried Forward for Detailed Analysis. Somewhere in the Alternatives section, there should be a discussion and description of those alternatives not considered in detail. Again, the preliminary DEIS released under FOIA contained alternatives not included among those considered in this EIS. There should be a clear explanation of early alternatives considered and why those were not considered in this DEIS.

5. Programmatic EIS. There should be an explanation somewhere in the document as to what a programmatic EIS is, what that means in terms of the alternatives presented, and whether any of the agencies intend to tier other EISs to this one.

6. EIS Organization. Many of the narratives for each alternative comprise information on background, history, and purpose and need for the action and should therefore be placed in the Purpose and Need, Background, or Existing Environment sections of the EIS. The Alternatives Section is too cluttered and confusing with this information in it. The Purpose and Need section sets the stage for the Alternatives section and the two sections should be linked that way. The Alternatives section should focus on the alternatives with references to the links to the Purpose and Need discussions with other background/history information placed in the Introduction.

DETAILED COMMENTS

1. A. Introduction. The first sentence in the first paragraph mentions that the agencies and public identified numerous environmental and community impact concerns. However, in presenting the agencies' review of their respective regulatory programs, the second paragraph avoids mention of the term "environmental" but seems to imply it in such phrases as "adequate regulatory controls" and "minimize concerns and adverse effects of mountaintop mining." It may seem minor but it is something that jumped out at me.

2. Table IV-1: This table more than any would likely leave a reviewer feeling that all the action alternatives are essentially the same. Every one begins with "...cross program actions to minimize adverse effects..." There should be a better explanation and use of key words to convey that each is unique. Again, this table suggests that all the money and effort invested in this project resulted in little more than better permit coordination.

3. B. Analysis of Alternatives: The first paragraph, 2nd sentence states that each of the alternatives will provide greater environmental protection than now exists. However, a reviewer would be hard pressed to find validation of this in the discussion of each alternative. Much of the discussion of enhanced environmental protection is in the abstract and left to the reviewer's imagination. We need to bolster the discussion of environmental benefits and clearly link these to each alternative set forth in the document. Perhaps a table should be included that lays out our projections for environmental benefits as a result of each alternative. There is an unbalanced focus on better permit coordination throughout the Alternatives section.

4. B. Analysis of Alternatives: The first paragraph includes the statement that "the principal distinction between (sic) the three proposed alternatives is which agency will take the lead role..." A question that will surely be posed by some in the public is "They did an EIS to determine which federal agency should take the lead role?" This sentence again highlights the limited range of alternatives and should be removed with more effort placed on distinguishing among the alternatives.

5. Alternative 1, Page 5: The 250-acre threshold is mentioned. Is this threshold explained somewhere in the document? Also, first sentence, "...those fill proposed...." should be "...those fills proposed..." Third sentence, "...the amount...and the level...required by the 404(b)(1) guidelines is..." should be "...guidelines are..." Are the Guidelines explained somewhere in the document? Because the Section 404(b)(1) Guidelines are regs published in the federal register, Guidelines should be capitalized when referring to Section 404(b)(1), which is done in some, but not all, parts of the documents.

6. Page 11, last paragraph, first sentence: Included "generally" in describing areas unsuitable for fill in the context of ADIDs. This sentence should be reworded to make clear that such designations will reduce the likelihood that aquatic disposal would comply with the Guidelines.

7. Page 13, Stream Impairment: Much like the other parts of the Alternatives section, the bulk of this text should be elsewhere in the document, not with the Alternatives discussion. In addition, more information is needed to explain why causal relationships could not be identified. This first paragraph seems "naked" and out of place in the discussion of alternatives.

8. Page 15, Stream Biomonitoring, West Virginia: "Baseline benthic surveys are normally always conducted..." "Normally" or "always" should be deleted as the two are mutually exclusive.

9. Page 23, first paragraph. This paragraph must set the record for length in the Alternatives section. It is shy only one sentence fragment from filling the entire page. Again, I don't believe the word "alternative" is used once in this lengthy paragraph despite its placement in the Alternatives section.

10. Page 38, Airborne Dust, first paragraph, 2nd sentence: "...did not find evidence of that off site..." should read "...did not find evidence that off site..." In the fifth sentence, I'm not sure why the term "identified" is used: "The most significant sources of emissions for this category of activities are identified removal and haul trucks."

From: <Peck.Gregory@epamail.epa.gov>
To: <MROBINSO@OSMRE.GOV>
Date: Tue, Oct 22, 2002 1:57 PM
Subject: Draft Exec Comm. Summary

Folks,

Here's a summary of the recent Executive Committee meeting in Shepherdstown WV. Please review and provide me with comments as soon as possible.

Thanks,
Greg

(See attached file: ECSummary10-16.wpd)

CC: <AKLEIN@OSMRE.GOV>, <miller.anne@epamail.epa.gov>, <Benjamin_Tuggle@fws.gov>, <Charles.K.Stark@HQ02.USACE.ARMY.MIL>, <Cindy_Tibbott@fws.gov>, CHARLIE STUREY <csturey@mail.dep.state.wv.us>, <Dave_Densmore@fws.gov>, <DHARTOS@OSMRE.GOV>, <welsh.donald@epamail.epa.gov>, <suriano.elaine@epamail.epa.gov>, <James.M.Townsend@lrl02.usace.army.mil>, <JCOKER@OSMRE.GOV>, <Forren.John@epamail.epa.gov>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <hodgkiss.kathy@epamail.epa.gov>, LEWIS HALSTEAD <lhalstead@mail.dep.state.wv.us>, <mamie_parker@fws.gov>, Matt Crum <mcrum@mail.dep.state.wv.us>, <Castle.Michael@epamail.epa.gov>, <MROBINSO@OSMRE.GOV>, RUSS HUNTER <rhunter@mail.dep.state.wv.us>, <kampf.rich@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <dvandelinde@mail.dep.state.wv.us>

Attachment(s):
Attachment File 1.wpd
Attachment File 2.822

EXHIBIT 44

Deliberative Process - Pre-decisional - Not for Release

Discussion Summary
MTM/VF EIS Executive Committee
October 16, 2002 - Shepherdstown, WV

I. Attendees:

Al Klein (OSM)
Mark Sudol, Kirk Stark (COE)
Mamie Parker (FWS)
Lewis Halstead (WVDEP)
Mike Castle, Greg Peck (EPA)

II. Key Discussion/Summary:

- Steering Committee Update: members of the interagency Steering Committee updated the Executive Committee (EC) on the status of key issues and requested EC attention on several matters. The following summary reflects the discussion of the EC in response to the update.

1. Economic Studies: The EIS agencies and one of the contractors (Hill and Associates) responsible for developing the economic analyses for the MTM/VF EIS, are scheduled to conduct a public meeting in Nitro, WV on October 17, 2002. The agencies have requested input from key stakeholders in the EIS, including the environmental community and coal industry, on the validity of key conclusions contained in the Phase 1 & Phase 2 economic studies. The agencies are concerned that as a result of problems with the original analyses, including critical assumptions used in the Phase I studies, that certain aspects of the final economic report are not valid. After a lengthy discussion, the EC recommended that a new Hill and Associates review of the economic studies proceed as recently proposed by the Steering Committee but, with the counsel of the EC, that the focus remain on an evaluation of the current studies and the development of sensitivity analyses for these studies.

2. National Academy of Sciences Study: The Steering Committee has been coordinating with staff at the NAS to consider opportunities for a more formal NAS review of the economic studies. Unfortunately, the NAS has indicated that such a study would cost an estimated $800,000.00 and could not be completed before the summer of 2003. Recognizing this expense and that the study would not be ready in time for inclusion in the DEIS, the EC recommends that the Steering Committee rely on the ongoing Hill and Associates review with stakeholder participation, and additional Steering Committee work, rather than initiate the new NAS study.

3. EIS Alternatives Analysis: The Steering Committee has recognized the need to continue to clarify the EIS alternatives framework focusing on efforts to improve the contrast between the alternatives and to better quantify the environmental results that are attributable to the alternatives. While the EC remains committed to the existing three alternatives framework,

the Committee agrees that additional efforts to better distinguish between the alternatives and to improve the quantification and qualification of the environmental benefits of each alternative would contribute to a more effective EIS.

4. Resources/Schedule: The EC discussed the need to ensure the agencies have committed appropriate resources for completing the draft EIS on the current schedule. The EC has directed the Steering Committee to develop a critical path of the key tasks necessary for an early spring 2003 completion of the DEIS and to assign the resources necessary to meet the schedule. The EC has recommended that an interagency conference, including the SC & EC representatives, be scheduled for the week of 10/21/02 to review the critical path development and to provide focus on this issue, to monitor progress, and to identify or assign the additional resources which may be needed.

III. Next EC Meeting

The EC will reconvene in approximately two weeks.

n-505

"Townsend, James M LRL02" <James.M.Townsend@lrl02.usace.army.mil>

10/31/02 12:40 PM

To: "Cindy_Tibbott@fws.gov" <Cindy_Tibbott@fws.gov>, Forren.John@epamail.epa.gov
cc: "Dave Densmore (E-mail)" <dave_densmore@fws.gov>, Dave Hartos <dhartos@osmre.gov>, Dave Vandelinde <dvandelinde@mail.dep.state.wv.us>, Hoffman.William@epamail.epa.gov, Russ Hunter <rhunter@mail.dep.state.wv.us>, "Townsend, James M LRL02" <James.M.Townsend@lrl02.usace.army.mil>, "Jeff Coker (E-mail)" <jcoker@osmre.gov>, "Stump, Jennifer M." <jstump@GFNET.com>, "Trott, Katharine L HQ02" <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, Les Vincent <lsv@mme.state.va.us>, Mike Robinson <mrobinso@osmre.gov>, Paul Rothman <paul.rothman@mail.state.ky.us>, Rider.David@epamail.epa.gov, Suriano.Elaine@epamail.epa.gov
Subject: RE: Alternatives Format

Based on our discussions about how the alternatives may be revised to show greater difference, I took the summary table on page 2 in Chapter IV and revised it based on my understanding of what I think I heard. I kept the Corps position that our evaluation is limited to waters of US.

JT

-----Original Message-----
From: Cindy_Tibbott@fws.gov [mailto:Cindy_Tibbott@fws.gov]
Sent: Wednesday, October 30, 2002 3:14 PM
To: Forren.John@epamail.epa.gov
Cc: Dave Densmore (E-mail); Dave Hartos; Dave Vandelinde; Hoffman.William@epamail.epa.gov; Russ Hunter; Jim Townsend (E-mail); Jeff Coker (E-mail); Stump, Jennifer M.; Kathy Trott (E-mail); Les Vincent; Mike Robinson; Paul Rothman; Rider.David@epamail.epa.gov; Suriano.Elaine@epamail.epa.gov
Subject: Re: Alternatives Format

Greetings all,

Hope you had a better drive back from Camp Hill than I did last night; I could have done without the October snow.

John's Alternatives Format got me thinking about some of our discussions this week about how much detail we need to put into the Alternatives, and I typed up some concerns -- please see the attached file.

EXHIBIT 45

(See attached file: MTMAltFormat.wpd)

Chapter II: ALTERNATIVES

A. Actions Considered to Address Issues Identified in Scoping

This would be the section linking the scoping discussion in the Purpose and Need section with the array of all actions developed to address those issues.

B. Screening of Actions and Development of Alternatives

This would be the section explaining why some actions were set aside, how some actions were already accomplished, and how the actions were assembled to become the three alternatives carried forward for detailed analysis.

C. Alternatives Carried Forward for Detailed Analysis, including the Preferred Alternative

Pre-1999 No Action Alternative:

Post-1999 No Action Alternative:

Alternative 1 (CWA Lead):

Alternative 2 (Joint Authorities):

Alternative 3 (SMCRA Lead):

D. Analysis of Alternatives

This section in essence would contain the existing "Section C: Detailed Description of Alternatives"

"alternativesdiscussion.wpd
Attachment to CTibbott's
10/30/02 e-mail

John,

Good outline. I especially liked the Who/what/when/how approach, that's a good way to make sure our explanation is organized. However, who/what/when/how naturally leads one to look for a "why" column.

To belabor a point I know you're all sick of hearing, the "Why" in this case is supposed to be "to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills." In the case of the alternatives framework that we're working with, "Why?" is instead going to be the public's response when they see that, to accomplish the EIS goal, all we've proposed is alternative locations to house the rubber stamp that issues the permits. Why on earth would we even prepare an EIS on such a non-event as tinkering with the permit issuance process, UNLESS we also fully develop and provide the details on HOW each one of the alternatives is really going to minimize environmental impacts?

Mike and I argued yesterday over the need to provide details on how the programs would evaluate permits under each of the alternatives. Mike said we don't need to go into the details because it's a PROGRAMMATIC EIS. Everyone should re-read the settlement agreement: it doesn't restrict us to doing a PROGRAMMATIC EIS, it says we will prepare AN EIS. Even if we call it a programmatic EIS, where is it written that programmatic EIS's should offer only vague alternatives -- especially a programmatic EIS that involved four years of studies that documented environmental impacts that need to be dealt with? Again, it seems that hiding behind the "programmatic" veil that we as agencies have unilaterally chosen and defined, really violates the spirit of the settlement agreement.

I still believe we need to take a hypothetical mine project and walk it through each alternative, so that the public (and even the agencies, for that matter!) understand the advantages and disadvantages of each one. Take a mine project that proposes 3 miles of intermittent and perennial stream fills in four different valleys. The streams in each valley contain good to excellent water quality and support aquatic life populations that score as good to excellent relative to regional reference streams. The entire project, including the associated mineral extraction area, haul roads, etc., will impact one square mile of typical Appalachian hardwood forest. Under Alternative 1, the Corps will process this as an individual Section 404 permit. What questions do we need to answer for the public to understand how the Corps would evaluate this permit? What questions do we need to answer in order for us, as agencies, to understand how the Corps would evaluate the permit, and what unintended consequences might there be to existing programs? For example, the question I've asked many times but never get an answer to: how will the Corps justify a "significant degradation" determination? Corps issuance of any permit means that the Corps has determined that the project will not result in "significant degradation" as defined by the 404(b)(1) guidelines; the significant degradation test trumps even the public interest review and the practicable alternatives test. To our knowledge, there is no other single industry or activity in the country that receives Section 404 authorization for the total elimination of waters of the United States on the scale that stream destruction occurs with mountaintop mining. (Contrary to Dave VandeLinde's arguments, the impacts of Walmart and even highway projects pale in comparison to the mining impacts.) If the Corps starts issuing permits for the total destruction of miles of streams, what precedent does that set for the significant degradation test for the "big box" stores and shopping malls and housing developments and all the other permit applicants that now have relatively minor impacts on streams– would the Corps be still able to require them to avoid the streams?

What would happen to this permit in Alternative 2? The Corps has to make a case-by-case determination of the applicability of NWP 21. How will it do that – how will the "minimal effects" call be made? Are we seriously going to propose that some sort of "compensatory mitigation" can be fabricated that would truly replace the lost functions and values of the destroyed miles of streams, to the degree that we could consider impacts to be less than minimal? How many miles of stream loss a year are we going to be willing to accept under the cumulative impact test required for nationwide permits? What precedents do these decisions set for attempts to limit the loss of streams resulting from other types of activities authorized by other nationwides?

Again, I know you're all tired of hearing this same argument, but it's hard to stay quiet about this when I really believe we're doing the public and the heart of the Clean Water Act a great disservice if we don't think this through and provide everyone with a clear "vision" of where these alternatives are going.

From: "Mike Robinson" <MROBINSO@OSMRE.GOV>
To: <Forren.John@epamail.epa.gov>, <Cindy_Tibbott@fws.gov>
Date: Fri, Nov 1, 2002 12:51 PM
Subject: Re: Alternatives Format

Cindy--Sorry I didn't reply sooner, but I'm composing away on the OSM assignments for completing Chapters I, II, and IV. Plus, when I returned from Camp Hill, I found out that I'm acting Regional Director for the balance of the week while our eastern and western SESers pass the baton.

I'm concerned that we can't maintain the 11/11 schedule deadline and conduct your proposed exercise--although it does have merit. The best we can do at this point is to try between now and 11/11 to generally spell out the consequences of the actions on applicants' mining proposals more thoroughly in our fleshing out of Chapter IV. I suggest that maybe between the 11/25 internal draft and the camera ready copy the EIS SC could discuss the possibility of exploring what you propose and consider possibly beefing up the consequences chapter more with a few scenarios of generic permits (large and small--to take into account Les Vincent's comments).

P.S.--Will we still see the Terrestrial Studies cover sheet(s) today? Did you receive the outstanding studies from Handel and Stouffer? Tick, tick, tick......!!

>>> <Cindy_Tibbott@fws.gov> 10/30/02 03:13PM >>>

Greetings all,

Hope you had a better drive back from Camp Hill than I did last night; I could have done without the October snow.

John's Alternatives Format got me thinking about some of our discussions this week about how much detail we need to put into the Alternatives, and I typed up some concerns – please see the attached file.

As a follow-up to my comments, I'd like to propose that we assemble ASAP, maybe again at Camp Hill, if Jennifer can accommodate us, with a facilitator, to walk a hypothetical mountaintop removal mine project through each alternative. The exercise would help us define the differences between the alternatives, and reveal any hidden "unintended consequences" of the various proposals. Any thoughts?

(See attached file: alternativediscussion.wpd)

Forren.John@epamail.epa.gov
10/30/02 11:21 AM

To: Cindy Tibbott <cindy_tibbott@fws.gov>, "Dave Densmore (E-mail)" <dave_densmore@fws.gov>, Rider.David@epamail.epa.gov, Dave Hartos <dhartos@osmre.gov>, Dave Vandelinde <dvandelinde@mail.dep.state.wv.us>, Suriano.Elaine@epamail.epa.gov, Russ Hunter <hunter@mail.dep.state.wv.us>,

EXHIBIT 46

520

David Rider
11/07/2002 11:38 AM

To: Stefania Shamet/R3/USEPA/US@EPA
cc: Dan Sweeney/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
Subject: Re: MTM study

Stef,

I am confident that the EIS will recommend further studies; and recommend monitoring at a minimum for *selenium, sulfates and conductivity ... everywhere in Appalachia.*

Stefania Shamet

Stefania Shamet
11/07/02 08:10 AM

To: David Rider/R3/USEPA/US@EPA
cc: John Forren/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Dan Sweeney/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Subject: MTM study

Hi Dave. Thanks for getting back to me yesterday. Based on your and John's responses, I think my voice mail probably wasn't clear, so let me try again. My question actually involves the programmatic EIS, although it arises in the context of the Hobet permit.

In connection with the Hobet NPDES permit, the WPD required that, in addition to the usual provisions, Hobet must monitor for selenium, sulfates and conductivity. This requirement came in response to the paired streams study conducted by the Wheeling office in connection with the programmatic EIS. Based on that study, WPD concluded that discharges associated with MTM activities have the potential to impair *aquatic life uses, with the parameters of concern being selenium, sulfates and conductivity.*

WVDEP pushed back pretty hard on this one. Their rationale wasn't entirely clear, in that they seemed to be arguing both that the study was insufficiently significant to warrant changes to the NPDES permit AND that the study has nationwide implications that EPA should be addressing on a national scale rather than through the permit. (Ken seemed a little sheepish taking either position.) In any case, one message from WVDEP that came through loud and clear was that they're feeling singled out. They had all sorts of questions about how R4 is using the study for Ky waters and whether R3 is going to require the monitoring in all R3 mining permits (they refuse to concede the point that the study examined the impact of MTM-related discharges and was not necessarily applicable to mining activity generally). In any case, Dan is talking to R4 and Ky, but the conversation also raised a number of questions about how the study was being used for purposes of the programmatic EIS, whether the programmatic EIS is likely to view the study results as applicable everywhere in Appalachia, whether there are EIS recommendations for further studies, etc.

Can you give me any insight? [Dan -- if I've inaccurately summarized yesterday's issues, please feel free to put in your two cents' worth]

Thanks!

EXHIBIT 47

From: <Cindy_Tibbott@fws.gov>
To: <mrobinso@osmre.gov>, <rider.david@epa.gov>, <forren.john@epa.gov>, <James.M.Townsend@lrl02usace.army.mil>, <rhunter@mail.dep.state.wv.us>, <Paul.Rothman@mail.state.ky.us>, <lsv@mme.state.va.us>, <jcoker@osmre.gov>, <jstump@gfnet.com>, <dvandelinde@mail.dep.state.wv.us>, <dhartos@osmre.gov>, <Hoffman.William@epamail.epa.gov>, <Dave_Densmore@fws.gov>
Date: Tue, Nov 12, 2002 11:35 AM
Subject: OSM's draft on fill inventory

I forwarded the fill inventory draft to our Virginia field office. As Roberta Hylton is careful to point out, their review is based on looking at this one piece of the EIS out of context. However, from the standpoint of the "fresh eyes" perspective we've talked about lately, the comments show where we can expect confusion to occur when the public reads this section.

----- Forwarded by Cindy Tibbott/R5/FWS/DOI on 11/12/02 10:18 AM -----

Roberta Hylton
11/07/02 12:07 PM

To: Cindy Tibbott/R5/FWS/DOI@FWS
cc: Brian Evans/R5/FWS/DOI@FWS, Shane Hanlon/R5/FWS/DOI@FWS, Gale Heffinger/R5/FWS/DOI@FWS, David Pelren/R4/FWS/DOI@FWS, Robert Bay/R4/FWS/DOI@FWS, Daniel Ramsey/R5/FWS/DOI@FWS
Subject: OSM's draft on fill inventory

Per your request, we've done a quick review of the draft fill inventory that you fed-exed to me. Here are my comments (they include comments of Brian Evans of this office too). We are reviewing this document out of context of the rest of the draft EIS and ask that our comments be considered with that in mind.

--The document looks at data from 1985 forward only. Page III.K-2 of the document states that the reason for this limitation is that "data from the years immediately following approval of a permanent program in a state shows a high level of permitting activity representing [a] 'repermitting' requirement rather than useful information on the trends of permitting new mines." While filtering out the noise of repermitting might be a worthy goal, we still need to look at new mining/valley fills that occurred prior to 1985. Is there no way to do this? In fact, the second full paragraph on page III.K-3 states that this was done for data after 1985 when there were "changes in ownership, sale of mining companies, closure and reopening of operations based on market conditions, etc." It seems odd that it was not done for pre-1985 data, but was done for post-1985 data. Knowing that repermitting noise can be filtered out and was filtered out for the post-1985 data might lead to suspicion that, for some reason, the EIS compilers fo not want to include pre-1985 data. If there's no reporting on valley fills prior to 1985, how can we get a full picture of cumulative

EXHIBIT 48

impacts over time and space?

--We have lots of problems with those sections purporting to use trends in watershed acreages above valley fills to evaluate the overall impact of fills. First of all, the watershed acreages considered are those beginning at the toe of the fill and running to......well, the document isn't quite clear in some places on this point . Are they looking at all upstream and upland areas or just those drained by blue-line streams? Even if acreages considered include all areas upstream and upland of the toe of the fill, this in no way accounts for the total area impacted by valley fills. What about downstream areas impacted by fills? What about impacts to streams and areas outside of the drainage areas (i.e., habitat fragmentation for some terrestrial species, limiting the abiliity to recover species in one watershed by eliminating them in another, etc.)

--This document has some problems with terms. It uses "watershed impacts" when what it means is some narrowly defined acreage within a watershed. Reporting that a specific acreage is impacted is not the same thing as evaluating what impacts are. For example, the title of the table on page III.K-28 is "Watershed Impacts by States." Actually, this table lists the acreage of impact from the toe of the slope of a fill to some unspecified upland/upstream mark.

--on page III.K-27, the document states, "Some valley fills may envelope [sic] the majority of the watershed, and others are farther downstream.......The watershed acreage is determined by measuring the upland area above each fill toe." Does this mean that they include all acreage upstream of the point of the toe of the fill or do they stop at ephemeral areas? Also, acreage upland/upstream of the fill does not include the total area impacted by a fill because it does not consider areas impacted downstream of a fill or areas in other watersheds that may have been impacted by the fill. This sort of trend analysis is a gross underestimation of the area impacted by fills.

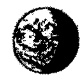
--Page III.K-36 states, "The final measurement for evaluating impacts from valley fill construction and predicting their overall impact on the environment is stream loss" and goes on to explain that ephemeral areas were not considered. "Stream loss," as reported in the remainder of the document is the valley fill footprint. For the "stream imacts" tables and graphs at this point in the document, it is painfully clear that they are looking only at the fill footprint. First, I would say that we must look at much more than the acres of stream lost or buried by fill. Stream loss and other impacts can extend well upstream and downstream of the footprint of valley fills and sometimes even outside of the drainage that is directly impacted. This type of trend analysis does not provide a comprehensive or "final measurement for evaluating impacts from valley fill construction" and can predict only a fraction of "the overall impact on the environment."

--In summary, this "fill inventory" will grossly underestimate the acreage impacted by valley fills and does nothing to consider how areas upstream and downstream will be impacted.

Gregory Peck
11/15/2002 04:57 PM

To: John Goodin/DC/USEPA/US@EPA
cc:
Subject: Fwd: Chapters I & II comments

Cindy Tibbott's "fatal flaw" comments on Chapters I and II for your amusement.
----- Forwarded by Gregory Peck/DC/USEPA/US on 11/15/2002 04:56 PM -----



Mike Robinson
<MROBINSO@OSMRE.GOV>
11/13/2002 11:29 AM

To: Gregory Peck/DC/USEPA/US@EPA
cc:
Subject: Fwd: Chapters I & II comments

fyi

----- Message from Cindy_Tibbott@fws.gov on Wed, 13 Nov 2002 10:53:32 -0500 -----

To: "Mike Robinson" <MROBINSO@OSMRE.GOV>
cc: bcl@mme.state.va.us, Charles.K.Stark@hq02.usace.army.mil, dave_densmore@fws.gov, dvand Forren.John@epamail.epa.gov, gconrad@imcc.isa.us, Hoffman.William@epamail.epa.gov, Jam jstump@gfnet.com, Katherine.L.Trott@hq02.usace.army.mil, lsv@mme.state.va.us, Paul.Rothm rhunter@mail.dep.state.wv.us, rider.david@epa.gov, suriano.elaine@epa.gov, Dave_Densmore@
Subject: Chapters I & II comments

(See attached file: chapter comments.wpd)

chapter comments.wp

EXHIBIT 49

Review of Chapters I and II – Cindy Tibbott

These chapter write-ups make it clear that the ability of compensatory mitigation to reduce impacts to minimal levels is the linchpin of each of the alternatives. Because compensatory mitigation for streams is an untested, unproven concept, and many believe that it can't be accomplished, we have (another) fatal flaw in our alternatives framework. (Other fatal flaws have been discussed in previous e-mails and meetings, and won't be repeated here.)

Throughout the document, the Louisville district protocol is offered as the solution to achieving adequate compensatory mitigation. The document should note that it will take years to collect and massage regional data to expand use of the protocol to areas outside of eastern KY. It took four years to develop for that area, and most of the resource baseline data had already been collected by KY Div. of Water. What happens in the meantime in the other states?

Chapter I, Section E, second paragraph. Delete the last two sentences, as they are out of context with the SMCRA discussion, confusing, and redundant with the 3rd paragraph.

Chapter I, Section E, third paragraph. Revise the last sentence to read: "CWA Section 404 and the standards by which Section 404 permit applications are evaluated (the "404(b)(1) guidelines") requires applicants proposing to place dredged or fill material into waters of the United States to demonstrate that they have considered upland alternatives that would avoid streams, and that they have taken all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem. However, the 404(b)(1) guidelines prohibit the issuance of a Section 404 permit for a project that would cause or contribute to significant degradation of waters of the United States."(Same language in Issue B, Direct Stream Loss, Regulatory program in 1998, second paragraph)

Chapter II, Section A, 3., b., 1st paragraph, 2nd sentence: change stream "class" designation to stream "reach" designation.

Chapter II, Section A, 3, e, 2nd paragraph, end of second sentence: change stream "classification" to stream "condition".

Chapter II, Section B, 1st sentence: Unclear – the Bragg decision occurred before any alternatives frameworks were discussed or developed...

Chapter II, Section B, b. Clean Water Act fill restrictions, 1st sentence, change to "Several CWA statutory or regulatory provisions were considered at different times throughout the alternative framework development process....."

Chapter II, Section B, 1) CWA antidegradation, 1st sentence, change to "contrary to EPA's antidegradation policy, which states that existing uses of waters must be maintained and protected." (Delete "the CWA principle that nothing can happen to alter the existing use of the Nation's streams). The second sentence is an inappropriate argument, as there are no other activities in the country that routinely eliminate entire streams.

Chapter II, Section B, 2), first sentence, change to "generally unsuitable for valley fills". Last sentence: this is not a rebutable presumption just for ADID streams, but for any project to be authorized via Section 404.

Chapter II, Section B, 2), third paragraph: ADID doesn't confer a "special" designation (somebody seems to be mixing up CWA terminology here). ADID is just a warning about the likelihood of a permit being granted or not. As stated earlier in this section, it's not an outright prohibition, so how can using it be "arbitrary and capricious"?

Chapter II, Section B, 2), fourth paragraph, last two sentences – are inaccurate and should be deleted. The Corps can't issue a permit that causes significant degradation, no matter what the public interest review says.

Chapter II, Section B, 3), second paragraph: The entire argument advanced in this paragraph is inaccurate. Designating all headwater streams as special aquatic sites is no different than designating all wetlands or all riffle-pool complexes as special aquatic sites as EPA has already done in the 404 (b)(1) guidelines. Furthermore, since most of the streams that will be filled in already contain riffle-pool complexes, we could argue that we're just clarifying what's already in the 404(b)(1) guidelines.

Chapter II, Section B, last paragraph. The statement that through mitigation, the filling of a stream in its native state could result in overall watershed improvements is unsupportable and should be deleted.

Chapter II, Section C, 1st paragraph, last sentence: Insert "regulatory" as in "Overall, these statutory and regulatory objectives..."

Chapter II, Section C, introductory sections – Needs a major re-write by someone who understands the Clean Water Act. The CWA isn't about identifying it, filling it in, and providing compensatory mitigation. It's about protecting and maintaining the chemical, physical, and biological integrity of the nation's waters, as in ALL waters, not just those with "special/high-value environmental resources." All states are supposed to have Tier I protection for their waters – it's called the "floor" of water quality protection under the Clean Water Act, and is supposed to provide the "level playing field" for protection of waters.

Chapter II, Section C, 2. 2003 no action alternative, 6th paragraph, 4th sentence. Remove FWS Cookeville, TN staff as collaborator with the Louisville district in the development of the stream protocol. Concerns expressed by Cookeville in the development of the protocol were ignored, and they do not believe that the protocol is appropriate for use in determining compensatory mitigation, as it is being presented in the EIS.

Chapter II, Section C, Alternative 1, a. Regulatory Responsibilities, first paragraph, 5th line: add "unsuitable for filling unless demonstrated otherwise after rigorous review of site-specific water quality and biological data"

Alternative 3, 2) Process, 4th paragraph, second sentence. Revise to read: "The permit can be denied if the project will cause or contribute to significant degradation, or if the proposal...." (Also under Section D, alternative 2).

Section C, Alternative 3, Regulatory Responsibilities, 3rd paragraph, 1st sentence: change to "waters of the US in Appalachia tend to begin in very small watersheds..."

Section D, Alternative 2, Action 1.1, second page, second asterisk item: Mitigation for "indirect impairment anticipated (meets TMDL, if 303(d) listed stream)"? Neither a Section 404 permit nor a SMCRA permit can be issued that would violate state water quality standards, so what is this saying?

Chapter II's subheadings need some re-formatting to make the major headings stand out better (bold, for No Action Alternative, Alternative 1, etc.), and the subheadings appear less prominent (no bold for "Regulatory Responsibilities," etc.).

Remember that "mitigation" as used by the federal government is a term that incorporates avoidance, minimization, and compensation. In most cases where they are used throughout the document, "mitigated" should be replaced with "compensated" and "mitigation" replaced with "compensatory mitigation."

Throughout the document, wherever FWS involvement with permit review is mentioned, it is only in the context of endangered species. In most of these cases, FWCA coordination should also be mentioned.

Throughout the document, "less than minimal" should be changed to "minimal."

The 404(q) process is mentioned throughout the document as EPA's avenue for objection to a permit. This should be restated as EPA's and FWS' avenue for objection.

From: <Cindy_Tibbott@fws.gov>
To: <rider.david@epamail.epa.gov>
Date: Fri, Nov 15, 2002 3:17 PM
Subject: Suggested edits/editions for aquatic study sheet

(See attached file: aquaticqualificationscomments.wpd)

CC: <dave_densmore@fws.gov>, <DHARTOS@OSMRE.GOV>, <dvandelinde@mail.dep.state.wv.us>, <Hodgkiss.Kathy@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <James.M.Townsend@lrl02.usace.army.mil>, <JCOKER@OSMRE.GOV>, <jstump@gfnet.com>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <MROBINSO@OSMRE.GOV>, <rhunter@mail.dep.state.wv.us>, <suriano.elaine@epamail.epa.gov>, <Forren.John@epamail.epa.gov>

Attachment(s):
Attachment File 1.wpd
Attachment File 2.822

EXHIBIT 50

COMMENTS ON AQUATIC STUDY QUALIFICATION WRITE-UP – Cindy Tibbott

Headwater Streams

1st paragraph – Recommend replacing this paragraph with the following: "To help assess the potential impact of stream filling activities on the aquatic ecosystem, a one-day invitational meeting was organized by FWS. The purpose of the workshop was to assemble experts in stream ecology to discuss the value of headwater streams and the possibility of setting acceptable impact thresholds."

2nd paragraph – Recommend replacing with the following: "The proceedings provide valuable information on the state-of-the-art of knowledge about headwater streams, which unfortunately are little understood outside of scientific circles. In fact, meeting participants discussed the fact that historically, small streams have been under-protected by regulatory agencies because of ignorance about their values. An industry representative discussed potential opportunities to create wetlands and stream channels as part of reclamation. The stream experts raised concern that many headwater streams are being eliminated by valley filling with no requirement for pre-impact biological inventories, and that many species may be unknowingly lost from the study area's unique ecosystem. They also stressed the importance of small, forested headwater streams and their associated biological communities in providing organic production that feeds downstream aquatic ecosystems. The experts concluded that although the state of scientific knowledge is far enough advanced to be able to say that headwater streams are too important to be destroyed, the state of knowledge is not far enough advanced to be able to decide which watersheds can be filled in and how many."

Fisheries

2nd paragraph, 2nd sentence – Stauffer's final report states that mountaintop mining/valley fill coal mining "has impacted" the condition of streams (not "has had a severe effect on the condition of streams."

Aquatic Ecosystem Enhancement

There's no summary information here. I suggest using the summary prepared for the January 2001 status report:

- With respect to mitigating the direct stream loss from valley fill construction, it is difficult if not impossible to reconstruct free flowing streams on or adjacent to mined sites. The difficulty results from the inability to capture sufficient groundwater flows necessary to provide a constant source of flow for the new stream. Only in rare instances will flows be sufficiently captured such that a new stream can be created on the mined site.

- Therefore, mitigation or compensation for these losses must generally take the form of restoring degraded streams at offsite locations through a variety of techniques including riparian planting and habitat restoration, or by creating other aquatic resources (ponds or wetland areas) at onsite or offsite locations. While these aquatic areas will seldom replace the functions lost in the headwater areas, they can provide or enhance other aquatic ecosystem functions, and may be considered as possible mitigation measures in limited situations.

- Ponds and wetland areas have been created on mining sites, in connection with sediment control structures, and these perform some aquatic functions. However, it is common practice to remove the structures after the bonding period because of safety and/or long-term management concerns. Consideration might be given to leaving shallow pond-wetland resources on site.

A-135

From: <Forren.John@epamail.epa.gov>
To: Mike Robinson <MROBINSO@OSMRE.GOV>
Date: Fri, Nov 15, 2002 9:59 AM
Subject: More on Sp Aquatic Sites

Just an update on our conference call yesterday afternoon with Greg Peck of our HQ office.

Greg disagrees that the 50% restriction on first order streams in second order watersheds would effectively eliminate mining in those watersheds. He further indicated he was one of the principal negotiators during the settlement negotiations between the plaintiffs and government/industry and disagreed with the notion that industry reps walked out of the negotiations because a similar option was proposed. Greg suggested this option to address our goal of sharply defining the differences among the alternatives and to address cumulative impacts, which he feels is lacking among the alternatives now.

We all agreed, however, to press on under the existing schedule but to continue parallel work on options to augment the alternatives for possible inclusion in the EIS during the small window of time prior to preparation of the camera-ready copy, which would be the preference, or during preparation of the Final EIS as a last resort. Nothing would preclude us from modifying the alternatives presented in the Final EIS as a means of being responsive to comments and concerns expressed during the Draft EIS comment period. As a result, EPA Region III has committed to draft a written proposal of this cumulative impacts threshold to submit to EPA HQ and subsequently to the Steering Committee for consideration.

Although we would drop the provision in Alternative 1 to designate headwater streams in the highlands as Special Aquatic Sites, Greg suggests that we emphasize that riffle/pool complexes, which already are identified as Special Aquatic Sites in the 404(b)(1) Guidelines, are typically found in these streams and that we use these complexes as a means to leverage more rigorous permit reviews and cumulative impact assessments (of course all of us, including Greg, are aware that wetlands have this same designation, yet continue to be rapidly turned into fastland; still, this would be a better approach than simply falling back to the IP-only reviews in Alt 1).

Whether or not the "bright line" percentage threshold eventually becomes part of Alternative 1, we should still include in Alternatives 1 and 2 a commitment to develop a cumulative impact assessment protocol specific to headwater streams.

Please let me know your reactions.

John

CC: <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <rider.david@epamail.epa.gov>, <DHARTOS@OSMRE.GOV>, <dvandelinde@mail.dep.state.wv.us>, <suriano.elaine@epamail.epa.gov>, <James.M.Townsend@lrl02.usace.army.mil>, <JCOKER@OSMRE.GOV>, <jstump@gfnet.com>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <rhunter@mail.dep.state.wv.us>, <Hoffman.William@epamail.epa.gov>, <Hodgkiss.Kathy@epamail.epa.gov>

EXHIBIT 51

987

Kathy Hodgkiss
11/18/2002 06:04 PM

To: Rich Kampf/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Benjamin_Tuggle@fws.gov, Cindy_Tibbott@fws.gov, dave_densmore@fws.gov, mamie_parker@fws.gov, jstump@gfnet.com, Charles.K.Stark@hq02.usace.army.mil, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, gconrad@imcc.isa.us, James.M.Townsend@lrl02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, mcrum@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Paul.Rothman@mail.state.ky.us, bcl@mme.state.va.us, lsv@mme.state.va.us, Al Klein <AKLEIN@OSMRE.GOV>, Brent Wahlquist <BWAHLQUI@OSMRE.GOV>, Dave Hartos <DHARTOS@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, Thomas Shope <TSHOPE@OSMRE.GOV>

cc:

Subject: MTM/VF DEIS Conference Call Thursday 11/21 9-11am: call 877/216-4412, 866654#

Executive Committee Members --

We have scheduled a combined Executive Committee/Steering Committee Call this Thursday (see proposed agenda below). Please let me know if you have comments or suggestions for the agenda.

By now you should have received Chapters 1 (Purpose and Need) and 2 (Alternatives) of the DEIS (sent 11/12) and Chapter 4 (Environmental Consequences) (sent earlier today) via email from Mike Robinson. Please review these before the call. Chapter 3 (Affected Environment) is available but the files are enormous and will require several emails to send. If you are interested in reviewing Chapter 3, please let me know and and I will get the files to you. Please see table of contents in the following attachment for more info about what you will find in Chapter 3.

TABLE OF CONTENTS - MAIN.wp

Please call me if you have any questions or need additional information. thanks, Kathy

Agenda
Mountaintop Mining/Valley Fill DEIS
Executive committee & Steering Committee Conference Call
November 21, 2002 9:00 - 11:00am
call in number: 877/216-4412, access code 86654#

1) Introductions (~5 minutes)

Existing and New Executive Committee Members:
- -Kathy Hodgkiss, EPA chairperson replacing Mike Castle
- -Brent Wahlquist, OSM - Director - OSM - Appalachian Regional Coordinating Center, replacing
- -Al Klein (who will be on the call too)
- -Kirk Stark, COE, interim (COE EC member is vacant)
- -Mamie Parker, FWS
- -Matt Crum, WVDEP

Steering Committee Roll Call

2) Steering Committee briefing on status of DEIS: (~60 minutes)

Chapter 1 (Purpose and Need) revised to:
- -explain scoping issues considered and dismissed based on significance of issue or study findings
- -explain alternative framework and fill restriction actions that were considered, but dismissed from further analysis (with reasons)

Chapter II (Alternatives) revised to:
- -retain 3-Alternative framework endorsed by principals
- -increase contrast of "Government Efficiency/Coordinated Decision Making" actions; provide new/revised tables showing contrast
- -considered proposal for "special aquatic sites;" currently is unevenly treated in Chapters I and II; will need revision since concept is not accepted by EPA and/or COE HQ

-For EC consideration: EPA proposal for avoidance of 50% of first order streams in 2nd order watershed not yet fully presented, discussed, accepted or integrated

Chapter III (Affected Environment) revised to:
- -incorporate all finalized technical studies
- -incorporate any "no-action consequences" narratives for those issues dismissed in Chapter I that were placed in earlier versions of DEIS

Chapter IV (Consequences of Alternatives) prepared, but:
- -all sections not yet put in consistent format or reviewed by SC and revised based on comments
- -introduction/summary consequences sections not prepared

Issues Raised During Preparation:

-Lack of environmental contrast; *is a fill restriction component needed in Alternative 1 to provided most environmentally-protective alternative?*
- -discussions to date concluded that no authority currently exists for Alternative 1 suggestions (anti-deg., ADID, special aquatic sites, etc.)
- -OFA states that NEPA compliance not satisfied; alternatives need not be limited to existing statutory authority--*Should a "no mining" or other restrictive alternative be included?*;
- -Counter: current contrast is "administrative" and similar environmental consequences is ok for programmatic DEIS and consistent with 1999 Notice of Intent and 1998 settlement agreement

-FWS concerned that alternatives hinge on effectiveness of mitigation – based on COE protocol that is not fully or adequately developed and untested in practice
- -FWS suggests that the DEIS fully explain how permits will be denied under each alternative and that detailed evaluation of the outcome of several case examples under each alternative should be included
- -Counterpoint: An EIS doesn't have to have all the actions fleshed out in great detail until after the Record of Decision (ROD). Further development of the actions that are part of the ROD will occur with appropriate APA input, NEPA compliance, and regulatory analysis, as appropriate, when implemented
- -Another view: This is not an EIS recommending Congressional action to limit fills--Congress has already taken a position in the CWA and SMCRA and all regulatory requirements to date have been through NEPA and regulatory analysis--this EIS is programmatic on how coordinated decision making can occur to effect environmental protections already required

-Need for legal review for: 1) accuracy of agency statutory regulatory positions portrayed or stated;

EXHIBIT 52

2) proper wording of baseline and no action descriptions of program to limit liability

Schedule: targeting early spring (end of February) release of draft EIS:
-all SC efforts geared to providing Gannett Fleming (GF) materials for November 25 draft CD
*Chapters I and II–Wednesday 11/13; Chapter IV–Monday 11/18
*Other minor insertions ok through 11/20
-GF to forward CD with preliminary draft of EIS to all reviewers by the end of November.
-Agencies have December to perform final detailed review, including legal review, and to edit the preliminary draft.
-EPA to give GF a revised document on CD by 1/10/03 for preparation of GPO camera-ready version, 100 CDs, and agreed-upon number of hard copies for agencies

Status of Economic Study Review by Hill and Associates

Other Logistics:
-distribution process discussed:
*post on web sites when sent to GPO, official public comment period starts with FR after printing completed
*send return post card with CD to all stakeholders involved in scoping for request for executive summary or full "hard" copy
*send hard copies to selected libraries and EIS agency offices within study area and announce availability of document for public review at those locations in FR

-Question to EC: *Who will sign (surname) for each agency?*

3) Executive Committee questions and discussions for clarification of issues (~15 minutes)

4) Executive Committee Session (~40 minutes)

Discuss results of EC review of draft chapters
-Areas improvements/revisions needed

Discuss Schedule
- factoring in:
the results of this review
December window for SC revisions, legal review
Additional EC review
Surname review
Briefing principals

11/29/02:	preliminary draft EIS on CD made available to agencies for detailed review and editing (pending the outcome of this preliminary EC review)
12/1-31/02:	window for final review and editing
	week of 12/16: briefing for principals??
1/1/03:	final steering committee and legal review changes provided to EPA
1/10/03:	final edited materials to go to Gannett Fleming
1/31/03:	Gannett Fleming produces camera-ready copy
+ 4 - 8 weeks	GPO printing

Discuss briefing principals on DEIS status, decisions, issues that may arise in public comments

ECAgenda112102.wpc

Kathy Hodgkiss, Acting Director
Environmental Services Division
U.S. EPA Region 3
215/814-3151

A-510

From: Thomas Morgan
To: Coker, Jeff; Hartos, Dave; Robinson, Mike
Date: Thu, Dec 12, 2002 2:27 PM
Subject: Comments on Draft EIS

Mike,

Attached are the Charleston Field Office comments on the Draft EIS documents you sent out earlier this week.

Our comments are contained in the two documents below. One lists the comments for Section II and Table II-3 and the other is a copy of Section IV.D., with our comments contained in strike through and redlines. You'll need to open the Section IV.D. section in order for the redlines to show up.

The comments for Section IV.D. relate to the discussion of the WV AOC+ document. The Draft EIS mis-characterizes the AOC+ document as a fill minimization document when in fact it is an optimization document that simply provides a process to determine the volume of excess spoil and calculates the size of the disposal area for the excess spoil. It creates a "model" minesite, but the operator is not bound by the constraints of the model when completing the final mine plan. The only constraint is that the amount of material backfilled must equal the amount determined not to be excess by the AOC+ process. It does not limit the size or configuration of any particular fill.

A redline is also included with a note about the "case study" site included in the discussion. The use of this particular mine site is misleading in that actual permit reviews generally do not see that great of a reduction in excess spoil volume.

If you have any questions about our comments, let me know. I'll be out of the office tomorrow but will be back in on Monday morning.

Tom

CC: Calhoun, Roger; McCauley, Lynn; Superfesky, Michael

EXHIBIT 53

A-157

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

December 20, 2002

Ms. Barbara Okorn (3ES30)
USEPA Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103

Dear Ms. Okorn:

We received a letter from Ms. Kathy Hodgkiss, dated November 22, 2002, requesting that we provide you with updated threatened and endangered species information for the Kentucky and Tennessee portion of the Southern Appalachian coal fields. A list of species that may be affected by mining activities is included as an attachment to this letter. Note that our data base is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus is not necessarily an exhaustive list of each county's endangered and threatened species. Note further that the time frame allotted for this information request was not sufficient for the development of species maps. Please contact us if you would like to further pursue the assimilation of maps.

Measures for protection of aquatic species (i.e., fish, mussels, and snails) focus on the maintenance of water quality. The primary measures are (1) retention of trees along streams in order to provide an energy source and buffer water temperatures and (2) the preclusion of sediment transport to streams.

All of the endangered bat species require protection of wintering habitat (i.e., caves and abandoned mine portals) and food sources, including streams. The Indiana bat, in particular, requires the use of trees as roosting habitat. Standard measures for protection and enhancement of habitat for this species, including maintenance of trees during and after mining, are presently being developed for Kentucky and Tennessee.

Protection of some plants is secured through minimization of the disturbance of specific habitats. For example, riparian species such as Cumberland rosemary and Virginia spiraea require protection of streams and adjacent areas. Adherence to the 100-foot stream buffer zone regulation fulfills these plants' needs. Likewise, maintenance of a buffer zone along sandstone clifflines benefits the species that inhabit those areas (e.g., Cumberland sandwort and white-haired goldenrod).

EXHIBIT 54

We provided information to representatives of the USEPA and Gannett Fleming, Inc., about species of potential concern related to mining in July 1999 and January 2002. Several species listed at those times were deleted from the attached list, or from some counties on the list. For example, the red-cockaded woodpecker is now considered extirpated from Kentucky. Distributions of some of the species included in the July 1999 and January 2002 lists only rarely overlap with areas considered to be within zones of potential mining impact. These species include the bald eagle, shiny pigtoe, birdwing pearly mussel, oyster mussel, fine-rayed pigtoe, pink mucket, cracking pearly mussel, dromedary pearly mussel, clubshell, fanshell, white wartyback, Anthony's river snail, Cumberland elktoe, Eggert's sunflower, Indiana bat, tan riffleshell, slender chub, yellowfin madtom, spotfin chub, and chaffseed. However, some of these species can be vulnerable to impacts in cases where mining and associated activities encroach on them. The pale lilliput and Alabama lamp pearly mussel are no longer considered extant within the area of this biological assessment.

On the other hand, species were also added to certain counties on the attached list. Some were added because of their recent additions to the candidate list, including the Cumberland johnny darter, fluted kidneyshell, and white fringeless orchid. Recent expansion of mining activities into new areas warranted the addition of some species to this list, including the Cumberland bean pearly mussel, green pitcher plant, Sequatchie caddisfly, large-flowered skullcap, and Virginia spiraea. The duskytail darter, tan riffleshell, running buffalo clover, gray bat, and Indiana bat were added to the list because of recent expansions of known distributions into certain areas.

Thank you for this opportunity to provide further input. Please contact David Pelren of my staff at 931/528-6481 (ext. 204) if you have questions about these comments.

Sincerely,

Lee A. Barclay

Lee A. Barclay, Ph.D.
Field Supervisor

Attachment

(620)

John Forren
12/23/2002 02:58 PM

To: Gary Bryant/R3/USEPA/US@EPA
cc: David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, Jim Green/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
Subject: Re: Comments on DRAFT EIS for MTM/VF

Thanks, Gary. We'll get them included the final version as much as we can.

John

Gary Bryant

Gary Bryant
12/23/02 02:25 PM

To: Kathy Hodgkiss/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
cc: Frank Borsuk/R3/USEPA/US@EPA, Jim Green/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA
Subject: Comments on DRAFT EIS for MTM/VF

The attached file has our comments on reviewing the Dec 2002 Interim *Draft report Mountaintop Mining/Valley Fill Environmental Impact Statement.*
Please contact me if there are questions.

Thanks,
Gary

EISDRAFTcmts.wpc

EXHIBIT 55

COMMENTS ON THE DRAFT EIS FOR MTM/VF COAL MINING (Dec 2002)
from ESD, OEP, Wheeling Staff 12/20/02

The body of the report has excellent scientific information on the environmental impacts of MTM/VF mining. Unfortunately, it appears that information was not used in developing the Alternatives. It is not clear why Alternative 2 is the preferred alternative when the only major difference among the three alternatives seems to be which agency leads the permit process. The summary of the alternatives listed on pages ES-2 and 3 states that cross-program actions minimizing adverse effects of mountaintop mining and valley fill construction on terrestrial resources and the public **are identical in Alternatives 1, 2 and 3.**

A proposed implementation schedule should be included in this report for the key actions like establishing interagency MOUs along with recommendations of how they would be funded. This is one lesson that should be gleaned from effort to draft this EIS.

The fill inventory data base, which was used to estimate the miles of stream impacted, does not support precise determinations. There is a comment on page 3K-22 "A total of 4,484 (67 percent) valley fills out of the 6,607 approved were constructed or may be constructed." Since there is no indication of which fills were built, and only 67% of the fills permitted are actually built, this is very imprecise data, a fact not adequately mentioned in the estimates of miles of streams impacted.

Pg ES-7 - 1st paragraph - "These regulatory changes resulted in a decline in the average number of fills per year approved in the EIS study area ...."
COMMENT: This is not an accurate statement as there are many factors, in addition to the **changes in regulations**, at work in determining the number of fills per year - especially the cyclical market for coal.

Near the middle of this same paragraph there appears to be an error in the total stream miles impacted during 1995-1998 (**63 miles**) and during 1999-2001 (**30 miles**). Table III.K-8 on page IIIK-49 would indicate that there were **206.74 miles** of streams impacted during 1995-1998 and **107.26 miles** of streams impacted during 1999-2001.

Near the end of that paragraph there is a sentence "Similar **environmental benefits** are expected with the implementation of one of the three action alternatives proposed in the EIS."
COMMENT: The scientific information in the main report does not indicate that MTM/VF mining produces any environmental benefits, but in fact the **impacts are detrimental to the environment**. It is more accurate to say that the implementation of one of these alternatives will reduce the detrimental environmental impacts of MTM/VF mining.

Pg II-76 - 1st paragraph - "None of the regulatory authorities in the study area. Including the OSM federal program in Tennessee, specify a preferential method for doing the flood analysis."
COMMENT: This conflicts with the statements on Pg III.G-9 2nd paragraph which indicate that KY & WV have preferred methods for analyzing peak flow and flooding potential.

Pg III.D-6 - 3rd paragraph - "Selenium concentrations from the Filled category sites were found to exceed the AWQC for selenium **at all sites in this category.**"
COMMENT: This statement is in error; the statement in the Stream Report was that all the excessive values were at Filled sites. There are some Filled sites that do not have excessive concentrations of selenium so the existing statement in this DRAFT report should state "... **at most sites in this category.**"

Pg III.D-7 - 3rd paragraph - "In the USEPA (2002a) stream chemistry study, selenium was found to exceed AWQC at Filled sites only, **and was found to exceed AWQC at all Filled sites included in the study.**"
COMMENT: This statement is in error, as noted in the previous comment. The statement should read "... **exceed AWQC at most Filled sites** ..."

Pg III.D-7 - 4th paragraph - "While changes in water chemistry downstream from mined, filled sites have been identified, **it is not known if these changes are resulting in alterations to the downstream aquatic communities or whether functions performed by the areas downstream areas from mined, filled sites are being impaired.**"
COMMENT: This should read, " While changes in water chemistry downstream from filled sites have been identified, **it is not known which changes cause the impairment observed in the downstream aquatic communities.**" EPA's studies and other studies have found that the strongest and most significant correlations are between biological condition and conductivity. We do know that the stream segments downstream of some of the fills are impaired, and we believe the impairments are due to water chemistry changes , based on the strong correlations. Please note that the biological conditions are considered impaired, and they are most strongly correlated with water chemistry changes. Conductivity may be a surrogate for other water quality parameters, that is true. It is also true we don't know the mechanism - why is high conductivity associated with impaired biological condition - for example, others have suggested that the high conductivity inhibits ion regulation - but we don't know That's what we don't know.

Pg III.G-6 - 3rd paragraph, last sentence - "Again this **did not result in any** predicted **overbank flooding.**"
Last paragraph last sentence "Again, **bank full capacity** of the stream channel **did not result.**"
COMMENT - Bank full flows are generally considered a 2 year storm event. The peak flows calculations in these studies are 10 year storms and 100 year storms. It seems impossible for the streams not to rise far above bank full conditions during these much larger storm events.

Pg IV.C-1 - 5th paragraph "The additional provisions for monitoring and mitigation in Alternatives 1, 2 and 3 will **increase the environmental benefit** provided for this impact factor as compared to the no action alternative."
COMMENT: This should read,"The additional provisions for monitoring and mitigation in Alternatives 1, 2 and 3 will **reduce this environmental impact** as compared to the no action alternative."

Pg IV.C-2 - Last paragraph, last sentence - "However, the additional provisions for monitoring and mitigation will **increase the environmental benefit** provided for this impact factor as compared to the no action alternative."
COMMENT: This should read, "However, the additional provisions for monitoring and mitigation will **decrease the environmental impact** as compared to the no action alternative."

(622)

Kathy Hodgkiss
12/30/2002 08:36 AM

To: forren.john@epa.gov, hoffman.william@epa.gov, David Rider/R3/USEPA/US@EPA
cc:
Subject: Comments on DRAFT EIS for MTM/VF

Kathy Hodgkiss, Acting Director
Environmental Services Division
U.S. EPA Region 3
215/814-3151

----- Forwarded by Kathy Hodgkiss/R3/USEPA/US on 12/30/02 08:39 AM -----

Ray George
12/29/02 01:37 PM

To: Kathy Hodgkiss/R3/USEPA/US@EPA
cc:
Subject: Comments on DRAFT EIS for MTM/VF

Kathy...I have reviewed Gary and the Wheeling ESD staff comments and browsed through the critical areas of the EIS CD. I concur with the expressed concerns. The CRITICAL component however is that the "draft" maintains the good science findings data. Even though these science findings are not reflected in conclusions/recommendations, this data provides the basis for legitimate challenge down the road. Current external agencies crafting may result in an ignore of solid data, however embodiment of the raw science data will ensure the record and allow future interpretation...

Ray George USEPA — WV/WPa State Liaison Officer
1060 Chapline Street
Wheeling, WV 26003

(304) 234-0234
(304)234-0258 fax
(304)280-2600 cellular

----- Forwarded by Ray George/R3/USEPA/US on 12/29/02 01:29 PM -----

Gary Bryant
12/23/02 11:25 AM

To: Ray George/R3/USEPA/US@EPA
cc:
Subject: Comments on DRAFT EIS for MTM/VF

FYI
----- Forwarded by Gary Bryant/R3/USEPA/US on 12/23/2002 02:28 PM -----

Gary Bryant
12/23/2002 02:25 PM

To: Kathy Hodgkiss/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
cc: Frank Borsuk/R3/USEPA/US@EPA, Jim Green/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA
Subject: Comments on DRAFT EIS for MTM/VF

The attached file has our comments on reviewing the Dec 2002 interim *Draft report Mountaintop Mining/Valley Fill Environmental Impact Statement.*
Please contact me if there are questions.

Thanks,
Gary

EXHIBIT 56

A-15-6

Cindy Tibbott
01/02/03 11:16 AM

To: BWAHLQUI@OSMRE.GOV, CSYLVEST@OSMRE.GOV, dvandelinde@mail.dep.state.wv.us, forren.john@epamail.epa.gov, hoffman.william@epamail.epa.gov, james.m.Townsend@lrl02.usace.army.mil, JCOKER@OSMRE.GOV, jstump@GFNET.com, katherine.L.Trott@hq02.usace.army.mil, MROBINSO@OSMRE.GOV, rhunter@mail.dep.state.wv.us, rider.david@epamail.epa.gov, Suriano.Elaine@epamail.epa.gov, Tom_Bovard@ios.doi.gov, dhartos@escgw.osmre.gov
cc: Dave_Densmore@fws.gov, Diane Bowen/ARL/R9/FWS/DOI@FWS, Marjorie Snyder/R5/FWS/DOI@FWS
Subject: Comments from other FWS offices on draft EIS

As I mentioned on one of our conference calls last week, we've received comments from two of our FWS field offices. It is noteworthy that independent review of the DEIS by these "fresh eyes" led them to many of the same conclusions and concerns Densmore and I have already raised, as have others on the Steering Committee.....

From Dave Pelren of our Cookeville, TN, field office:

I have quickly reviewed the draft Mountaintop Mining EIS. Given the short review time for this draft, we in the Tennessee
Field Office have very few comments. We would like to offer an observation or two at this point.

Although the Corps of Engineers' recent approach to minimizing stream impacts is commendable in terms of initiating a
stream avoidance/mitigation process, some problems remain. This EIS should discuss those problems. The proposed Corps' process would emphasize placement of fill in previously impaired streams, thereby negating potential for the future improvement of those streams. Considering the situation in eastern Kentucky, where multiple entities often own the land within one mining permit boundary, this system of prioritizing hollows for proposed fill is unjust. However, we concur with the use of this prioritization system in cases where fill is placed in a watershed that is already irreparably damaged.

Cumulative impacts are a critical concern regarding mining and stream impacts. This EIS does not appear to
adequately discuss the current lack of a cumulative impact assessment and potential solutions. We recommend that
conduct of a comprehensive assessment of downstream invertebrate resources be required to establish a baseline prior to timber removal in all cases where instream fill is proposed. A realistic method of achieving this and appropriate means of mitigating cumulative impacts should be addressed by the EIS.

Section IV.G. (Deforestation) of the EIS includes a discussion of forest as possibly containing the highest environmental
value of many mining areas. Although we agree with this sentiment, it does not appear to be consistent with the
regulatory situation in many areas of Kentucky and Tennessee in terms of the perception of post-mining land use. The
EIS indicates that landowners would be expected to support reforestation because of its long-term benefits. Because of
the lack of success of the reforestation initiative that was begun several years ago in Kentucky, we do not believe
landowners or the mining industry will show significant support for anything more than is required. The EIS should only

EXHIBIT 57

provide realistic potential solutions.

The projected forest cover conditions for various states should be further explained. The time frames used for
projections and quality of forest cover in the EIS is not clear.

Thank you for this opportunity to review the latest draft of the Mountaintop Mining EIS.

- David Pelren

From Brian Evans of our Southwest Virginia Field Office:

The Service is correct when it "suggested", as stated on page II-11, that valley fills in streams are contrary to EPA's anti-degradation policy. It appears EPA is disregarding portions of drainage networks to make anti-degradation policy harmonious with valley fills. Why does EPA consider "...anti-degradation principals intact if the overall integrity of the watershed downstream is intact"? EPA does not explain why upstream portions of watersheds isolated and therefore degraded by filled stream segments are not considered as part of anti-degradation policy. Moreover, shifting the emphasis on protection to the broad scale "general integrity of the watershed" obviates protection of smaller streams or stream reaches, which are Waters of the U.S. The potential to restore streams or mitigate stream impacts, such that pre-impact uses are attained has not been demonstrated. It is unlikely that streams and the ecological functions they contribute to the watershed can be replaced through mitigation, nor is it likely that a no net loss of streams policy could be implemented in a manner similar to wetland compensation. Even if EPA restricts consideration of impacts to the reach of stream below the filled reach, studies described in section III.D show that fills contribute to significant degradation to the overall chemical, physical, and biological integrity of adjacent waters. For example, below fills the ambient water quality criterion for selenium concentration is exceeded consistently, natural flow regimes are altered, and macroinvertebrate diversity is depressed.

From Gale Heffinger, Southwest Virginia Field Office:

The discussion at b.2. disregards FWS suggestion the all headwater streams could be identified generally unsuitable for valley fills primarily because it would be at odds with the NEPA requirement that alternative be reasonable. The narrative discussion includes "The ADID process was developed to identify particularly sensitive or high value aquatic resources". This statement implies headwater streams in mining areas are not sensitive or high value aquatic resources. To the contrary, all waters of the US are sensitive and high value aquatic resources, otherwise the Congress through the CWA would have designated certain waters as not sensitive or high value aquatic resources. The CWA objective is to restore and maintain the chemical, physical and biological integrity of the Nation's waters. Additionally Virginia State Water Control Law states all high quality waters will be protected and all other state waters restored to such condition of quality that any such waters will permit all reasonable public uses....... . Specific sections of the CWA address identification of waters not meeting minimum water quality standards (303d) but nowhere does the CWA designate or otherwise identify certain waters that are not sensitive and high value aquatic resources. This exclusion of a list of waters that are not considered sensitive or of high value reinforces the objective of the CWA, the State's laws and in effect indicates Congress recognized all waters are sensitive and of high value. Any finding of ADID or CHIA or any other tool to assess water quality would have two conclusions 1) the waters subject to the ADID or other assessment process are impaired and therefore should be restored and maintained per the objective of the CWA. 2) the waters are not impaired and therefore should be maintained per the objective of the CWA. Filling waters of the US with mine waste irreparably degrades the chemical, physical and biological integrity of the waters and permanently disposes such waters to be contrary to the objectives of the CWA, specifically, restoration. Such action as filling streams not only insures the stream cannot be restored, it also causes loss of the biological integrity of the waters downstream because the energy inputs from upstream (the stream now under fill) are disrupted. The action of filling and disrupting the energy flow from upstream to downstream users adversely impacts the biological community including federal trust aquatic resources.

- abThe discussion at b.3. includes narrative that states "...not all headwater streams are special; 404(b)(1) will most likely lead to avoidance of truly special sites; and the legal vulnerability of such a designation or use of presumptions". Again, the CWA does not include listing certain streams as "not special" not sensitive or not high quality. This is done for several reasons among which are the objective of the CWA to maintain and restore the chemical, physical and biological integrity........ This in effect states that Congress recognized certain waters are or may be impaired by various causes, however remedies for the impairment (maintain and restore) are set forth in the CWA. Section 303d of the CWA, for instance, mandates the EPA or States to identify impaired streams and include them in the TMDL list and water quality standards planning. Section 401 requires a statement that a National Pollutant Discharge Elimination System permit (section 402 CWA) will not cause a violation of water quality standards. Section 402 requires all discharges be permitted, another tool to restore and maintain. State and federal programs expend dollars to restore streams through such programs as CRP, CREP, WHIP, PFFW and more.

From: <Forren.John@epamail.epa.gov>
To: Cindy Tibbott <cindy_tibbott@fws.gov>, "Dave Densmore (E-mail)" <dave_densmore@fws.gov>, <Rider.David@epamail.epa.gov>, Dave Hartos <dhartos@osmre.gov>, Dave Vandelinde <dvandelinde@mail.dep.state.wv.us>, <Suriano.Elaine@epamail.epa.gov>, Russ Hunter <hunter@mail.dep.state.wv.us>, "Jim Townsend (E-mail)" <james.m.Townsend@lrl02.usace.army.mil>, "Jeff Coker (E-mail)" <jcoker@osmre.gov>, "Kathy Trott (E-mail)" <katherine.L.Trott@hq02.usace.army.mil>, Les Vincent <lsv@mme.state.va.us>, Mike Robinson <mrobinso@osmre.gov>, Paul Rothman <paul.rothman@mail.state.ky.us>, <Hoffman.William@epamail.epa.gov>, "Stump, Jennifer M." <jstump@GFNET.com>, <Hodgkiss.Kathy@epamail.epa.gov>
Date: Thu, Jan 2, 2003 12:49 PM
Subject: EPA-OGC NEPA comments on MTM/VF EIS

FYI

----- Forwarded by John Forren/R3/USEPA/US on 01/02/03 12:51 PM -----

James Havard
To: John Forren/R3/USEPA/US@EPA

01/02/03 12:41 PM cc: David Rider/R3/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, Marilyn Kuray/DC/USEPA/US@EPA, Pamela Lazos/R3/USEPA/US@EPA, Steven Neugeboren/DC/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA
Subject: OGC NEPA comments on MTM/VF EIS(Document link: John Forren)

Here are comments from me and Marilyn Kuray. We both plan to be on the 1:30 call.

(See attached file: OGC NEPA Comments on draft EIS 12-02.wpd)

Attachment(s):
Attachment File 1.wpd
Attachment File 2.822

EXHIBIT 58

Privileged and Confidential

EPA OGC NEPA Comments on MTM/VF EIS

General

These general comment apply throughout the document. While we provide some examples of where the issues arise in the detailed comments below, we do seek to identify each time these issues arise.

1. The document as a whole is confusing and difficult to read.

2. Many grammatical errors/typos

3. Many times statements are phrased in a negative or defensive manner which weakens the document.
   For example: (Alternatives chapter A.1 paragraph 3)
   Some individual actions were considered to be similar to or addressed by other actions and were therefore dismissed.

   Would be better written as:
   Some individual actions were determined to be similar to or addressed by other actions and, therefore, were eliminated from detailed study.

4. It is not clear what the reference point for comparison is. Is it 1998 or 2002? This seems to make a huge difference as many actions have been taken in the intervening years that address the same issues.

5. Do the Agencies all consider this an EIS required under NEPA. Or do the Agencies want to spin this as a voluntary EIS? If it is a voluntary EIS (even though done under a settlement agreement), we would want to make changes to reflect that. Even if we consider this voluntary, we'd still want to follow the regs and statutes to get the most benefit out of doing preparing it. [Note: EPA does not appear to be engaging in an action here for which NEPA compliance would be required.]

6. CEQ regs at 1502.14(c) require agencies to include reasonable alternatives not within the jurisdiction of the lead agency. Further, CEQ guidance provides:

   > An alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable. A potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered. Section 1506.2(d). Alternatives that are outside the scope of what Congress has approved or funded must still be evaluated in the EIS if they are reasonable, because the EIS may serve as the basis for modifying the Congressional approval or funding in light of NEPA's goals and policies. Section 1500.1(a).

In addition, CEQ guidance states: "A potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered."

Therefore, it is important that we don't say lack of authority is our only reason for not considering alternatives in detail. We should include other reasons why alternatives are not reasonable.

7. The use of "will" throughout the document causes confusion. It gives the impression that particular actions are going to happen. Better wording would be "If this alternative were adopted, it would..." or "Under this alternative, COE would..."

8. In several places the document acknowledged that the Agencies do not have important information. It is important to keep in mind CEQ reg 1502.22 regarding incomplete or unavailable information. That provision says that if incomplete information relevant to reasonably foreseeable significant adverse impacts is **essential to a reasoned choice among alternatives** and the overall costs of obtaining it are not exorbitant, the Agencies must include this information in the EIS. If the costs are exorbitant, 1502.22(b) provides specific procedures to be followed.

9. It's not clear whether there would be NEPA review on subsequent actions. For example if the agencies enter into an MOU, would that be subject to NEPA review?. Also, some may argue that it is difficult to assess the alternatives without seeing drafts of the implementing MOUs, etc.

Executive Summary

10. The Executive Summary does not explain why Alternative #2 is preferred.

11. If there were regulatory changes instituted following the Bragg settlement, will the preferred alternative provide more environmental protection or is it providing the same level of protection? The term "regulatory changes" sounds like agencies already promulgated rules in this area. If this is true, the EIS needs to explain how the changes being considered with this EIS are different.

I. Purpose and Need

12. Section C. 2.d.4.
"Many of the efforts in this so-called "interim permitting" period identified areas where the agencies, the regulated community, and the environment would benefit from coordinated or clarified procedures, better baseline data collection, improved analysis of potential impacts, and a different sequence of processes."

The meaning of the term " 'interim permitting' period" is not clear. Does it refer to permitting as done under the Bragg settlement, the interim guidelines or under the MOU?

13. Section C. 3.b.1
"Some studies completed allow conclusions to be drawn and others suggest more in-depth information is required."

What does this sentence mean? Should it be "Some completed studies ... This sentence needs an explanation of what studies allowed conclusions to be drawn and what additional information is needed.

II. Alternatives

14. Section A (First paragraph)
In accordance with the National Environmental Policy Act, significant issues identified in the scoping process must be evaluated ~~to determine the proper focus of~~ in the EIS.~~In focusing the EIS, the action agencies must be direct their efforts to those~~ Significant issues are those that (1) relate to the purpose and need of the EIS, and (2) are ~~truly~~ "significant" or important to the decisions being made. [Also, where does this definition of "significant" come from? Do we have a cite?]

15. Section A.1 (intro, paragraph 2)
Pursuant to NEPA, "values" are defined as aesthetic, historical, cultural, economic, social, and health considerations relevant to the proposed action and the alternatives.

Do you mean impacts? Neither NEPA nor the CEQ regs define values.

16. Section A.1 (intro, paragraph 3)
This paragraph suggests that we considered other alternatives, but they are not discussed in the EIS because they were "similar to or addressed by other actions and were therefore dismissed." The CEQ regs state that during scoping the agency should "identify and eliminate from detailed study issues [that] . . . have been covered by prior environmental review." (40 C.F.R. 1501.7(3)) If an issue already has been subject to an environmental review, we should state what that issue is and how it was addressed.

It's unclear what is meant by "actions" does it mean alternatives? or issues?

17. Section A.3.k.
This section says that EPA is writing a BA under the ESA. What is EPA's relevant action under the ESA? What about other Agencies? Will they consult on subsequent actions?

18. Section A.3.l.
Make the following change: "NEPA Section 102(2)(B) requires federal agencies to 'identify and develop methods and procedures, in consultation with [CEQ] which will ~~...~~ insure that presently unquantified environmental amenities and values may be given

appropriate consideration in decision making...'" And then we should discuss what procedures are already in place. Alternatively, we could strike the reference to this section. This section reads as a requirement to develop procedures.

B.2 Fill Restriction Alternatives

19. It is not clear why we rejected an alternative that was not a bright line. We need a reason other than a lack of authority.

B.2.a.

20. Citations to court cases should include the complete citation. For example *District Court: 452 F. Supp. 327 (1978); U.S. Court of Appeals: 627 F.2d 1346 (1980)]*
should be :
In re Surface Min. Regulation Litigation, 452 F.Supp. 327 (D.C.D.C.,1978), aff'd in part, rev'd in part, 627 F.2d 1346, (D.C.Cir. May 02, 1980)

21. Reasonableness of alternatives - the CEQ regs say that an EIS must consider all reasonable alternatives. It is not necessarily true that the regs prohibit consideration of other alternatives – if an alternative is not reasonable, just say it was eliminated from detailed study because it was not reasonable rather than saying such alternatives would violate the CEQ regs.

22. The EIS must explain why this alternative was unreasonable in terms other than conflict with federal law and/or lack of authority.

23. The paragraph beginning "However, it is OSM's position that, should the CWA contain such a prohibition or bright-line standard. . . ." is very difficult to follow.

In that paragraph, the following sentence should be explained.. Why is this so? "OSM and the state SMCRA authorities historically did not apply the stream buffer zone rule to the area of stream disturbance **beneath** the fill, but to the **downstream** effects, offsite."

B.2.b.1 and B.2.b.2

24. Neither section adequately describes why the alternative is unreasonable. The paragraph beginning "Further, EPA and the COE concluded that the general application of ADID to class of streams (i.e., headwater streams) would be somewhat arbitrary and difficult to administer . . . ." is a start and should be made clearer and a similar analysis could be used for other alternatives.

B.2.b.3

25. Is the part of this section that begins with "In summary an alternative framework..." a summary of just this subsection? If it is meant to be a summary of all of section 2b, then it needs to be in a separate subsection.

C. Alternatives Carried Forward . . .

26. (paragraph 1) It is not clear whether the 3 alternatives are significantly different from the status quo. I think you mean that the proposed alternatives would maintain the environmental benefits that resulted from the regulatory changes made as a result of the Bragg settlement. What happens to the regulatory changes? This makes it sound like they will go away.

27. If 1998 is not the baseline for the "no action" alternative, why is it discussed here? Wouldn't going back to the way programs were operated in 1998 be an alternative that was eliminated because it is not viable? This discussion belongs in section B on rejected alternatives.

C.2 No Action Alternative

28. In the summary of regulatory benefits, I don't see any real summary of the benefits. Are there any? If not, we should say that this alternative does not provide any regulatory benefits. Does the Bragg settlement only apply in WVA?

29. In the summary of environmental benefits, the first paragraph needs a topic sentence to lead into all of the statistics. You could reword the last sentence to use as a topic sentence (leaving the last sentence in place).

Alternatives 1, 2, and 3

30. We find it confusing as to why under Alt 1 valley fills are presumed to have significant impacts, under Alt. 3 they are assumed not to and under Alt 2 they may or may not have significant impacts. Do the impacts really change depending on the Alternative? How can we justify this?

D. Detailed Analysis

31. Why is the 1998 process discussed as if it were an alternative we are considering? Since it is not, discussion here is unnecessary and confusing.

32. Definitions of Stream Characteristics - Are Alts 1, 2, and 3 the same? Shouldn't that be stated?

33. We did not see any discussion of why Alternative 2 is the preferred alternative. Since so many aspects of the 3 alternatives are the same, there should be some discussion of why one is better than the others. Otherwise, there is no "clear basis for choice among the options."

34. D.3. Direct Stream Loss

The following two sentences seem like a non sequitur:
"Both SMCRA and CWA place a high value on stream protection, but both of these programs recognize that incursions and disturbances of streams may be unavoidable. For example, there have been hundreds of miles of headwater stream buried by valley fills in the past decade in this EIS study area."

35. D.7.c Action 19.
This action would create a rebutable presumption that at least one headwater stream in a system must be preserved or reconstructed. Didn't we reject rebutable presumptions for all streams under b.3? It is not clear why such a presumption is reasonable here and couldn't be reasonable under b.3.

36. D.9. Air quality – Someone from OGC ARLO should review this section.

37. D.11. Species.
Make the following change:
Section 1502.25(a) of the CEQ regs ~~NEPA~~ requires, to the fullest extent possible, that an EIS be prepared concurrent with the consultation and coordination requirements of the ESA.

38. D.11. Action 25. Shouldn't this action only apply to EPA where we have an action requiring ESA compliance?

III. Affected Environment

39. III.D.1.f.2. This summary notes that:

"While changes in water chemistry downstream from mined, filled sites have been identified, it is not known if these changes are resulting in alterations to the downstream aquatic communities or whether functions performed by the areas downstream areas from mined, filled sites are being impaired. Further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community structure and function are needed to address the existing data gaps."

Is this information essential to a reasoned choice among alternatives? See 1502.22. If it is, we need to get this information if the costs are not exorbitant. If they are exorbitant, see the procedures of 1502.22(b).

IV Environmental Consequences

40. B.2. Notes: "There is a lack of information on the degree to which length of stream directly correlates with the amount of energy in the form of fine-particle organic material or coarse-particle organic material leaving a particular reach of headwater stream." This section also notes: "Few conclusions regarding level of environmental impacts expected among Alternatives 1, 2 and 3 can be made for this impact factor."

Is this information essential to a reasoned choice among alternatives? See 1502.22. If it is, we need to get this information if the costs are not exorbitant. If they are exorbitant, see the procedures of 1502.22(b).

1113

Steven Neugeboren
01/07/03 03:39 PM

To: srusak@enrd.usdoj.gov, ryoung@enrd.usdoj.gov
cc:
Subject: MTM legal issues

fyi - here are the legal comments I've provided on the draft EIS.

----- Forwarded by Steven Neugeboren/DC/USEPA/US on 01/07/2003 03:38 PM -----

Steven Neugeboren
12/31/2002 10:39 AM

To: csylvest@osmre.gov, pmcdaniel@mail.dep.state.wv.us, lance.d.wood@usace.army.mil
cc: John Forren/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
Subject: ~~MTM~~ legal issues conference call

Perry, Cheryl and Lance:

I have recently conducted a legal review of ~~the~~ MTM draft EIS under the Clean Water Act (a review under NEPA is being conducted by others in my office). John Forren has scheduled a conference call for this thursday to discuss the issues identified in my review. While I found no fatal flaws in my review, I raised concerns that some of the discussion in the document gave rise to legal concerns, principally: 1) legal vulnerabilities of the 404 program, in particular Corps NWP authorizations, resulting from the characterization of the program as it was administered in 1998; (2) potential legal vulnerability for the new fill rule caused by some of the discussion of past permitting practice ~~for valley~~ fills which is inconsistent with statements by agency administrators in the preamble to the fill rule that it was generally consistent with past practice; (3) legal difficulty with the discussion of the relationship between the section 404 program and antidegradation requirements; (4) accuracy of various characterization of CWA programs and requirements.

Attached below are my comments. If you'd like to discuss prior to the conference call, you can reach me at 202-564-5488.

MTM EIS comments final.wi

Privileged Attorney/client communication
Deliberative/predecisional

OGC water law office comments on mountaintop mining EIS 12/26/02

Executive Summary:

I found this discussion, like some other sections of the document, somewhat difficult to follow. The use of terms of art, etc. assumes a fair amount of knowledge of the programs by the reader. I would suggest an effort be made to put the discussion more into plain english. Also, in general, the organization of the document was somewhat difficult to follow, e.g., . the interspersal of various "alternatives" and "actions." I would suggest more thought be given to how to explain to the reader the relationship between alternatives and actions, etc. up front and in the various sections.

Section I.E - Need for proposed action

I am concerned that this section discusses several longstanding critical legal issues that have been controversial under both SMCRA and the CWA for sometime (e.g., the meaning of the stream buffer zone rule and the relationship between the 404 program and antidegradation). It's unclear to me why we would want to, or need to, tee up those difficult issues, since they will only engender public comments that the agencies will need to address. It seemed like the basic point we are trying to make is that there has been some regulatory uncertainty and we could make that point with a more general discussion without getting into these legal issues. At a minimum, I strongly recommend deleting the entire third paragraph that discusses the CWA. We anticipate seeing the fill rule being subject to litigation, and some might seek to argue that the discussion in this draft is inconsistent with statements in that rulemaking.

Some of the discussion (i.e., the fourth to last paragraph) would strongly support the conclusion that existing permitting decisions have not been adequate, so that language should be modified or deleted. This is a consistent problem I found throughout the document, particularly regarding the pre-1999 practice but also in other respects as well. I assume we don't want the EIS to enhance the legal vulnerability of corps authorizations past and present.

Section II.B - Alternatives considered but not analyzed in detail

p. 10 - There are fairly sweeping legal conclusions here that the stream buffer zone rule could not be used to determine allowable stream segments for filling because doing so would supercede the CWA, something congress precluded in SMCRA. The lawyers need to look at this more closely. I'm uncomfortable with the breadth of this argument and how it is articulated. I sent it to lawyers at DOJ who handled bragg and kentuckians to see if that position is consistent with how we have articulated the relationship between SMCRA and the CWA in litigation.

p. 11 - the discussion identifies the various perspectives of the different agencies in considering and rejecting alternatives (e.g., FWS suggested x alternative, but EPA and the Corps disagreed). I find this odd and based on experience with political leadership in the agency, I think they would view such an approach very unfavorably. I would recommend the discussion simply refer to "the agencies."

EXHIBIT 59

Privileged Attorney/client communication
Deliberative/predecisional

- the discussion of antidegradation as it relates to valley fills was pretty confusing to me. It obviously touches on a very important and controversial legal issue. A lot of care needs to be given to whether this issue is discussed, and, if so, exactly how to do it so as to not encourage future litigation. My strong recommendation is to delete all reference to this issue in the EIS.

Section b.2. - Advanced Identification

I was uncomfortable with how much of this discussion was presented. See my markup for more detail. In certain respects, the discussion was not accurate; in others, overstated (e.g., I don't see how doing ADID for headwaters streams was on its face at odds with NEPA).

Section b.3 - Special Aquatic Site Designation

It was unclear to me how existing regulations could support designating a new class of special aquatic site. Those are currently listed in the regulation and are an exclusive list; we could certainly add to that list, but doing so would require rulemaking, but that doesn't seem to be contemplated here.

Section II.C.

In general, I found this section fairly confusing and in certain respects an inaccurate characterization of the CWA programs. In contrast, the more detailed disussion in section II.D of the alternatives was more organized and accurate. I think some substantial work would be needed on this section. Alternatively, do you all think that this section adds much that isn't contained in the more detailed discussion in section D. From my vantage point, section C could be deleted entirely and make the document more accessible and accurate in general.

In any case, I suggest an up front explanation of how this section is structured, and why the analysis is organized as it is - e.g., first regulatory framework and process, then discussion of summary of regulatory and environemntal benefits. It would be helpful to know why this structure was selected. Are these the criteria that NEPA requires us to evaluate, or a similar explanation.

Section II.C.1 - The regulatory program in 1998

I'm fairly confused as to why the EIS discusses the situation in 1998, since that is not one of the "alternatives." In general, I found the inclusion of that section made it much more difficult to understand the array of alternatives. I'd be interested in discussing why it is in there. If the purpose is to show the improvements that have been made over recent years, perhaps there may be a more effective way to accomplish that.

In any case, as written, much of this discussion appears to suggest (I assume unintentionally) that the program was improperly administered prior to the Bragg settlement, so I would suggest substantial revision to this section.

Privileged Attorney/client communication
Deliberative/predecisional

Section III.C.3 - Alternative 1:

It's unclear to me what the basis is for making the assumption in this alternative that valley fills are generally more than minimal impact. This is so at odds with current practice, that even suggesting it seems to imply that determining minimal impact is a policy, as opposed to a technical/environmental call. I'd be concerned that this undermines the credibility of the current program's minimal effect determinations. It's also unclear to me how this assumption relates to the fact that the SMCRA determinations will defer to the corps under this alternative.

Section III.C. 5 - alternative 3

As with alternative 1, it's unclear to me how the conclusion that valley fills will generally be minimal relate to this alternative, since it ultimately turns on the facts. The document states that it is because the Corps would require compensatory mitigation to make it minimal, but isn't this the case with any alternative, and in any case required by 404(e) itself and the current nationwide permit.

36 - States' SMCRA authority for compensatory mitigation: One critical issue that was not clearly explained was the ability of states to require compensatory mitigation under their statutes. What was unclear was the extent to which OSM intends any new rules to require states to have that authority, and if not, how that would relate to the process at the federal level. My guess based on the draft would be that OSM would not plan to require that states revise their legal authorities to require evaluation of compensatory mitigation. If that's the case, then how exactly would state SMCRA authorities take the lead on those issues? If I guessed wrong, then I think the document needs to make more clear that OSM intends to conduct rulemaking to require states to revise their authorities.

p. 36 - Corps reliance on State SMCRA decisions - The discussion of alternative 3 needs to make sure it's not suggesting that the Corps is not delegating its authority to the SMCRA permitting authority. Some of the discussion could be read as suggesting that. While the corps can certainly rely on information generated by the state, the corps retains ultimate authority for ensuring compliance with 404, and that should be made clear. There is good language on this issue in the fill rule final preamble describing how the corps will rely upon decisions by states, including state SMCRA authorities.

p. 37 -Streamlinine ESA consultation In the discussion of ESA, I think there is a legal problem with asserting that addressing ESA concerns by the State SMCRA authority would "hopefully eliminate possibly redundant FWS consultation with the corps on the" 404 permit. This would be true if the smcra proceeding eliminated all effects to species, beneficial or detrimental. However, if there were any possible effect remaining on the species, I think the corps obligation to consult would remain. Suggest changing the wording to say it would "streamline" any consultation that may be needed by the corps.

P. 40 - Action 1.1- individual permits for valley fills - this action states that the corps will issue individual permits. As stated previously, there needs to be a factual, and not just a policy basis, for such a conclusion, and it doesn't seem "reasonable" to suggest that all valley fills pose more than minimal effects, in light of past practice and the individualized nature of such determinations. I think this could, however, be done through modification of NWP, but I imagine that's not what's contemplated.

Privileged Attorney/client communication
Deliberative/predecisional

Also, the IP process is described, but no mention is made of public comment. Doesn't that need to be mentioned?

P.48 - Inconsistent stream definitions – the draft states that the agencies will look at definitions of waters, including waters of U.S. under the CWA to enhance consistency. Given the ongoing SWANCC rulemaking, that statement and commitment need to be run by political management. I frankly doubt that the agency leadership would want those issues addressed in this context.

P. 51 - Relationship of SMCRA to CWA – the draft states that applying the stream buffer zone rule to prohibit fills would contrary to section 404. This also raises the question whether section 404 constrains DOI's authority, which as noted above is an issue that should be run by DOJ.

Change in practice on fills – draft states that the regulation of direct loss of streams has changed in two ways since 1998, one of which is the fill rule. The fill rulemaking, however, states that it's generally consistent with agency practice, so this language in the draft should be struck.

Corps practice under prior NWP – The draft also states that the new NWP 21 requires project by project determinations of impacts and appropriateness of an IP. While I realize the corps might not have been looking closely at projects under the previous NWP, they were still receiving PCNs and, as a legal matter, determining the applicability of 404. I'm concerned that this language could be read by some as suggesting that the corps was not fulfilling its legal obligations by how it was implementing the prior NWP, so it should be revised.

52 - Advanced Identification – ADID does not, as indicated in the draft, change the threshold for impacts or information requirements. It has no regulatory effect whatsoever, but is only information about the likelihood that the guidelines will be met at a future time. The standard for reviewing a permit an application at that time is the same for any other proposed discharage. So the language here should be modified accordingly.

P.56 - Region III permit objection policy – There is a discussion of region III's 402 permit objection policy as it relates to valley fills which is some legal concern. We have been very careful in how we have characterized that policy, because of litigation around the issue of whether 402 or 404 covers valley fills. I'm concerned that some of the language could be used to undermine current agency positions, potentially in litigation. My preference would be for it to be dropped. It doesn't seem central to the discussion in this section.

Privileged Attorney/client communication
Deliberative/predecisional

60 - draft states that siting of fills hasn't been based on most environmentally protective alternative. This statement again could be cited to argue that current authorizations violate section 404, so it should be deleted.

60 - SMCRA authority for fill minimization – there is a statement that SMCRA "appears" to provide statutory authority for requiring fill minimization. I don't think it's appropriate for an EIS to be tentative about one of the agency's statutory authority, especially where that authority is a prerequisite to some of the most important actions considered in the document. The DOI lawyers should be asked to speak to this question so the document can be definitive.

62 - the fill minimization section discussion of the no action alternative only discusses SMCRA. Doesn't it need to also discuss 404?

68 - II.F.7 - Cumulative Impacts - the discussion of the program in 1998 includes a discussion of the relationship between anti-degradation and 404. As stated previously, that is a legally complex and controversial issue, and I don't see any benefit to teeing it up in the EIS process. I strongly recommend its being deleted.

The discussion also contains a background paragraph of basics on the TMDL program. It's entirely unclear why this is being discussed here in this section, and what its relevance is. Suggest either tieing it in better or deleting it. It's not clear to me at all why TMDLs would be relevant here (if it is relevant as background, would seem relevant to the document as a whole and not just cumulative impacts).

69 - Action 19 - rebuttable presumption that at least one headwaters stream must be preserved. — I didn't see this very significant proposal discussed elsewhere. This is quite a significant policy proposal, but is discussed only briefly, and the manner in which it would be implemented is not mentioned. I think rulemaking would probably be necessary, so this should be discussed further internally, in particular with OW.

74 - Air Quality - this should be reviewed by an air attorney in region 3 for accuracy

79 - ESA - It is not accurate to say that a biological assessment is needed if species are present; a BA is only required for "major construction activities." I think it's not clear that a BA is required here. Since one is being prepared, I don't think the document needs to be speak to whether it's legally required and language should be changed accordingly.

80 - ESA - the document states that the EIS "cannot" be published until agreement

Privileged Attorney/client communication
Deliberative/predecisional

is reached with FWS. I suggest changing the language to "will not" – I don't see the ESA as prohibiting proceeding with a programmatic EIS. Rather, we intend to complete the consultation prior to issuing the EIS, so I suggest changing the language accordingly.

Also, the discussion of the regulatory program today in this section for some reason keeps referring to NEPA, as opposed to ESA. Not clear why it's doing that since we're supposed to be discussing endangered species.

SECTION IV - ENVIRONMENTAL CONSEQUENCES

Section A of this section discusses administrative costs far more than environmental consequences. I don't know, but presume that such discussion is warranted under NEPA. As an uneducated observer, the emphasis on cost was notable, and I raise this only to say that I can see outside parties citing this as an example of how the EIS has failed to meaningfully focus on environmental impacts.

A-7 - Inconsistent definitions of stream characteristics

I strongly suggest toning down the repeated discussion of how much confusion there is in the public and regulated community about the programs. Such discussion could be used to challenge permit authorizations and enforcement actions. This is particularly true of the discussion of uncertainty in CWA jurisdiction, which should be deleted.

B-4 Direct Stream Loss - states that "the agencies will formally make an ADID" of watersheds. I assume we mean that we will "consider" making such identifications. Current language should be modified to make that more clear.

D-1 - Fill Minimization - Again, the document states that until 1998 fill minimization wasn't required. Even if true, such statements could by used by outside parties to suggest that those authorizations failed to meet the guidelines, so suggest deleting that.

D-4 - the document states, as it has elsewhere, that we believe AOC + satisfies requirements for alternatives analysis under the guidelines. This is a strong statement. Is OW on board with it and saying it in this public way? Do we think it satisfies alternatives analysis requirements, or just minimization?

D-6 - Discussion of costs - I was very confused by the discussion of costs at the end of this section. It's not clear why we are discussing it, and it is of such a

Privileged Attorney/client communication
Deliberative/predecisional

general nature it didn't strike me as contributing to the discussion in this section in a meaningful way.

G-8 Forestation - The discussion of takings claims is not germane or appropriate, and should be deleted.

H-2 Air Impacts - A very broad and strong statement is made that states' regulation has "not been consistent with the intent of the CAA." Couple concerns - first, states are not required to act in accordance with the "intent" of a statute, only the requirements in it applicable to them. If we believe that states have failed to meet applicable requirements, then I suggest being more precise in where they have failed, and coordinate that position with the air office in the region.

J - Endangered Species - the first page of this section is by far the best and clearest explanation of the 1996 biological opinoin. I suggest using this discussion elsehwere in the document where ESA is discussed.

The document states that EPA is preparing a BA. I assume it's doing it on behalf of all the federal agencies. This should be made clear. This similar change should be made in other locations where EPA's preparation of the BA is mentioned.

J-2 - There are many strong and significant statements made that the conditions in the 1996 biological opinion are not being met. If I were OSM, I'd look closely at this. This discussion could be relied upon by outside parties to bring lititgation claiming that OSM is required to reinitiate consultation.

K - Environmental Justice - The document assumes that preparation of this EIS is an action covered by the EO. Are we sure that's the case? I have sent the discussion to the EJ lawyer in OGC to review.

A-167

From: Mike Robinson
To: "Cindy_Tibbott@fws.gov".ESCGW.ISMESC;
"Dave_Densmore@fws.gov".ESCGW.ISMESC; "dvandelinde@mail.dep.state.wv.us".ESCGW.ISMESC;
"Forren.John@epamail.epa.gov".ESCGW.ISMESC;
"Hoffman.William@epamail.epa.gov".ESCGW.ISMESC;
"James.M.Townsend@LRL02.usace.army.mil".ESCGW.ISMESC;
"Peck.Gregory@epamail.epa.gov".ESCGW.ISMESC; Hartos, Dave; RHUNTER.CWVGW.ISMCWV
Date: Fri, Jan 10, 2003 3:01 PM
Subject: RE: H&A economic analysis

Bill, et al--With everything else going on, I've only had time to briefly skim John's report. Apart from some concerns with the draft (read on), my recommendation is that we don't finalize it at this time for inclusion in the DEIS. We just don't have sufficient time to deal with this report--particularly when you consider all the comments on the EIS Chapters that must be addressed in the next two weeks. I don't see that finalizing John's report is a high priority task.

Further, the original purpose of John's report (as agreed upon by the EIS SC), was to provide his mining engineering opinions to the SC on which senstivity modeling input factors should be evaluated by H&A. These opinions were supposed to be shared with the SC and all stakeholders immediately following the outreach meeting in October and prior to H&A soliciting feedback through interviews. Since the need for John Morgan's report was predicated on this approach, finalizing it now seems unnecessary and the value of his report at this point is likely moot. The draft Morgan report has several inaccuracies regarding the agencies' positions on the earlier reports. It is also incomplete as to detailing all of the issues that the SC identified with respect to inputs, methodology, and assumptions made in evaluating limitations of the RTC study. Finally, the draft report was prepared before several meetings and discussions occurred to design the recent H&A sensitivity study approach. John Morgan was involved in all the discussions of the approach to the H&A sensitivity study. The report does not reflect this involvement or provide a description of the mutual (i.e., SC, John Morgan, and H&A) agreements on what the H&A contract ultimately involved.

In summary, to rectify these concerns would require commitment of resources that we don't have to spare given the current schedule. I propose we focus on revisions of the DEIS for now. The bloom's off the rose at this juncture.

Michael K. Robinson
Chief, Program Support Division
Appalachian Regional Coordinating Center
Office of Surface Mining
US Department of the Interior
(412) 937-2882 fax (412) 937-3012
3 Parkway Center
Pittsburgh, PA 15220

>>> <Hoffman.William@epamail.epa.gov> 01/07/03 01:34PM >>>

Attached is John Morgan's draft report following the economics meeting that was held in Charleston last October. Please submit comments to my attention ASAP so John can finalize the report. Thanks!

Bill

William J. Hoffman (3ES30)
Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street

Philadelphia, PA 19103-2029
(215) 814-2995
----- Forwarded by William Hoffman/R3/USEPA/US on 01/07/03 01:34 PM

John Morgan
<jmorgan@morganwor To: William Hoffman/R3/USEPA/US@EPA
ldwide.com> cc:
Subject: RE: H&A economic analysis
01/07/03 12:56 PM

Bill

Please find attached the draft document.

John

-----Original Message-----
From: Hoffman.William@epamail.epa.gov
[mailto:Hoffman.William@epamail.epa.gov]
Sent: Tuesday, January 07, 2003 12:39 PM
To: John Morgan
Subject: RE:H&A economic analysis

Jeff brought it up this morning. Sorry for the confusion. If you could send it electronically, it would help me get it out to the rest of the group for comments. Thanks!

William J. Hoffman (3ES30)
Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

John Morgan
<jmorgan@morganwor To: William
Hoffman/R3/USEPA/US@EPA
ldwide.com> cc:
Subject: RE:H&A
economic analysis

EXHIBIT 60

01/07/03 09:21 AM

Bill,

The draft report was included with our invoice dated November 14, which was addressed to Jeff Alpers. I am not sure who actually received it as I understand Jeff has been reassigned (?).

We have not finalized our report so please give me guidance.

John

-----Original Message-----
From: Hoffman.William@epamail.epa.gov
[mailto:Hoffman.William@epamail.epa.gov]
Sent: Monday, January 06, 2003 5:22 PM
To: John Morgan
Subject: RE: Fola

Thanks John!

To whom did you send the invoice????

Bill

William J. Hoffman (3ES30)
Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

John Morgan

<jmorgan@morganwor To: William Hoffman/R3/USEPA/US@EPA
ldwide.com> cc:

Subject: RE: Fola

01/06/03 04:36 PM

Bill

I submitted an initial draft of our report on the Charleston meeting with our invoice for that effort. Since that submission we have made some small changes based on discussions with RTC. I will complete this and send it to you. I noted Mike Robinson's postscript on his email.

John

-----Original Message-----
From: Hoffman.William@epamail.epa.gov
[mailto:Hoffman.William@epamail.epa.gov]
Sent: Monday, January 06, 2003 10:41 AM
To: John Morgan
Cc: Terry Sammons (E-mail)
Subject: Re: Fola

Thanks John. I have forwarded your message to Rich, Dan, and my Division Director (Kathy Hodgkiss) to find out if these dates work. Did you indicate in your prior message that the COE was about to issue. Please advise. Thanks! I'll get back to you if either of these dates work.

Also- did you ever put together a report on your review of the Phase I and II economics studies following the outreach meeting held in Charleston on 10/17? Please advise. Thanks once again!

Bill

William J. Hoffman (3ES30)
Director, Office of Environmental Programs
Environmental Services Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
(215) 814-2995

John Morgan

<jmorgan@morganwor To: William Hoffman/R3/USEPA/US@EPA

Mike Robinson - RE: H&A economic analysis Page 5

(E-mail)" ldwide.com> cc: "Terry Sammons <Tsamm63810@aol.com>

01/06/03 09:34 AM Subject: Fola

Bill,

I hope you had an enjoyable Christmas, and a Happy New Year to you.

As we discussed before Christmas Terry Sammons and I would like the opportunity to meet with you and your colleagues to outliner the final configuration of the Fola 4 permit. This is the permit that we reviewed with you last year and incorporates the innovative stream restoration and
landforming.

I am not sure who you would recommend that attends but it might include rich
Kampf and Dan Sweeney.

I would like to propose a meeting date of January 14 or January 23 at your
office in Philadelphia.

I look forward to hearing from you.

John

(See attached file: MWCI Analysis of MTR-VF Economics.doc)

DRAFT

Morgan Worldwide Consultants, Inc.
Analysis of MTR/VF EIS Economic Impact Studies
October 22, 2002

Introduction
This letter report prepared by Morgan Worldwide Consultants Inc. (MWCI) is an analysis focused on work completed since 1999 regarding the economic impacts of restrictions on Mountaintop Mining Valley Fill operations in Appalachia. It also addresses the current attempt to essentially disregard this work and replace it with unsubstantiated data to produce different results within the next two months.

Conclusions
RTC, with direction from the EIS Steering Committee, endeavored to estimate the effect of various valley fill restrictions on the quantity of coal potentially available for mining as objectively as possible, going to great lengths to prevent human bias from swaying results one way or another. The results of this unbiased approached are being questioned, and OSM proposes to solicit input from coal industry representatives. MWCI has reviewed the Phase 1 work and determined that it is premature to dismiss the results portrayed in the Final Phase 1 Report.

H&A, with direction from the EIS Steering Committee, used the unbiased results of the RTC Phase 1 Report as input into their econometric models in an effort to predict the regional economic impacts of various valley fill restrictions on regional coal production and coal-derived power generation through 2010. The methodologies and results of the H&A Phase 2 work are not in question, but H&A has been requested by OSM to conduct a sensitivity analysis using input solicited from coal industry representatives. MWCI does not question the integrity of Hill & Associates, Inc., but questions the validity of information supplied by coal industry representatives on such short notice. This is not to say that coal industry representatives will intentionally provide bad information, but that they probably do not have defensible answers to effects on their respective and/or collective MTR reserve base and operating costs.

The original intended use of the Phase 1 and Phase 2 results was to provide input into the Phase 3 work, a much more detailed regional econometric modeling effort conducted by West Virginia University College of Business and Economics. This Phase 3 study has been canceled. MWCI has not determined whether or not this Phase 3 work should be conducted as originally envisioned.

Recommendations
MWCI puts for the following recommendations:

1. Do not pursue the current OSM direction of sensitivity analysis based upon input solicited from coal industry representatives. Instead of throwing out the results of the unbiased approach based on poor comparisons, spend the time and money to qualify and quantify the work accomplished to date. Introducing unsubstantiated data at this point as input into the H&A models is not a sensitivity analysis, but in fact replaces the Phase 1 results. Normally, sensitivity analyses are conducted on an accepted baseline case to show which input parameters affect that baseline case more than other input parameters.
2. Pursue the sensitivity analysis by accepting the work completed to date as the baseline, then quantify the margins of error within the work already completed and use this error analysis as the basis for sensitivity analyses. In fact the 10% ROI or 15% ROI base cases could be selected as the baseline case, with the various percentage reductions in MTR sites representing the most influential of the input parameters. Of these reduction scenarios, error analysis applied to the 75-

DRAFT

acre restriction probably has the most meaning in sensitivity analysis since it appears to be on the "knife edge" and could go one way or another in terms of Phase 2 output.

3. If OSM and H&A have budgeted for two more model runs, MWCI suggests that the input parameters targeted be:
   a. The delayed effect of restrictions as opposed to the instantaneous effect currently assumed, using percentage reductions currently in place; and
   b. Run the model assuming that mountaintop mining effectively halts, along the lines of the tech team study which claimed that 92% of all mountaintop mining would cease as a result of proposed valley fill restrictions. There is very little margin for error in this case, and it would certainly bracket the range of possible outputs. Additional work associated with this scenario is the re-definition of all coal reserves at MTR sites in terms of alternative mining methods.
4. If interviews with coal industry representatives proceeds and the sensitivity analysis is carried out with this input to Phase 2 modeling the following concerns need to be addressed:
   a. Coal industry representative are not likely to have production reduction, add-back reserves, and effects on economics for their operations that correspond to 250, 150, 75 and 35-acre fill restrictions. They will have a feel for what level of restriction will materially affect their particular situation, and H&A will need to correlate these levels of restrictions to represent a 250, 150, 75 or 35-acre fill.
   b. Current MTR operations will not experience an instantaneous change in operating costs, but changes to equipment spreads as a result of MTR reductions and mining method selection will have an impact on operating costs.
   c. Changing too many inputs simultaneously might make it impossible to determine which variable produced the largest impact on model outputs. This requires very careful consideration.
   d. Before H&A actually runs the models again, present the changes in input to members of the steering committee for review.

Analysis of the Phase 1 Report

RTC prepared the Phase 1 Report under guidance from the EIS Steering Committee regarding methodologies for estimating the Effect of Various Valley Fill Restrictions on the Quantity of Coal Potentially Available for Mining. After this report was published RTC was criticized for its methodologies by some members of the same Steering Committee. These criticisms suggested that:

1. RTC erred in base seam elevations used in the regional GIS database with coal seams identified throughout West Virginia; and
2. RTC overestimated the volume of fill space available upon implementation of various restrictions in valley fill sizes, thus overestimating the residual quantity of coal amenable to MTR mining methods upon implementation of various restrictions in valley fill sizes.

The intent of the RTC approach was twofold:

- Produce a regional GIS database with coal seams identified throughout West Virginia, and combine this database with topographic information to produce a theoretical (virgin state) volume of coal available for mining. From this theoretical volume adjustments would be made to account for coal already mined from the ground, in the process of being mined, and coal reserves made inaccessible due to proximity to incorporated towns, national parks, etc. Remaining theoretical coal reserves would then be subjected to mining engineering parameters to determine amenability to Mountaintop Removal/Valley Fill methods, thus creating a theoretical mountaintop mining reserve base.

DRAFT

- Produce a regional GIS database with watersheds available to accept excess spoil generated by Mountaintop Removal mining methods. In the unconstrained case no reduction in watershed size was made, i.e. Pre-Judge Hayden ruling, mine permitting practice. Four watershed size constraints were then imposed on these available watersheds; they were 250, 150, 75, and 35-acre limitations. For each of these size constraints RTC estimated the percentage of mountaintop mining coal reserves effectively sterilized due to insufficient valley fill storage capacity. Ergo the coal could be mined economically if there were adequate valley fill capacity available, but a portion of these economic reserves become uneconomic by MTR methods because there is no way to dispose of all the excess spoil.

Theoretical Mountaintop Mining Reserve Base

During the presentation of RTC's Phase 1 results by OSM on October 17, 2002, a slide was shown of a particular location where the RTC regional coal seam approach was compared with West Virginia Geological and Economic Survey (WVGES) detailed information. The differences in basal seam elevations as related to topography was pointed out, implying differences in coal reserves and physiographic features that influence the economics of MTR methods when mining engineering parameters are applied to a coal seam or series of coal seams and associated interburden and/or overburden. This, according to the OSM representative presenting RTC's work, is an illustration of the flawed approach used by RTC to create a theoretical mountaintop mining reserve base.

MWCI is not convinced that a singular example of differences obtained when comparing regionally-derived data with site-specific data is indicative of the entire Phase 1 level of accuracy. Drawing general conclusions from such a specific comparison is poor practice. In the case illustrated by the OSM presenter there may very well be substantive errors one way or another, but the EIS Steering Committee agreed with RTC that on a regional basis, errors of omission will more or less equal errors of commission and the overall integrity of the regionally derived database would serve the purposes of the intended regional analysis.

If OSM and/or RTC wish to qualify the Phase 1 results or quantify the errors inherent to RTC's approach then a statistically valid sampling procedure needs to be implemented. This procedure would certainly encompass more than one or for that matter several, comparisons of regionally-derived data with site-specific data. This statistically derived error would then be the basis for subsequent sensitivity analyses regarding input into the H&A models, rather than introducing unsubstantiated data solicited from coal industry representatives as the basis for sensitivity analyses.

Furthermore, RTC assets that its methodology has been employed since 1998, when "...an initial series of seam occurrence, thickness, and quality maps were produced. Various geologists and coal operators familiar with coal operations throughout the state reviewed the maps. Interpolation bounds were modified and new data points were added based on these reviews. This data was used to revise the map output. The revised set of maps was subjected to public scrutiny by way of their use for tax assessment purposes. As a result, where appropriate, interpolation bounds have been modified and new data points have been added to again revise and correct map output. This is an annual correction process and has been completed twice." This is another indication that it is premature to dismiss the results portrayed in the Final Phase 1 Report.

Theoretical Valley Fill Capacity

During the same OSM presentation on October 17, a slide was shown of the 150-acre watershed modeling results. The same OSM presenter proceeded to describe how some of the 150-acre watersheds identified by RTC were nonsensical with respect to a watershed by definition and watersheds with respect to consideration as potential valley fill sites. RTC's Phase 1 results indicated that for the 250 and 150-acre size restrictions, less than 10% of the available space is actually required for valley fill. It is unlikely that

DRAFT

RTC's methodology is so far off that the isolated discrepancies pointed out by the OSM presenter will explain away the remaining 90% of fill space available for valley fill according to RTC.

RTC responded to criticism of their watershed modeling methodology in the letter memorandum from RTC to Mr. Bill Hoffman dated 7/14/02. During OSM's presentation of RTC's results on October 17, 2002 it was pointed out that some of the 150-acre watersheds crossed streams and thus were not valid watersheds by definition. In RTC's 7/14/02 response to this criticism this issue was specifically addressed whereby stream buffers incorporated into the database "...split the fill in two and only that portion that touched the mine would be considered useable." Furthermore, RTC responded to various watershed modeling inconsistencies with regards to regionally-derived data compared with site-specific information. Indeed some watersheds were withdrawn from consideration as valley fills by RTC when conducting this comparison. More importantly, however, was the inclusion of watersheds previously discarded by the same methodology when site-specific information indicated a potential valley fill site had not been identified within the regionally-derived database. Thus the assumption of errors of omission approximating errors of commission on a regional basis was more-or-less validated. MWCI finds it misleading that the OSM described how some of the 150-acre watersheds identified by RTC were nonsensical with respect to a watershed by definition and as potential valley fill sites, without revealing to the audience RTC's response to these criticisms.

Effect of Fill Restrictions on MTR Reserves and Coal Available by Alternative Mining Methods
The estimated effect on mountaintop mining reserves generated by RTC is summarized as follows:

Base case unconstrained (Pre-Judge Hayden) MTR coal reserves:	1,111,223,494 tons
MTR Coal reserves economically mineable with a 250-acre restriction:	919,512,131 tons
MTR Coal reserves economically mineable with a 150-acre restriction:	852,829,517 tons
MTR Coal reserves economically mineable with a 75-acre restriction:	600,324,203 tons
MTR Coal reserves economically mineable with a 35-acre restriction:	252,053,489 tons

These figures represent MTR coal reserve reductions of 17.25%, 23.25%, 45.98%, and 77.32% for the 250, 150, 75, and 35-acre cases respectively. The MTR percentage reduction results were provided to Hill & Associates, Inc. for input into their models. These percentage reductions apply to coal reserves economically mineable by mountaintop mining methods and do not include coal reserves that can be added back in at the mountaintop sites by mining some of the same coal using alternative mining methods. The logic here is that although 17.25% of the coal is no longer recoverable in the 250-acre case by MTR methods (for example), a certain percentage of coal in this 17.25% can still be economically recovered using other mining methods including contour, highwall, auger, and/or deep underground mining methods. Thus an inverse relationship was established at mountaintop mining sites whereby consequential reductions in MTR coal reserves resulted in progressively increasing coal reserves amenable to alternative mining methods at the same sites. This results in the following revised reduction percentages for coal reserves at defined MTR sites:

	Total Reserve (MTR Sites) Tons	Percentage Reduction
Unconstrained	1,942,384,821	0.00%
250-Acre Restriction	1,766,528,993	9.05%
150-Acre Restriction	1,701,937,226	12.38%
75-Acre Restriction	1,481,821,864	23.71%
35-Acre Restriction	1,201,118,213	38.16%

For modeling purposes the reserves no longer available by mountaintop mining but added back in using alternative mining methods were treated by H&A as coal reserves added to the supply database as

DRAFT

possible new mines, albeit with a two-year delay to account for engineering and permitting. MWCI understands that these percentage reductions apply only to mountaintop mining sites by definition, and coal mining activities elsewhere in the region are not represented here. Other sources of coal throughout the region are included in the H&A proprietary database however, and it is these other sources that will make up for some of the lost production capacity indicated above.

Analysis of the Phase 2 Report
The intent of the Phase 2 Report is to estimate the effect the afore-mentioned valley fill restrictions have on the regional coal mining and coal-fired power generation industries. Hill & Associates, Inc. utilizes a proprietary database consisting of all known current coal producers and suppliers nation-wide, and nation-wide coal reserves still in the ground subject to future exploitation using proven technologies. H&A applies proprietary production cost data from these current coal producers to generate cost curves representing the supply and demand economics of current and future coal mining activities. With such a comprehensive modeling mechanism H&A is comfortable with estimating the effect on supply and demand economics when various inputs to the models are changed. These inputs include, but are not limited to: coal supply from various domestic and foreign producers, environmental controls imposed on coal-fired power generating plants, and rate of return assumptions for capital investment. These inputs are noted in this letter report due to their prominence in the H&A Phase 2 modeling effort. Outputs supplied by H&A modeling, essentially the results of Phase 2, include the following:

- Coal tonnage
- Direct coal employment
- Mine capacity capital expenditures
- Average coal price, fob mine
- Average wholesale price (lambda costs)[1] of electricity
- Megawatt-Hours of generation
- Environmental clean-up equipment capital expenditures for utilities
- Electricity capacity investments by type (construction, equipment, etc.)
- Major coal mining costs by category
- Average U.S. wholesale price (lambda costs) of electricity

In this letter report, and in the context of the EIS study region, we will focus on the results of the first five of these outputs.

Coal Tonnage
As states previously, H&A utilizes comprehensive proprietary databases to estimate the effect certain activities might have on the economics of defined regions. In this case the region includes West Virginia, Eastern Kentucky, and Virginia. One of the things the H&A models are capable of is accounting for substitution if for some reason a coal producer drops out, a coal producers' cost goes up, or the demand for a particular coal type changes. Thus the percentage reductions obtained from the RTC Phase 1 work can be input into the H&A models, and the models are able to estimate increased production from one producer to make up for the decreased production from another producer. This increased production may come from the same region, which is the topic of interest in this case, or it may come from a source outside the region as a response to classic supply and demand economics. Note that the H&A reserve base pertaining to various mining methods is completely different and independent of the RTC tonnage figures used to derive percentage reductions.

[1] In the context of this letter report MWCI assumes that lambda costs is a term describing the cost of the next kilowatt hour that could be produced from dispatchable units on an electric supply system.

DRAFT

In this fashion H&A is able to take the RTC output which represents effects on coal production from defined MTR sites and estimate the amount of lost production capacity that is made up from the same region. Not all of the lost capacity may be made up from the same region; if for example, it makes better economic sense to import coal from outside the region. The following table shows the cumulative effects on coal produced from 2001 through 2010 of H&A modeling for all sources of coal within the EIS region:

H&A Summary Coal Tonnages	Total Tons Years 2001 - 2010	Percentage Reduction From Base Case
Base Case - 15% ROI	2,261,259,000	0.00%
250-Acre Restriction	2,156,612,000	4.63%
150-Acre Restriction	2,149,469,000	4.94%
75-Acre Restriction	2,113,743,000	6.52%
35-Acre Restriction	1,972,355,000	12.78%

Note that the base case at 15% ROI is compared against the four restriction cases also at 15% ROI. H&A originally had the base case at 10% ROI and the four restriction cases at 15% ROI to factor in perceived increased risk associated with implementation of valley fill restrictions. At the request of the steering committee and essentially on their own time H&A provided the base case at 15% ROI to keep this particular assumption constant between the alternatives.

From the H&A Phase 2 Report it appears the impact to regional coal producers is considerably less than indicated by the RTC Phase 1 work, primarily due to regional capacity at other mines to substantially make up for production lost from MTR mines in the same region.

As part of the H&A output it is evident that with or without valley fill restrictions the mining capacity of the region is in decline. Between 2001 and 2010 the annual coal production from the region, using the 15% ROI unconstrained base case, decreases by 25%. This appears to outweigh the regional percentage reductions shown above brought about by possible restrictions on valley fills.

Direct Coal Employment
Impacts of potential valley fill restrictions on direct employment for the coal industry were also provided by H&A and are summarized below:

H&A Summary Employees 2001 - 2010	Average	Reduction in Employees 2001 - 2010	Percentage Reduction From Base Case
Base Case - 15% ROI	16,383	4,078	0.00%
250-Acre Restriction	15,789	4,581	3.63%
150-Acre Restriction	15,778	4,735	3.69%
75-Acre Restriction	15,701	4,737	4.16%
35-Acre Restriction	15,136	5,011	7.62%

Once again it appears that the anticipated decline in coal production from this region outweighs potential impacts on employment levels as a result of possible restrictions on valley fills. In the unconstrained base case employment levels drop from 17,845 in 2001 to 13,767 in 2010, a reduction of almost 23%. The impact of reduced employment as shown above in the percentage reduction from base case will nevertheless have a negative economic impact on the region, but far less of an impact than reductions in West Virginia coal industry employment reductions experienced during the past 20 years[2].

[2] According to West Virginia Coal Association published figures, coal industry employment dropped by 73% between 1981 and 2001, while coal production increased in the same time frame by 50%.

DRAFT

Mine capacity capital expenditures
Hill & Associates, Inc. also has the ability to estimate mine capacity capital expenditures associated with replacement equipment at existing operations and new equipment for new operations. This output for the EIS study region within the specified time frame is shown below:

H&A Mine Capacity CAPEX	Totals Years 2002 - 2010	Percentage Reduction From Base Case
Base Case - 15% ROI	$2,139,120,000	0.00%
250-Acre Restriction	$1,782,090,000	16.69%
150-Acre Restriction	$1,725,980,000	19.31%
75-Acre Restriction	$1,920,400,000	10.22%
35-Acre Restriction	$1,963,140,000	8.23%

In the case of mine capacity capital expenditures a comparison of percentage decrease for the base case between years 2002 and 2010 is not provided due to the inherent variability and cyclical nature of capital expenditures. However, the declining reserve base in the study region, as shown by the coal tonnage results presented previously, suggests that for the base case as treated within the framework of the H&A modeling, the level of mine capacity capital expenditures will decline accordingly. None the less, the percentage reductions from base case shown above will obviously have a negative impact on regional equipment suppliers.

Average coal price, fob mine
Another output provided by H&A is the expected coal prices for the various options and at certain points in time. This output is summarized below:

H&A Summary Coal Price 2002 - 2010	Average	Reduction in Coal Price $/ton 2002 - 2010	Percentage Increase From Base Case
Base Case - 15% ROI	$24.26	$0.86	0.00%
250-Acre Restriction	$24.75	$1.66	1.99%
150-Acre Restriction	$24.69	$1.65	1.78%
75-Acre Restriction	$25.01	$2.39	3.09%
35-Acre Restriction	$25.68	$3.63	5.84%

This output of the H&A modeling also shows that within the time frame specified, and within the EIS study region, the base case price of coal declined by 3.40% before any consideration of effect from valley fill restrictions was taken into account. The percentage reductions from base case as shown above will nonetheless have a negative impact on coal producers' bottom lines.

Average wholesale price (lambda costs) of electricity
Another H&A Phase 2 output is the effect of the afore-mentioned valley fill restrictions on average wholesale price (lambda costs) of electricity generated in the study region. The range of price differentials in this case is considerably less than differences in coal tonnages and direct employment, and is summarized below for the period 2002 – 2010:

DRAFT

H&A Average Wholesale Electricity Price
2002 - 2010, US dollars per KW-Hr

	Average	Cost Increase 2002 - 2010 US Dollars per KW-Hr	Percentage Increase From Base Case
Base Case - 15% ROI	0.02077	0.00330	0.00%
250-Acre Restriction	0.02076	0.00306	-0.06%
150-Acre Restriction	0.02074	0.00294	-0.16%
75-Acre Restriction	0.02074	0.00317	-0.14%
35-Acre Restriction	0.02199	0.00156	5.90%

As stated in the H&A Final Report, "…it is evident that the electricity prices are quite insensitive to the MTM/VF restrictions, showing differences of only 1%-2%, or 3% at the maximum." The figures presented above represent averages over the time frame considered, and are therefore considerably less than specific comparisons made at different points in time with the exception of the 35-acre case. Consistent with results obtained with coal tonnage and direct employment, the anticipated 1.15% increase in the base case from $0.01971/KW-Hr in 2002 to $0.02276/KW-Hr in 2010 overshadows price changes induced by potential valley fill restrictions placed on the mountaintop mining segment of the regional coal industry, with the exception being the 35-acre case.

Summary

The work conducted by RTC and H&A to date resulted in the production of final Phase 1 and Phase 2 reports. Both contractors acted under the direction and guidance of the EIS Steering Committee during the entire process, and there is no reason to question the integrity of the results obtained using the methodologies employed within the context of the EIS study region. MWCI realizes the benefit of conducting sensitivity analyses for the purposes of identifying which factors or input parameters, when changed, have the greatest impact on modeling results. Changing certain inputs, however, with no defensible logic or reasoning, becomes more of a what-if type analysis rather than a sensitivity analysis conducted from an accepted baseline. The EIS work has already spanned years, and RTC and H&A have had the benefit of input from many qualified professionals during the preparation of their Phase 1 and Phase 2 reports, respectively. Rather than replacing these years of effort with a couple of harried months to produce a different answer, spend the time and money understanding and qualifying the results produced to date.

References

This report draws primarily upon the following sources of information:

- Effect of Various Valley Fill Restrictions on the Quantity of Coal Potentially Available for Mining, Final Report by Resource Technologies Corporation (RTC) dated 10/26/01. This is also known as the Phase 1 Report;
- Economic Impact of Mountaintop Mining and Valley Fills Environmental Impact Statement, Final Report prepared by Hill & Associates, Inc. (H&A), dated 12/12/01. This is also known as the Phase 2 Report;
- Letter memorandum from RTC to Mr. Bill Hoffman, USEPA Region 3, dated 7/14/02, defending methodologies employed by RTC during preparation of the above-mentioned RTC Final Report;
- Presentation of the RTC Final Report by OSMRE, and presentation of the H&A Final Report by H&A at a meeting convened in Charleston, West Virginia on 10/17/02; and
- Conference call between MWCI, OSMRE, H&A, and USEPA on 10/22/02.

DRAFT

In addition to these sources of information used in this analysis, reference is occasionally made to previous work conducted on the topic of restrictions on Mountaintop Mining Valley Fill operations in Appalachia.

Division of Mining and Reclamation
10 McJunkin Road
Nitro, West Virginia 25143
Ph. (304) 759-0510
Fax (304) 759-0526

West Virginia Department of Environmental Protection

Bob Wise
Governor

Michael O. Callaghan
Cabinet Secretary

January 13, 2003

Donald S. Welsh
Administrator, Region 3
United States Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103

Via Facsimile and First Class Mail

Re: Mountaintop Mining Draft Environmental Impact Statement

Dear Mr. Welsh:

The West Virginia Division of Environmental Protection (WVDEP or State) shares many of the concerns recently expressed by reviewers for the federal agencies with regard to the December 2002 Draft Environmental Impact Statement (DEIS). Those concerns relate to readability, the presentation of legal issues, the scope (range and detail) of the alternatives and the manner in which the technical studies are characterized and presented. It is encouraging that key sections of the text are being discussed and edited this week and many of these issues may be addressed. However, please know that WVDEP has several additional concerns which have been raised on numerous occasions before the steering and executive committees and which, to date, the federal agencies have not addressed in the DEIS. The State is concerned that if these issues are not resolved the document will not be the product anticipated by the parties to the litigation or the citizens of the Appalachian coalfields.

Generally, the State is concerned that a lack of clear and consistent federal definitions and guidelines has created an uncertain regulatory climate for a state to administer the delegated Surface Mining Control and Reclamation Act (SMCRA) and/or Clean Water Act (CWA) programs. More specifically:

1) Cumulative impacts: The CWA and SMCRA (and NEPA) require regulatory agencies to address cumulative impacts of mountaintop mining and valley fills. What are the parameters the agencies should consider in evaluating such impacts? What size area is to be evaluated?

2) Stream definitions: Several federal agencies have different names and/or definitions for stream types, i.e., ephemeral, wet weather, intermittent, perennial, waters of the United States, navigable waters, etc. The various regulations which apply to coal mining operations refer to certain types of streams, yet there are no federal guidelines for stream delineation which would provide specific field tests to determine where one stream type ends and another begins. Between the different

DEP West Virginia Department of Environmental Protection "Promoting a healthy environment." EXHIBIT 61

Donald S. Welsh
Environmental Protection Agency
January 13, 2003
Page 2

state and federal programs that deal with coal mining, there are over seventeen different definitions of streams/waters. How do they compare and interact in the permitting process?

3) Material damage, adverse affect, adverse impact, significant impact, minimal impact, significant degradation: The laws and regulations require the permitting agency to make findings regarding these terms. How can the oversight authorities and the COE determine if the thresholds for such terms have been exceeded? Do some of the terms have the same meaning in different programs? What parameters are used to measure impacts and what are the thresholds? Will consistent federal guidelines be developed and applied nationally?

4) Contemporaneous reclamation: Reclamation is a key component of the SMCRA program and was a critical factor in the Bragg litigation given the relationship between contemporaneous reclamation and excess spoil disposal. However, the DEIS provides no clarity or specificity regarding contemporaneous reclamation above that set forth in current state and federal law. West Virginia will continue to carry out its obligations pursuant to state law, but the issues raised in the litigation remain.

5) Minimize and/or prevent degradation: SMCRA requires an operator to "prevent" adverse impacts to the hydrologic balance and the CWA requires an operator to "mitigate" the impacts to waters of the United States. The regulatory agencies need consistency and clarity from the federal agencies that oversee compliance with SMCRA and the CWA.

6) Fill minimization: The DEIS contains no guidance for determining whether fill sizes have been minimized. As acknowledged in the DEIS, West Virginia has developed an Approximate Original Contour (AOC plus) formula in order to achieve fill optimization. However, this guidance has not been adopted but only acknowledged by the federal agencies. In order to provide consistency, federal guidance is needed.

7) Monitoring requirements: SMCRA and CWA (402, TMDL, and Antidegradation) provide for different baseline and compliance monitoring for both parameters and frequency. The requirements should be reconciled. The EIS should clarify methods which the federal agencies support as acceptable monitoring protocol. The protocol should identify the parameters to be monitored and the underlying scientific basis for the monitoring requirements.

8) Mitigation: The EIS should identify acceptable methods of mitigation, i.e., aquatic projects or monetary compensation. The EIS should also define the role of mitigation in the "avoid, minimize, restore, compensate" analysis. For example, can compensation (project or monetary) be used to reduce significant impacts to minimal impacts?

Donald S. Welsh
Environmental Protection Agency
January 13, 2003
Page 3

9) Role of the USFWS: The federal agencies should identify the role of the U.S. Fish and Wildlife Service in the permit review process, including the scope and timing of their involvement.

10) Coordinated review of permit applications: One of the critical issues in the permitting process is coordination among the state and federal agencies. The state regulatory agency, the permit applicant and the citizens who desire to participate in the permit review process need clarity on the logistics of federal participation in the review of applications for mountaintop mining/valley fill applications. The DEIS currently lacks requisite detail on this issue.

The foregoing list highlights key programmatic issues raised by the State throughout the EIS process. While the EIS should not address these matters with statements that amount to rulemaking, it would be appropriate for the document to set forth and discuss in detail the issues and the options available for resolution, including potential rule changes.

We are hopeful that the work session this week will successfully address the concerns set forth above. My staff will be participating to assist in this regard.

Sincerely,

Matthew B. Crum, Director
Division of Mining and Reclamation

MBC/ss

cc: Benjamin H. Grumbles, Deputy Assistant Administrator of Water
Environmental Protection Agency
Jeffrey D. Jarrett, Director
Office of Surface Mining
George Dunlop, Deputy Assistant Secretary
Department of the Army
Steve Williams, Director
U.S. Fish and Wildlife Service
John Cruden, Esq., Deputy Assistant Attorney General
Department of Justice
EIS Executive Committee

Pre-decisional **Deliberative Process** **Not for Release**

MOUNTAINTOP MINING/VALLEY FILL DEIS
Background Information for Communications Team
January 16, 2003

Issue: What is the current schedule for issuance of the mountaintop mining/valley fill draft Programmatic Environmental Impact Statement (DEIS)?

Background:

- Mountaintop removal coal mining is a surface mining technique practiced in the steep slope coal fields of central Appalachia that involves removing mountain ridges to expose coal seams and placing the associated mining overburden (excess spoil) in adjacent valleys. These excess spoil disposal sites are called "valley fills."
- Mountaintop mining/valley fills occur in steep terrain where there are limited disposal alternatives. Construction of valley fills results in filling headwater streams. The DEIS estimates that as many as 725 miles of headwater streams have been buried under valley fills in Appalachia. Permitting reviews conducted under the Surface Mining Control and Reclamation Act and the Clean Water Act are being implemented to provide protection for human health and the environment.
- Two lawsuits in Federal District court for Southern West Virginia, ***Bragg v. Robertson*** (1998) and ***Kentuckians for the Commonwealth v. Rivenburgh (2002)***, have highlighted certain issues related to Federal permitting of surface coal mining operations that result in valley fills. A key issue in both cases has focused on the Corps authority to issue Clean Water Act permits to discharge excess spoil into waters of the United States as "fill material." Plaintiffs in each case have alleged that the placement of excess spoil in waters is more properly regulated as "waste" under CWA Section 402 and therefore, can not be permitted. In May, 2002, EPA and the Corps issued a final rule defining the term "fill material" clarifying that excess spoil is properly regulated by the Corps under CWA Section 404 consistent with the agencies' long-standing interpretation
- In December, 1998, as a provision of a settlement agreement in ***Bragg v. Robertson***, EPA, COE, OSM, FWS, and the State of West Virginia agreed to "prepare an Environmental Impact Statement on a proposal to consider developing agency policies, guidance, and coordinated agency decisionmaking processes" to reduce the adverse environmental impacts from surface coal mining operations in Appalachia. The agencies further expressed their intent to complete the EIS "within 24 months," i.e., January, 2001.
- Since 1998, the agencies have been working together to prepare a "programmatic" EIS, a process that has included several public hearings. In August, 2002, the Secretary of Interior indicated in a statement to the press that the agencies intended to publish a draft EIS for public review and comment by February, 2003. (The agencies' schedule for meeting this commitment is attached)
- In May, 2002, the Federal District court in ***KFTC v. Rivenburgh*** enjoined the Corps from issuing "any further Section 404 permits within the Huntington District that have no primary purpose or

EXHIBIT 62

use but the disposal of waste, except dredged spoil disposal." As a result, the Corps has not been approving new valley fills in the coal fields of southern WV and eastern KY, except in limited circumstances where the fill is associated with a "constructive purpose," e.g., a road will be built on top of the valley fill. The Federal government has appealed this decision in the Court of Appeals for the 4th Circuit. Previously permitted mining operations are not affected by the injunction.

- The Appeals court granted the government's motion for expedited review in this case in response to the concern that ongoing mining operations discharging excess spoil under the Corps current Nationwide permit #21 would be forced to stop their operations when that national permit expires on February 11, 2003. DOJ requested that the court rule on the appeal before February 11 so that ongoing mining operations could be reauthorized under the newly issued Nationwide permit #21 in response to safety concerns and anticipated harm to mining companies and their employees associated with any disruption of ongoing operations.

Communications Issues: The following questions begin to identify the key issues that we anticipate will be raised when the DEIS is published for public review:

- The agencies committed in their 1998 settlement to complete the EIS in two years; why has the EIS taken so long to prepare? Is this DEIS fully consistent with NEPA requirements and does it fulfill the agencies' commitments under the settlement agreement to identify actions to minimize adverse environmental impacts associated with surface coal mining operations?

- In response to a 2001 FOIA request, an earlier version of the DEIS and associated technical studies were released to the public and subsequently placed on the ***Charleston Gazette's*** web site. The current draft is different in several important respects, including the characterization of alternative actions being considered in the DEIS. (The earlier version focussed on evaluation of alternative restrictions for limiting the size of valley fills as a way to limit environmental impacts. The current version is focusing on alternative "programmatic" improvements under CWA and SMCRA to ensure more effective environmental protection. Why were these key changes made?

- A key conclusion in the EIS is that discharges of excess spoil in waters of the U.S. associated with valley fills are properly regulated by the Corps under CWA Section 404 as "fill material." Why is the EIS making this assumption when a Federal District court found that such discharges are not fill material and enjoined the Corps Huntington District from regulating them?

- What are the key recommendations included in the DEIS designed to ensure more effective protection for human health and the environment? Will these recommendations be implemented by the agencies? What differences would implementation of those recommendations make?

- As part of the studies conducted in conjunction with the DEIS were studies to assess the economic impacts that would result from implementing actions considering limits on the size of valley fills. Information from the economic studies released under FOIA suggest that limits on the size of fills will have only minimal economic consequences on coal and electricity prices. Since smaller fills would seem to coincide with reduced environmental impacts, why is the current version of the DEIS not recommending such limits?

Pre - Decisional Document　　**Draft**　　**Not for Release**

Mountain Top Mining and Valley Fill
Environmental Impact Statement
Timeline for Completion

2003

late - January	EIS Steering Committee revisions to the interim draft EIS.
late January/early February	Interagency reviews of the revised draft EIS completed - document transmitted to contractor for assembly.
late February	Draft EIS submitted to Government Printing Office - agencies make DEIS available on internet
late March	***Federal Register*** notice published; draft EIS available for public review and comment. 60 day comment period begins. Public meetings during the comment period are anticipated.
late November/early December	Final EIS released (30-day review period)

2004

late winter/early spring	Record of Decision released

A-164

Cindy Tibbott
01/22/2003 09:38 AM

To: mrobinso@osmre.gov, dhartos@osmre.gov, Hoffman.William@epamail.epa.gov, forren.john@epamail.epa.gov, rider.david@epamail.epa.gov, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Suriano.Elaine@epamail.epa.gov, james.m.Townsend@lrl02.usace.army.mil, jcoker@osmre.gov, katherine.L.Trott@hq02.usace.army.mil, Kathy_Hodgkiss@epamail.epa.gov, Peck.Gregory@epamail.epa.gov
cc: Dave Densmore/R5/FWS/DOI@FWS, Diane Bowen/ARL/R9/FWS/DOI@FWS
Subject: New Petra Wood Study

Cathy Weakland and Dr. Petra Wood of the West Virginia Cooperative Research Unit (USGS - BRD), who authored some of the terrestrial wildlife studies for the EIS, have just released a study entitled "Cerulean warbler microhabitat and landscape-level habitat characteristics in southern West Virginia in relation to mountaintop mining/valley fills."

The issue of MTM/VF effects on cerulean warbler habitat is more important now than it appeared to be at the time of earlier drafts of the EIS. The Southern Environmental Law Center has petitioned the Fish and Wildlife Service to list the cerulean warbler as threatened and to designate critical habitat. The Service's 90-day finding on the petition listed mountaintop mining as one of the threats to this species, and noted that "unfortunately, the area of the country with the highest density of ceruleans is also in a coal-mining region where mountaintop removal mining is practiced."

We may want to add a sentence or two to the EIS to update the forest fragmentation discussion based on the findings of this new study. Here are some quotes from the abstract: "Territory placement on ridges was greater than expected and in bottomlands (ravines) and west-facing slopes less than expected based on availability in both intact and fragmented forest. In fragmented forest, 92% of territories occurred only in fragments with ridgetop habitat remaining. Preference for ridges suggests that MTMVF may have a greater impact on Cerulean Warbler populations than other sources of forest fragmentation since ridges are removed in this mining process. Generally, our data indicate that Cerulean Warblers are negatively affected by mountaintop mining from loss of forested habitat, particularly ridgetops, and from degradation of remaining forests (as evidenced by lower territory density in fragmented forests and lower territory density closer to mine edges.)"

The study was a continuation of work done for the EIS in that the researchers returned to the original EIS study sites, but also added additional sites. The methods used in the new study allow a more accurate and precise estimate of bird abundance than were used in the EIS study, and facilitate evaluating the relationship between bird density and habitat and landscape variables. This study was not funded through the EIS process, but through the USGS' own "Species at Risk" program. The report has been peer-reviewed and officially approved for release by USGS.

If the Steering Committee agrees that information about these results should be mentioned in the DEIS, I could write a couple of sentences and figure out where they should be placed in the document. I have an electronic copy of the report if anyone would like to read it; however, it's a fairly large file and I don't want to overload the laptop computers of those of you in Washington.

EXHIBIT 63

From: <Cindy_Tibbott@fws.gov>
To: "DAVE VANDE LINDE" <dvandelinde@mail.dep.state.wv.us>
Date: Wed, Jan 22, 2003 11:20 AM
Subject: Re: New Petra Wood Study

(See attached file: Final_CERW_Rept_Jan10.pdf)

"DAVE VANDE LINDE" <dvandelinde@mail.dep.state.wv.us>
01/22/2003 10:12 AM

To: <Cindy_Tibbott@fws.gov>
cc:
Subject: Re: New Petra Wood Study

please forward me a copy

David L. Vande Linde
West Virginia Department of Environmental Protection
Division of Mining and Reclamation
10 McJunkin Rd
Nitro, West Virginia 25143-2506
Ph. (304) 759-0510; Fax (304) 759-0526
E-mail: dvandelinde@mail.dep.state.wv.us

Attachment(s):
Attachment File 1.pdf
Attachment File 2.822

EXHIBIT 64

CERULEAN WARBLER (*DENDROICA CERULEA*) MICROHABITAT AND LANDSCAPE-LEVEL HABITAT CHARACTERISTICS IN SOUTHERN WEST VIRGINIA IN RELATION TO MOUNTAINTOP MINING/VALLEY FILLS

Final Project Report

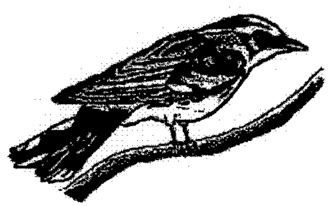
December 2002

Submitted by:

CATHY A. WEAKLAND AND PETRA BOHALL WOOD
West Virginia Cooperative Fish and Wildlife Research Unit
USGS Biological Resources Division
and West Virginia University, Division of Forestry
P.O. Box 6125, Morgantown, WV 26506

Submitted to:

USGS Biological Resources Division
Species-At-Risk Program



CERULEAN WARBLER (*DENDROICA CERULEA*) MICROHABITAT AND LANDSCAPE-LEVEL HABITAT CHARACTERISTICS IN SOUTHERN WEST VIRGINIA IN RELATION TO MOUNTAINTOP MINING/VALLEY FILLS

CATHY A. WEAKLAND AND PETRA BOHALL WOOD, West Virginia Cooperative Fish and Wildlife Research Unit, USGS, BRD and West Virginia University, Division of Forestry, P. O. Box 6125, Morgantown, WV 26506

ABSTRACT

The Cerulean Warbler (*Dendroica cerulea*) is a species of conservation concern in eastern North America, where declines in its population have been documented over the last several decades. Both habitat fragmentation and increased edge may negatively impact Cerulean Warbler populations. A high proportion of this species' population occurs in forested areas of southern West Virginia, where it may be threatened by loss and degradation of forested habitat from mountaintop mining/valley fills (MTMVF). We examined the impact of forest fragmentation (in particular the effects of fragment size and response to edges) on Cerulean Warbler densities from a landscape perspective using territory mapping techniques and geographic information system (GIS) technology. Specific objectives were: (1) to quantify Cerulean Warbler territory density and indices of reproductive success in forests fragmented by MTMVF mining and in relatively intact blocks of forest, (2) to quantify landscape characteristics affecting Cerulean Warbler territory density, and (3) to quantify territory-level characteristics of Cerulean Warbler habitat. The study area included portions of 4 counties in southwestern West Virginia. Territory density was determined using spot-mapping procedures, and reproductive success was estimated using the proportion of mated males as an index of reproductive performance. We quantified landscape characteristics (cover types and fragmentation metrics) from digitized aerial photographs using Arcview® with the Patch Analyst© extension and measured microhabitat characteristics on spot-mapping plots.

Territory density of Cerulean Warblers was greater in intact (4.6 terr/10 ha) than fragmented forests (0.7 terr/10 ha), although mating success of males was similar in both (60%). Habitat models that included both landscape and microhabitat variables were the best predictors of territory density. The best model indicated that territory density increased with increasing snag density, percent canopy cover >6-12m and >24m, and distance from mine edge. Models for predicting microhabitat use at the territory level were weak, indicating that microhabitat characteristics of territories were similar to habitat available on spot-mapping plots. The species did not appear to avoid internal edges such as natural canopy gaps and open or partially-open canopy roads. Territory placement on ridges was greater than expected and in bottomlands (ravines) and west-facing slopes less than expected based on availability in both intact and fragmented forest. In fragmented forest, 92% of territories occurred only in fragments with ridgetop habitat remaining. Preference for ridges suggests that MTMVF may have a greater impact on Cerulean Warbler populations than other sources of forest fragmentation since ridges are removed in this mining process. Generally, our data indicate that Cerulean Warblers are negatively affected by mountaintop mining from loss of forested habitat, particularly ridgetops, and from degradation of remaining forests (as evidenced by lower territory density in fragmented forests and lower territory density closer to mine edges).

977

Kathy Hodgkiss
01/27/2003 01:26 PM

To: Gregory Peck/DC/USEPA/US@EPA, mamie_parker@fws.gov, Charles.K.Stark@hq02.usace.army.mil, mcrum@mail.dep.state.wv.us, Brent Wahlquist <BWAHLQUI@OSMRE.GOV>, Rich Kampf/R3/USEPA/US@EPA, mark.f.sudol@hq02.usace.army.mil
cc: Cindy_Tibbott@fws.gov, dave_densmore@fws.gov, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, James.M.Townsend@lrl02.usace.army.mil, dvandelinde@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Dave Hartos <DHARTOS@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, mrobinso@osmre.gov, Elaine Suriano/DC/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA
Subject: MTM EIS Executive Committee Call Tuesday, 1/28; 9-11am: 1-877-216-4412, 866654#

We have a lot to discuss. If possible, it might save time if each of the Execs could get together with his/her steering committee rep for a briefing on the issues before the call tomorrow. Please let me know if you have comments on the proposed agenda (see below). Many thanks to Mike Robinson for providng background info on these issues (see the attachment below). Please let me know if you have questions or need additional info. thanks, Kathy

Proposed Agenda (discussion times are approximate)

Roll call/intro (5 minutes)

Steering Committee Status Report (10 minutes)

Projected Schedule (10 minutes)

Need for Commitment of Agency Legal and Technical Support to Complete the DEIS

Issue Discussion/Resolution

Air Quality (15 minutes)

Minimal impact threshold for NWP in Alternative 2 (20 minutes)

Cumulative Impacts (20 minutes)

Executive Committee Only Session

execommagenda1_28_03.wp

Kathy Hodgkiss, Acting Director
Environmental Services Division
U.S. EPA Region 3
215/814-3151

DRAFT, DELIBERATIVE, PRE-DECISIONAL--DO NOT DISTRIBUTE OR CITE

MTM/VF EIS Executive Committee Agenda
Weekly Conference Call: January 28, 2002, 9 a.m.
To Connect: 877.216.4416, access code 866654#
(Page 1)

- Progress Report from Steering Committee
  - ★ Chapter II Alternatives:
    - ♦ Stream Loss, Stream Impairment, Fill Minimization, T&E Species complete
    - ♦ Assessing and Mitigating Stream Habitat and Aquatic Function near complete
    - ♦ Cumulative Impacts, Flooding, Deforestation, Definitions, Government Efficiency not complete
  - ★ Chapter I, IV, and Executive Summary not completed
    - ♦ Executive Summary redrafted but not reviewed by SC
    - ♦ Chapter IV initial comments incorporated as redline/strikeout but not reviewed
  - ★ Attorney review
    - ♦ DOI comments/edits received for completed sections
    - ♦ No EPA OGC or OFA comments received on Ch II (except for OGC minor comment on T&E)
    - ♦ OFA comments on Ch IV EJ section received

- Projected Schedule
  - ★ Chapter II
    - ♦ ~ 79 pp total. SC assigned ~43 pp, Peck assigned ~36 pp. SC completed ~29 pp with co-lead agency consensus review. Peck product must still be reviewed and agreed upon by SC
    - ♦ Best estimate is that Chapter II can be completed, with attorney feedback by 2/12
  - ★ Chapter IV
    - ♦ ~55 pp total.
    - ♦ Estimate revision by 2/21
  - ★ Chapter I and Executive Summary
    - ♦ ~23 and 7 pp, respectively
    - ♦ Estimate revision by 2/28
  - ★ Gannett Fleming, communication and release schedule
    - ♦ Provide completed chapters as finalized to communications team and GF
    - ♦ Q&As developed by 3/7
    - ♦ GF camera-ready print out to EPA by 3/7
    - ♦ DEIS to GPO by 3/11
    - ♦ Press release prepared by 3/12
    - ♦ Post on web by 3/14

EXHIBIT 65

DRAFT, DELIBERATIVE, PRE-DECISIONAL--DO NOT DISTRIBUTE OR CITE

- Press panel 3/14
- FR published, DEIS hard copies available, comment period begins 4/18
- Comment period closes mid-July

DRAFT, DELIBERATIVE, PRE-DECISIONAL--DO NOT DISTRIBUTE OR CITE

MTM/VF EIS Executive Committee Agenda
Weekly Conference Call: January 28, 2002, 9 a.m.
(Page 2)

- Issue Resolution Needed:

★ Air Quality Section

- EIS description of existing statutory and regulatory controls is inaccurate, incomplete, or unknown
  - Surface mines aren't currently considered a "major stationary source" requiring permits with preventative measures
  - Apparently no data exists that indicates whether or not surface mines produce more than 250 tons of a regulated pollutant to constitute a major source under Title V of the CAA
  - Is an enforcement approach (e.g., when an apparent violation occurs) sufficient?
  - CAA regulates fugitive dust through state air quality agency implementation plan; SMCRA fugitive dust control through state SMCRA mining agency--neither program has established defined limits for fugitive dust
  - At what point is dust a nuisance not covered by CAA or SMCRA (i.e., as opposed to a respirable health issues)?
- Action creates an unfunded mandate for states to develop BMPs without:
  - Adequate research on scope of fugitive dust problem from eastern surface coal mining
  - Any federal standards for fugitive dust limits (i.e., dust not considered respirable hazard > PM 2.5 or PM10)
  - Effective/standardized monitoring/testing technology
- Two options to proceed:
  - Option 1--Revise writeups to accurately reflect existing program controls (or lack thereof) and address WVDEP and other states' concerns with an action description stating that additional study and regulatory analysis are necessary to address this issue before BMPs could be developed. *The Steering Committee is discussing the issues with EPA R3 Air Protection Division to see if this is possible.*
  - Option 2--Explain that insufficient data exists for this EIS to address the issue at this time, explain issue is beyond the scope of this EIS and what the federal government plans to do to address outside of the EIS, and remove the issue from the alternatives and consequences section. The Steering Committee would need to discuss with EPA OFA how best to frame the discussion in the

DRAFT, DELIBERATIVE, PRE-DECISIONAL--DO NOT DISTRIBUTE OR CITE

scoping section.

DRAFT, DELIBERATIVE, PRE-DECISIONAL--DO NOT DISTRIBUTE OR CITE

MTM/VF EIS Executive Committee Agenda

Weekly Conference Call: January 28, 2002, 9 a.m.

(Page 3)

★ Revise alternative framework to make NWP more streamlined and make NWP/IP process more predictable
- ♦ Propose an action establishing a minimal impact threshold for NWP in Alternative 2 (e.g., as a general matter, a 250-acre (or smaller) watershed cutoff would define when individual permits are required)
  - One suggested approach discussed by some SC members is to set the minimal impact threshold for fills in 75-acre watersheds or less. Fills in watersheds less than 250-acre watersheds, but more than 75-acre watersheds, **might** be eligible for NWP--if assessment protocol and mitigation determines net minimal impact can be achieved (if not, IP required). Fills in watersheds greater than 250-acre watersheds must be processed as IPs
  - Even without scientific data on the relationship of fill size to indirect impacts, it is intuitive to justify a minimal threshold based on the concept that "smaller fills are better than larger fills" with respect to direct impacts on aquatic habitat buried by fills.
- ♦ Allow mitigation determinations for fills below the selected minimal impact threshold to be based on something other than a functional stream assessment
  - Assume all streams are "high quality" and base mitigation on an estimated Ecological Integrity Units (EIUs) multiplied by the jurisdictional stream length
  - Require mitigation, foot-per-foot of stream loss, such that offsite mitigation necessary to augment any onsite mitigation (in order to net less than minimal) would restore/enhance other in-basin streams and improve Cumulative Impact Area watershed health to some established quality level
- ♦ Pros
  - Provides more contrast in alternatives consistent with NEPA regs
  - Provides more substantive proposals in DEIS
  - Meets public expectation that a new minimal impacts threshold would be established with this EIS. Counters possible perception by environmental stakeholders that the EIS is removing "protections" afforded by interim threshold. Possible assertion by environmental community without this change to Alternative 2 would be that the EIS is recommending "rolling back" environmental protection so that <u>any</u> size valley fill can be approved under NWP. This assertion could be rebuked because the EIS is not currently proposing such a position. The current EIS proposes use of COE functional stream protocol to determine which permit

process (NWP or IP) each application must follow. This approach could result in valley fills proposed in watersheds well below 250 acres requiring the IP process.

- More predictable NWP/IP process for applicants
- Less evaluation and data collection by applicants
- Less-involved review by COE and potential reduction of FTE demands
- According to the Fill Inventory, 5471 of 6697 fills constructed were in watersheds less than 75 acres
- The DEIS fulfills the terms of the settlement agreement, meets the stated purpose in the FR notice of intent to prepare an EIS, and provides greater environmental protection and not just "looks at how permits are processed," as has been portrayed by some critics.

♦ Cons

- No documented scientific basis exists to justify this threshold. EIS technical studies could not determine if fill size mattered other than for direct stream loss impact. Other NWPs use much smaller threshold for minimal impact (e.g., 1/4 acre wetland, 200 feet of stream stabilization, etc.). Limited technical studies indicate that perennial streams exist in watersheds much less than 250 acres. There may be some legal vulnerability regarding this threshold based on the arbitrary and capricious standards.
- Plaintiffs in *Bragg* anticipated that 250-acres was an interim threshold and that the EIS would provide a more refined (i.e., smaller)
- Assuming mitigation requirements without characterizing streams might result in less rigorous avoidance and minimization alternative analysis and siting of fill locations in less desirable, higher quality streams.
- The Corps may need to revise its Regulatory Guidance Letter 02-2 or establish a regional condition for NWP 21 formalizing these 404 permit thresholds.
- A no-protocol mitigation standard needs to be developed for use in NWP-eligible permits. Experience with the stream assessment protocol may already provide a basis for selecting an appropriate EIU for mitigation purposes.
- Incorporation of this concept in the EIS will result in delays to the EIS schedule of approximately 2 weeks, including time required for interagency coordination and approvals.
- Some states already require stream bio-assessments and therefore, there would be little cost savings to the applicant. States require various types of stream characterizations for such determinations as 401 Certifications, anti-degradation, and SMCRA baseline data collections.

A-167

Dave Densmore
01/28/2003 02:01 PM

To: Hodgkiss.Kathy@epamail.epa.gov, Benjamin Tuggle/ARL/R9/FWS/DOI@FWS, Diane Bowen/ARL/R9/FWS/DOI@FWS
cc: Brent Wahlquist <BWAHLQUI@OSMRE.GOV>, Charles.K.Stark@hq02.usace.army.mil, Cindy_Tibbott@fws.gov, Dave Hartos <DHARTOS@OSMRE.GOV>, dvandelinde@mail.dep.state.wv.us, Forren.John@epamail.epa.gov, Hodgkiss.Kathy@epamail.epa.gov, Hoffman.William@epamail.epa.gov, James.M.Townsend@lrl02.usace.army.mil, Jeff Coker <JCOKER@OSMRE.GOV>, Kampf.Rich@epamail.epa.gov, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, mamie_parker@fws.gov, mark.f.sudol@hq02.usace.army.mil, mcrum@mail.dep.state.wv.us, mrobinso@osmre.gov, Peck.Gregory@epamail.epa.gov, rhunter@mail.dep.state.wv.us, Rider.David@epamail.epa.gov, Suriano.Elaine@epamail.epa.gov
Subject: Re-proposed NWP 21 Scheme for Alternative 2

All:

In anticipation of our call on Thursday, we would appreciate everyone taking another look at the attached flow chart we proposed a year ago for a 75-acre minimal effects threshold for NWP 21. We have made one minor change to clarify that compensation would be determined using the protocol (in conjunction with in lieu fees or similar approach), which would also enable the Corps to make the occasional discretionary call in especially high value or unique situations before calculating that compensation need.

In addition to the "pros" identified in Mike Robinson's outline (improved contrast and substance; public and plaintiff expectation thereof; predictability; and the incentive to reduce the size of fills), we believe this approach also has the advantage that, unlike the truly arbitrary 250-acre threshold, it is based on data specifically collected for this EIS (see footnotes). Setting aside the intuitive question of smaller footprint equalling smaller direct impact, which is arguably a conclusion reached in the document, it is not clear why workload cannot also be cited as a rationale for setting such a threshold. The Corps cited this factor in setting NWP thresholds in the 2001 Draft EIS for the NWP program, and in the 2002 FR notice for reissuance of the NWPs.

We should add further that this approach makes a more substantive attempt to tackle the cumulative impact issue that we've been grappling with, and at least partially addresses the concern that smaller fills lead to more numerous fills.

Proposal for Minimal Effects Threshold for NWP :

David Densmore
Supervisor, Pennsylvania Field Office
U.S. Fish and Wildlife Service
315 S. Allen St., Suite 322
State College, PA 16801-4850
(814) 234-4090 x233 FAX: (814) 234-0748

Proposal for Minimal Effects Threshold for NWP 21 (follows a determination that avoidance and minimization have been accomplished to the maximum extent practicable)

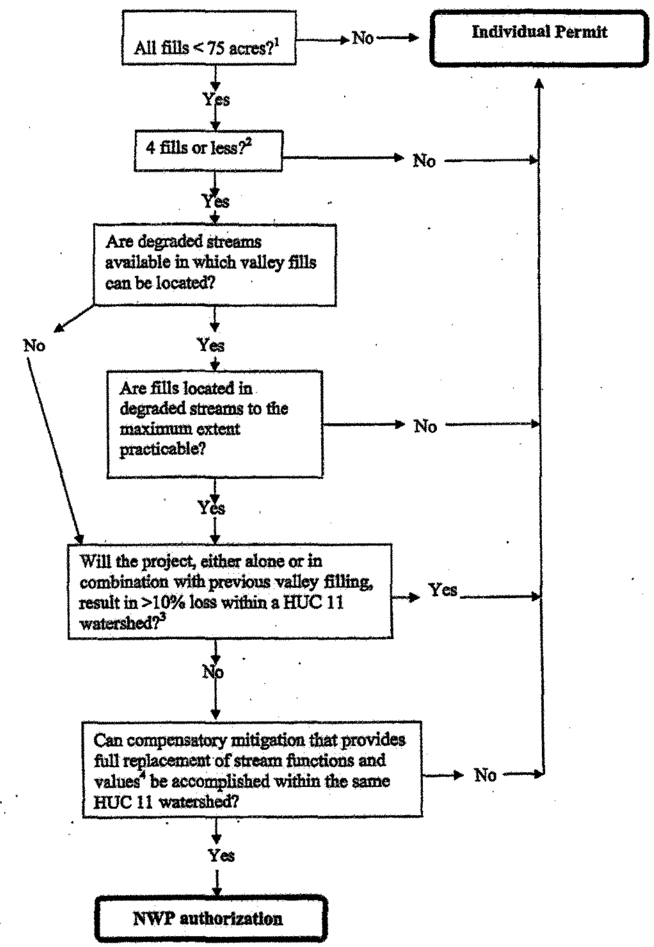


EXHIBIT 66

[1]OSM's fill inventory indicates that historically, most valley fills have been < 75 acres (70% of permits in VA, 81% in KY, 59% in WV).
[2]OSM's fill inventory indicates that the average number of valley fills per permit has been < 4 (0.6 for TN, 3.7 for KY, 2.7 for VA, 3.2 for WV).
[3]Previous studies in developing areas in the mid-Atlantic have noted that impacts to stream ecosystems are identifiable when >10% of a watershed is developed.
[4]Using the Louisville stream assessment protocol.

A-179

Cindy Tibbott
02/18/03 03:17 PM

To: Rider.David@epamail.epa.gov
cc: csylvest@osmre.gov, dave_densmore@fws.gov, dhartos@osmre.gov, diane_bowen@fws.gov, dvandelinde@mail.dep.state.wv.us, Field.Stephen@epamail.epa.gov, Forren.John@epamail.epa.gov, Havard.James@epamail.epa.gov, Hodgkiss.Kathy@epamail.epa.gov, Hoffman.William@epamail.epa.gov, james.m.Townsend@lrl02.usace.army.mil, jcoker@osmre.gov, katherine.L.Trott@hq02.usace.army.mil, kuray.marilyn@epamail.epa.gov, Lance.D.Wood@usace.army.mil, Lazos.Pamela@epamail.epa.gov, mrobinso@osmre.gov, Neugeboren.Steven@epamail.epa.gov, Peck.Gregory@epamail.epa.gov, pmcdaniel@mail.dep.state.wv.us, rhunter@mail.dep.state.wv.us, Rider.David@epamail.epa.gov, Suriano.Elaine@epamail.epa.gov
Subject: Edits

Greetings Dave et al.,

Attached is a file containing some inserts for Chapters III and IV (information on the new study from Weakland and Wood on cerulean warblers), as well as some additional miscellaneous edits I'd like to offer.

In addition, I understand that there are MOUs being drafted between FWS and other federal agencies to implement the 2001 Executive Order on migratory birds. The EO directs all federal agencies to take actions to protect and conserve migratory birds. It would be an oversight if we failed to mention it in the EIS. If the team agrees that this needs to be included, I drafted a paragraph. I don't know at this point where it belongs in the EIS, and thought that those of you who have been editing would probably have a better idea.

Let me know if there are any questions....

cerulean.wpd

EXHIBIT 67

Revisions to II.D.1.i, Impacts of MTM/VF on Fish Assemblages (first paragraph)

Two studies relating fish communities to potential impacts from mining ~~and or~~ and/or mining and valley filling are available for use in this EIS. ~~The USFWS MTM Fish Assemblage Characterization Report (Stauffer and Ferreri, 2002) directly addressed this issue.~~

Revisions to "Summary of the USFWS Stream Fish Assemblage Characterization Report" section

~~Summary of the USFWS~~ Stream Fish Assemblage Characterization ~~Report~~

There is little historical information regarding stream fish populations in the primary region of ~~mountain top removal/valley fill coal mining~~ mountaintop mining. To address this data gap, ~~the U.S. Fish and Wildlife Service developed a program~~ a study was designed to sample the fish communities at several pre-selected sample sites in the ....

Revisions to Chapter II.C.7.a.1. CWA, <u>**CWA Role in Cumulative Impact Analyses**</u>**, last paragraph**

Under the CWA Section 404(q) ~~Memorandum~~ Memoranda of Agreement between the EPA and the COE and between the Department of the Interior (DOI) and the COE (dated August 11 and December 21, 1992, respectively) EPA ~~and~~ and/or FWS can elevate a proposed decision by the COE to issue a CWA Section 404 permit if the proposal would impact an Aquatic Resource of National Importance (ARNI), as defined by ~~this~~ the MOAs. The elevation is made to higher authorities within ~~both~~ each ~~agencies~~ agency for resolution. ~~FWS has the option of initiating this elevation procedure for adverse impacts regarding ARNIs.~~

Revisions to Chapter III.F.3.a (Birds), paragraph 5

~~Some argue that~~ Mountaintop mining ~~has the potential to~~ has adverse effects on many forest songbirds, in particular neotropical migrants, through direct loss and fragmentation of mature forest habitats. Forest-interior species like the Acadian flycatcher, American redstart, hooded warbler, ovenbird, and scarlet tanager were more abundant ~~have significantly higher populations~~ (during at least one year of ~~the~~ a two-year study) in intact forests than fragmented forests (Wood and Edwards, 2001). Furthermore, cerulean warblers, Acadian flycatchers, and wood thrush are more likely to be found in a forested area as distance from the mine increases (Wood and Edwards, 2001; Weakland and Wood, 2002). ~~These data suggest that forest-interior bird species are negatively impacted by mountaintop mining through direct loss of forest habitat and fragmentation of the terrestrial environment.~~

In October 2000, the Southern Environmental Law Center, on behalf of itself, 27 other organizations, and seven scientists, formally petitioned the FWS to list the cerulean warbler as a threatened species and to designate critical habitat for the species pursuant to the Endangered Species Act. The petition, currently being evaluated by FWS, cited a rangewide decline in cerulean populations of about 70 percent since 1966. As a forest-interior species, it is sensitive to forest fragmentation. In a study of cerulean warbler habitat use in the vicinity of mountaintop mining sites in southern West Virginia, Weakland and Wood (2002) found that cerulean territory densities were lower in fragmented forests, and lower closer to mine edges, than in intact forested habitat. Mountaintop mining may have a greater negative impact on cerulean warbler populations than many other types of forest fragmentation because of this species' preference for forested ridgetops, which are removed in the mining process (Weakland and Wood, 2002). In addition, because the forested mountains of the study area contain the core breeding area for this species in North America (www.mbr-pwrc.usgs.gov/bbs/htm96/map617/ ra6580.html), forest losses here may have a disproportionately greater impact on cerulean populations than forest losses in other areas.

Weakland, C. A. and P. B. Wood. *Cerulean Warbler Microhabitat and Landscape-level Habitat Characteristics in Southern West Virginia in Relation to Mountaintop Mining/valley Fills.* Final Project Report. USGS-Biological Resources Division, West Virginia Cooperative Fish and Wildlife Research Unit, Morgantown, WV. 2002.

Revisions to IV.F.2, 1st paragraph

The avian fauna of the study area is rich and contains a number of species with interior forest requirements for successful breeding. Large tracts of intact forest are rare in the eastern United States ~~due to a number of land use change associated reasons~~. The cumulative impact study (USEPA, 2002) estimated (by adding past impacts, impacts from permits issued in the last 10 years, and projecting 10 years into the future) that under the no action alternative, 1,408,372 acres (2,200 square miles), or 11 percent of forest habitat in the study area would be lost due to mining. ~~227,198 acres (2%) of forest has been directly impacted in the study area in the last 10 years, and that an additional 227,198 acres of forest will be impacted in the next 10 years under the no action alternative.~~ These impacts would result in fragmentation of the forests......[continue with rest of paragraph]

Revisions to IV.F.2, 3rd paragraph

Although~~,~~ the cumulative impact study suggests that ample forest will remain in the study area under future conditions of Alternatives 1, 2, and 3 to maintain relatively high PEC scores, ~~potential~~ adverse impacts to many forest interior bird species are likely ~~still possible~~. Take for example those species with breeding ranges that are restricted to or confined mostly within the study area. The core of breeding ranges for the Louisiana waterthrush, worm-eating warbler, and cerulean warbler ~~is~~ are within the study area. Disturbances associated with mountaintop mining could potential adversely impact each of these species' breeding ranges. Researchers have demonstrated that habitat loss does not have to be total to reduce wildlife populations; many species are "area sensitive." In other words, these species require large blocks of habitat of a certain minimum size. For example, although fragments of forest may remain after mining is complete in a previously forested area, certain area-sensitive forest birds ("forest interior" species) will be absent.

In addition to requiring large blocks of forested habitat, some species have other special habitat requirements that exacerbate the impacts of mountaintop mining on the species. The cerulean warbler, a species of concern due to population declines, may be especially affected not only because it is a forest interior species, but also because of its preference for forested ridgetops, which are removed by mountaintop mining (Weakland and Wood, 2002). The Louisiana waterthrush, a forest interior species, requires headwater streams which are eliminated by valley filling.

Paragraph reflecting Executive Order 13186 (not sure where it fits in the document)
In January 2001, the President signed Executive Order 13186 directing federal agencies to conserve migratory birds (see http://migratorybirds.fws.gov). The Executive Order directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the FWS to develop an agreement to conserve those birds. The protocols developed by the consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans. In addition to avoiding or minimizing impacts to migratory bird populations, agencies are expected to take reasonable steps that include restoring and enhancing habitat, preventing or abating pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. By January 2003, Federal agencies were to have developed and implemented a Memorandum of Understanding (MOU) with FWS for the conservation of migratory bird populations. As of publication of this draft EIS, MOUs with the federal EIS agencies are still in draft form. Because the Executive Order does not apply to actions delegated to states, it has limited applicability in SMCRA permitting actions in all of the study area states except Tennessee. Provisions of the Corps/FWS and EPA/FWS MOUs implementing this executive order would apply in all of the study area's states.

From: <Hodgkiss.Kathy@epamail.epa.gov>
To: <Peck.Gregory@epamail.epa.gov>, <mamie_parker@fws.gov>, <Charles.K.Stark@hq02.usace.army.mil>, <mcrum@mail.dep.state.wv.us>, Brent Wahlquist <BWAHLQUI@OSMRE.GOV>, <Kampf.Rich@epamail.epa.gov>, <mark.f.sudol@hq02.usace.army.mil>
Date: Wed, Mar 12, 2003 10:18 AM
Subject: MTM EIS Executive Committee Call Friday,3/14; 9-10am: 1-877-216-4412, 866654#

This is short notice but I hope you can be available for this call. We need to talk about how the Steering Committee proposes to factor in the decision made by the Principals on Monday (see attachment A) and what this means for the draft EIS schedule (to be determined). Please let me know if you have comments or questions. thanks, Kathy

Attachment A: (See attached file: 250threshhld.pdf)

Kathy Hodgkiss, Acting Director
Environmental Services Division
U.S. EPA Region 3
215/814-3151

CC: <Cindy_Tibbott@fws.gov>, <dave_densmore@fws.gov>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <James.M.Townsend@lrl02.usace.army.mil>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>, Dave Hartos <DHARTOS@OSMRE.GOV>, Jeff Coker <JCOKER@OSMRE.GOV>, <mrobinso@osmre.gov>, <Suriano.Elaine@epamail.epa.gov>, <Hodgkiss.Kathy@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <Forren.John@epamail.epa.gov>, <Rider.David@epamail.epa.gov>

Attachment(s):
Attachment File 1.pdf
Attachment File 2.822

EXHIBIT 68

Sudol, Mark F HQ02

From: Smith, Chip R Mr ASA-CW [Chip.Smith@HQDA.Army.Mil]
Sent: Tuesday, March 11, 2003 8:53 AM
To: Mark F Sudol; Charles K Stark; Katherine L Trott
Subject: FW: MTM Way Ahead

Here is the result of the Principal's meeting. The Cruden (DOJ) Plan is to be followed and the EIS revised accordingly. The Regional Conditions will be launched as we intended after DOJ and Stockdale coordinate. Work on protocols and the GIS analysis of impacts should proceed as described in the EIS. The only departure is we wanted to restrict the 250 acre interim threshold to West Virginia -- the Principals decided that the entire Huntington District made more sense so we didn't have one District regulating differently in 3 States.

It is very important that Kathy get this information ASAP. Is there a way to get it to her this morning so she knows what is going on?

-----Original Message-----
From: Dunlop, George Mr ASA-CW
Sent: Tuesday, March 11, 2003 8:13 AM
To: Smith, Chip R Mr ASA-CW
Cc: Stockdale, Earl H Mr OGC; Johnson, Darin E Mr OGC
Subject: MTM Way Ahead

Chip:

After you left the meeting yesterday, the discussion lasted another 45 minutes. Here is the outcome.

1. For the EIS, adopt the Cruden plan, but provide that the interim 250 acre threshold applies to the entire Huntington District (WV, KY, OH). There will be a robust discussion of thresholds in the EIS to include the data that Ben Grumbles used, a well as reference to the way that WV has adopted the 250 acres in their procedures, and the general understanding that the thresholds are accepted by the regulated community. Further there should be discussion about the OSM perspective that there were other factors operating at the same time as thresholds and those other factors may have been the reasons that there were fewer valley fills after the thresholds were in place. OSM is very sensitive about the message that thresholds result in improved environmental quality. IF that were the case, then the real message is that 200 would be better, 100, better yet and 0 fills, best of all. Instead the focus really needs to be on stream protocols and the relative quality for each stream. Thresholds may have utility once the protocols are working and it is determined that, as a practical matter, a very high percentage of permits for certain kinds of streams seem to always be X acres, so for that kind of stream, we can short-cut/streamline the process to say that the threshold for a NWP 21 would be X acres, for another kind of stream, another acreage may seem to be the norm, so that we could streamline by setting another threshold for that kind of stream. We want to communicate that we know that "one size does NOT fit all," but we want to have streamlined processes that will add to environmental protection and benefit, as well as efficiency and efficacy for the regulated community and the regulatory agencies. Further there should be reference that the Corps now has underway studies and assessments of protocols that will help guide future policy as to whether acreage thresholds are appropriate or not. There should be recognition that the EIS does not provide the science or other information to confirm the efficacy of thresholds.

2. The Corps will announce the Regional Conditions that had been held in abeyance. This needs to be further coordinated with Justice, to make sure all factors are considered and are in place before we make the

3/11/2003

announcement. John Cruden wants to have a discussion with Earl Stockdale, in particular.

3. The Corps should proceed with its investigations into protocols and other studies that would address whether or not thresholds are appropriate tools and policy. At the time that such studies are complete the Corps will proceed to formal comment and rule-making.

4. The EIS and the Regional Conditions should be announced at the same time, with a well-thought through roll-out plan designed to demonstrate that the Corps is seeking to use the best science possible to come up with the best tools to assure maximum environmental quality.

The goal should be to accomplish all this by April 4.

Please let me know if there is anything that need clarification, or if you have any further recommendations.

GEORGE

==============================

George S. Dunlop
Deputy Assistant Secretary of the Army
Office of the Assistant Secretary for Civil Works
Pentagon 3E431, Washington, DC 20310-0108
Tel: (703) 695-1370
George.Dunlop@hqda.army.mil

3/11/2003

OASA(CW) April 4, 2003

ADNR 30

MOUNTAINTOP SURFACE COAL MINING MASTER STRATEGY

Contents

EXHIBIT 69

OASA(CW) April 4, 2003

Mountaintop Surface Coal Mining
Master Strategy Summary

KEY ELEMENTS SUMMARY

1. Notifications for New Authorizations Under Revised NWP 21
   - Held regular meetings, workshops, made presentations
   - Public Notices and Website Guidance
   - Over 100 conference calls
   - Continue to be accessible and expediting permit processing
2. Processing New Authorizations Under Revised NWP 21
   - Hayden Decision and appeal affected ability to develop guidance
   - NMA and mining company strategy was to not apply thinking issue would be resolved but legal reviews clearly demonstrated need for new authorizations
   - New NWP 21 requires Statement of Findings, NEPA (EAs), 45 day comment period, mitigation plans, which takes time but provides legal protection to all parties
   - Follow 8-Point Plan: performance bonds/letters of credit; integrate 401, 402, 404 and SMCRA reviews; Corps and States co-host permitting workshops by State; Corps Tiger Teams to speed up permit processing; interagency permit review teams for on-stop shopping; establish self-auditing program by State; use In Lieu Fee Arrangements and Mitigation Banks; and, use lessons learned for streamlining and consistency
3. MTM EIS Agency Commitments
   - Corps would implement 3 regional conditions
   - Corps would refine, calibrate, and implement stream protocols
   - 250-acre threshold for status quo part of No Action Alternative
   - Corps would conduct independent analysis using GIS database to evaluate thresholds
4. MTM EIS Threshold Plan
   - 250-acre threshold would be described as an interim measure
   - part of No Action Alternative
   - *discuss potential "management utility"*
   - note that benefits could have resulted from other factors
   - Corps will not supplement EIS but have independent environmental *documentation for any future threshold vs. protocol analysis*
5. Regional Conditions to Maintain Status Quo
   - establishes 250-acre threshold as an interim measure pending results of Corps independent analysis of thresholds vs. protocols
   - requires consideration of nature and extent of aquatic resources and assessment of potential cumulative impacts on aquatic environment

- requires appropriate and practicable compensatory mitigation to offset impacts to waters of the U.S., and be based on nature of the stream impacted, and direct, indirect, and cumulative losses of waters of the U.S.

6. Stream Assessment Protocols
   - Corps will refine, calibrate, and implement in Appalachian Region State-by-State basis
   - Appropriate environmental documentation and Public Notices
   - Goal is for science-based protocols to replace interim non-science based 250-acre threshold
7. Enforcement (Mitigation MOA)
   - January 19, 1989 Army and EPA Enforcement MOA
   - EPA is lead for "unpermitted" activities
   - Corps is lead for violations at "permitted" activities
   - Violations of both types a longstanding problem due to remoteness, lack of data, insufficient staff and resources, reluctance to shut down operations, etc.
   - Violation estimates (data evolving): Kentucky = 70; Ohio = 54; and, West Virginia = 150
   - Corps and EPA Regions 3 and 4 met March 27, 2003, along with OSM, and State staff to discuss issue and develop a plan of action, options include
     - Cease and Desist Letters which would shut down mines
     - Establish a Self-Auditing/Reporting program to achieve compliance on a voluntary basis by sending letters to mining companies with a deadline
     - Agencies will share date, records, photos, GIS, staff to refine estimates of the nature, scope, and location of violations
     - Agencies agreed to start a collaborative enforcement review
     - OSM recommends efforts concentrate on ongoing activities that never got 404 authorizations in watersheds of 50 acres or more and that were initiated after the new NWP 21 came out in March 2002
     - Best handled at the local level as opposed to DC driven

2

OASA(CW) April 4, 2003

Mountaintop Surface Coal Mining
Master Strategy Details

1. **NOTIFICATIONS FOR NEW AUTHORIZATIONS UNDER REVISED NWP 21**. On May 8, 2002, the U.S. District Court for the Southern District of West Virginia ruled that the Huntington District could not permit new activities involving the placement of fill material in waters of the U.S. unless those fills have a constructive purpose. This decision caused regulatory chaos and since the matter was under appeal, it took some time for the government to determine how to proceed. The Corps issued three Public Notices informing mining companies that new authorizations would be required, and providing guidance on the new NWP 21 requirements:

a. Louisville District has had regular meetings with mining companies since 1999; made presentations at the last 4 Mining Engineers of Kentucky Annual Meetings; held workshops; and, opened field offices to be more accessible

b. Issuance of NWPs on February 11, 1997

c. December 6, 2002 reminder that NWPs expired on February 11, 2002 and any further work in waters of the U.S. after February 11, 2003 would require reauthorization

d. January 10, 2003, providing additional guidance to coal companies and consultants concerning the current NWP 21 requirements (Regulatory Guidance Letter 02-2 on Compensatory Mitigation)

e. Public notices were also posted on the District's web page

f. Corps Districts had conference calls with mining companies and their consultants (no logs kept, but averaged 3-4/day starting in November 2002); by December 15, 2002, Huntington District had completed 100+ phone calls to mining companies to further advise them of the need to apply for new permits

g. Numerous meetings have occurred with some mining companies, consultants and coal associations in WV, KY and OH. The companies initiated some and the Corps initiated some

2. **NEW AUTHORIZATIONS UNDER REVISED NWP 21**

a. **Issue**: The National Mining Association is very concerned about the informational requirements for obtaining new NWP 21 authorizations for existing operations, and about the time it is taking to process PCNs. NMA also objects to the sentence "*The applicant must be notified of the determination in writing before any work*

3

in waters of the U.S. may be conducted" that has appeared in letters back to mining companies. NMA also hoped that the Corps could use information already on file to reduce requirements, but the Corps reports that the files for previously authorized projects have little or no information applicable to the new NWP 21 requirements.

b. **Background**: *The current situation regarding new authorizations was, in part,* affected by:

(1) The Haden decision, which prohibited the Corps from authorizing valley fills (absent a constructive purpose), and the appeal process, created an uncertain regulatory climate and prohibited the development of clear guidance for obtaining new NWP 21 authorizations until the decision was overturned in January 2003.

(2) The NMA took the position that the Corps could, under existing laws and regulations, simply grandfather or extend authorizations for ongoing mining operations, and a strategy emerged whereby mining companies did not apply for new authorizations in 2002, even though by Public Notice they had been encouraged to do so. NMA assumed that its view would prevail or that the pressure on the Corps would result in a solution other than having to obtain a new authorization. Several legal reviews (DOJ and Army) were conducted and it was affirmed each time that the Corps had no legal or regulatory basis for extending previous authorizations – new authorizations were required under the reissued NWP 21 (with new PCN and mitigation requirements).

c. **Applications**: there are approximately 98 applications "pending" in the Huntington District for Kentucky, Ohio, and West Virginia, and of those, 77 have been determined to be "incomplete applications", in some cases, very incomplete; working with incomplete applications is very inefficient.

d. **NWP 21**: The new NWP requires that the Corps prepare a Statement of Findings, do NEPA (EAs), hold 45-day comment periods, and require mitigation plans to ensure that impacts are no more than minimal. Following the process provides the best possible legal protection for both the Corps and applicants; shortcutting the process would leave mining companies vulnerable to legal challenge and could result in shutdowns.

e. **Way Forward Eight Point Plan:**

(1) For those applications that are sufficiently complete to make appropriate minimal effects determinations, the Corps intends to accept Performance Bonds and/or Letters of Credit to allow some work to proceed, under permit conditions, while mitigation plans are completed and approved. Also, temporary impacts can be conditioned separately so, for example, work could be done on "sediment ponds" while the application process is completed for permanent impacts (up to 120 days)

4

(2) Reinvigorate the 1998-99 interagency effort to integrate 401, 402, 404, and SMACRA permit reviews and processes to streamline decision-making and minimize informational requirements

(3) Ask States to host and run permitting workshops in each of the 3 States so that the Corps can explain the new requirements and provide guidance on how best to generate a complete permit application (Corps can be ready in 15-30 days)

(4) After the workshops, the Corps could be inundated with a slew of complete applications. HQ would work with the Districts to establish "tiger teams" to assist with the processing of NWP 21 PCNs, or accomplish other work, so that the NWP 21 PCNs can be processed as quickly as possible

(5) Establish interagency permit teams composed of regulatory and permit decision makers from Corps Tiger Teams, EPA, FWS, State DNR's and OSM, to review PCNs concurrently and work together to resolve issues in a "one-stop shopping" streamlined process to reduce the application backlog

(6) Continue to pursue a plan to establish a self-auditing program for each State to assist mining companies with efforts to come into compliance

(7) Explore options for developing and using In-Lieu-Fee Arrangements and Mitigation Banks for stream impacts

(8) Use the lessons learned to establish a prospective streamlined process to facilitate consistency of approach by all agencies so that information developed to satisfy requirements of one agency would be presented in a format that could be used by other agencies for their respective requirements

3. **MTM EIS AGENCY COMMITMENTS**

The Federal and/or state agencies cooperatively would:

- develop a joint application form as part of the MOA and FOP.
- develop guidance, policies, or institute rule making for consistent definitions of stream characteristics as well as field methods for delineating those characteristics.
- continue to assess aquatic ecosystem restoration and mitigation methods for mined lands and promote demonstration sites.
- work with interested stakeholders to develop a "best management practices" (BMPs) manual for restoration/replacement of aquatic resources.
- evaluate and coordinate current programs for controlling fugitive dust and blasting fumes from mountaintop MTM/VF operations, and develop BMPs and/or additional regulatory controls to minimize adverse effects, as appropriate.

5

- develop guidelines for calculating peak discharges for design precipitation events and evaluating flooding risk. In addition, the guidelines would recommend engineering techniques useful in minimizing the risk of flooding.
- based on the outcome of ongoing informal consultation, identify and implement program changes, as necessary and appropriate, to ensure that future mining is carried out in full compliance with the Endangered Species Act.

The COE would:

- **continue to implement the 3 regional conditions in WV and KY as described in the MTM EIS No Action Alternative**
- through a coordinated interagency process, make case-by-case determinations of the applicability of NWP 21 to MTM/VF projects.
- refine and calibrate the stream assessment protocol for each COE District where MTM/VF operations are conducted to assess stream conditions and to determine mitigation requirements as part of the permitting process.
- compile data collected through application of the assessment protocol along with PHC, CHIA, anti-degradation, NPDES, TMDLs, mitigation projects, and other information into a GIS database
- use these data to evaluate whether programmatic "bright-line" thresholds, rather than case-by-case minimal individual and cumulative impact determinations, are feasible for CWA Section 404 MTM/VF permits.

OSM, in conjunction with the SMCRA agencies would:

- consider rulemaking to replace the stream buffer zone rule with requirements for alternatives analysis and environmental impact analysis similar to the requirements of CWA Section 404.
- incorporate mitigation/compensation monitoring plans into SMCRA/NPDES permit inspection schedules and coordinate SMCRA and CWA requirements to establish financial liability (e.g., bonding sureties) to ensure that reclamation and compensatory mitigation projects are completed successfully.
- develop guidelines identifying state-of-the-science, best management practices (BMPs) for selecting appropriate growth media, reclamation techniques, revegetation species, and success measurement techniques for accomplishing post-mining land uses involving trees.
- if legislative authority is established by Congress or the states, require reclamation with trees as the post mining land use.

EPA would:

- as appropriate, develop and propose criteria for additional chemicals or other parameters (e.g., biological indicators) that would support a modification of existing state water quality standards.

6

consider, along with the COE, designating areas generally unsuitable for fill disposal, referred to as Advanced Identification of Disposal Sites (ADID).

4. <u>MTM EIS THRESHOLD PLAN</u>

a. 250 acre threshold would be described in the EIS as an interim (status quo) measure in WV, and KY, because in the opinion of some it seems to have "a certain utility" for environmental protection, pending the results of a separate science-based analysis of thresholds to be undertaken by the Army.

b. The EIS discussion will note that WV finds "a management utility" in the 250 acre threshold, and will also note that other events, such as WV changing its mining regulations, may account for all or part of the perceived "utility" of the threshold.

c. The 250 acre threshold discussion will be included in the No Action Alternative because it maintains the status quo on an interim basis and because the EIS does not contain the science and data required to establish this or any threshold.

d. Army will NOT supplement the MTM EIS to disclose the results of its independent analysis of thresholds because the MTM EIS does not contain the information necessary to inform a decision on the appropriateness of thresholds, or what alternative thresholds should be considered.

5. <u>REGIONAL CONDITIONS TO MAINTAIN STATUS QUO</u>. Districts in the Appalachian region will implement the 3 Regional Conditions (or some minor variation) immediately through the Public Notice process and complete any necessary environmental documentation. [except perhaps KY because protocols have been in use for a period of time]

a. Discharges of fill material authorized under NWP 21 comprising a valley fill or a coal waste ("slurry") impoundment may not, as a general matter, occur below the point on a stream (as measured from the toe of the fill or slurry embankment) that drains a watershed of 250 acres or more. In specific circumstances, however, the Corps may determine, after a project-specific evaluation, that valley fills or slurry impoundments larger than 250 acres may be authorized under NWP 21 where impacts would be no more than minimal. This threshold is being established as an interim measure to ensure impacts are minimal and shall be reevaluated after completion of the stream assessment protocols currently under development by the Corps and based on consideration of information gathered for use in the interagency environmental impact statement on mountaintop removal coal mining.

b. In determining whether an activity may be authorized under NWP 21, the nature and extent of aquatic resources affected by the activity will be evaluated as part of the assessment of potential cumulative impacts on the aquatic environment.

7

c. Each NWP 21 authorization for valley fills or slurry impoundments will include appropriate and practicable mitigation to offset impacts to waters of the U.S. The appropriate mitigation will be based on consideration of the nature of the stream impacted, and direct, indirect and cumulative loss of waters of the U.S.

6. STREAM ASSESSMENT PROTOCOLS. The Corps will continue work to develop and implement stream assessment protocols in the Appalachian Region, and before making them permanent, on a State-by-State basis, will do appropriate environmental documentation (separate from MTM EIS) and use the Public Notice process [except for Kentucky where protocols were implemented in 2002]. Additionally, the Corps will undertake an independent analysis of the utility of thresholds using site-specific verification data, and using a GIS-based evaluation process, evaluate whether the interim 250-acre threshold should be made permanent, lowered, increased or eliminated. While the Corps currently believes that the Stream Assessment Protocols are the superior regulatory tool, this independent analysis will verify this assumption and if it proves false, make new recommendations regarding thresholds. Any regulatory changes would be accomplished by notice and comment rulemaking, as appropriate.

7. ENFORCEMENT. Enforcement is handled in accordance with a Memorandum of Understanding executed January 19, 1989. Paragraph "D." states that the Corps will be the lead enforcement agency for all violations of Corps-issued permits, while the EPA will be the lead enforcement agency for all unpermitted discharge violations. It is common knowledge that there are violations occurring in the mining industry. Sites are often remote, and neither agency has the staff and resources to look for violations, however, if credible information is provided, the agencies should, and usually do, an investigation in accordance with the MOA. The Corps advises that some mining companies have figured out that is significantly cheaper to pay administrative penalties for violations than it is to request a new authorization and have to fund compensatory mitigation requirements. Also, it is not meaningful to simply compare lists of mining operations with SMCRA permits to lists of mining operations that have 404 permits. Some operations do not require 404 permits, or they have completed their work in waters of the U.S. and have let their authorizations expire. If the Administration wants to address this issue more aggressively, they we need to develop a consistent policy and begin issuing ***Cease and Desist Letters***, which will shut down operations until compliance is achieved (if it can be).

The Data

Ohio: approximately 108 mine sites with no 404 permit; assuming 50% (conservative) require a 404 permit, the Corps expects 54 potential enforcement cases

Kentucky: Data collected from March 18, 2002, to April 3, 2003, indicates that the Kentucky DSMRE has issued 87 mining permits. The Corps has authorized 6 and 10 are pending (18%) of the State's issued permits). Of the 87, 54 are actively mining without 404 permits (which may or may not be needed). The Corps also reports 26 pending 404 applications that are not reflected in the above data since the SMCRA

8

authorization was before March 2002. A conservative estimate would be 70 potential enforcement cases considering SMCRA permits issued prior to March 2002.

West Virginia: Based upon phone contact on April 3, 2003, the West Virginia Department of Environmental Protection appears to be reluctant to divulge their data, but based upon one seasoned employee's best professional judgment, there are 150 potential enforcement cases

The Way Forward

a. Interagency meeting held on 27 March 2003 in Lexington, KY. Participants included Office of Surface Mining, USEPA representatives from HQ and Regions 3, 4 and 5, USFWS (Frankfort, KY office), KY Division of Water, KY Division of Surface Mining Reclamation & Enforcement (KDSMRE), and the Army Corps of Engineers from the division as well as Huntington, Louisville, Nashville & Pittsburgh districts.

b. Meeting requested by USEPA Region 4 (USEPA-R4) to discuss their desire to initiate a ***self-reporting/self-audit*** with the coal industry in KY to bring violations into compliance with the Clean Water Act.

c. For regional consistency, the Corps is also reviewing this issue in Ohio, Tennessee, Virginia and West Virginia and will coordinate with USEPA Regions 3 and 5.

d. Discussed timeframe to begin initiative, what resources each agency had to offer (GIS, databases, aerial photographs, manpower etc), and details on how to determine the category (perennial, intermittent or ephemeral), extent and quality of waters that had been impacted.

e. The potential number of violations was discussed but the Corps and State stressed that further investigation was needed to gain an accurate understanding of the extent of violations.

f. USEPA-R4 advocated sending out a letter to coal companies with a deadline to self-report unauthorized activities. USEPA-HQ advocated meeting and working w/ the National Mining Association (NMA) to get active mines into compliance.

g. All participants agreed that a date needed to be agreed upon to start the enforcement review and written documentation should be prepared supporting this decision. Dates suggested: March 10, 2000 – the date of KDSMRE Reclamation Advisory Memorandum #133 regarding the need for Section 404 permits for fills in waters of the U.S.; October 2001 – the date of a Corps memorandum to the field requiring compensatory mitigation on NWP 21; March 2002 – the effective date of the new NWPs.

9

h. OSM recommended that the enforcement effort concentrate on those ongoing activities that never got Corps authorization (higher priority that those activities working under expired Nationwide permits), in watersheds of 50 acres or more in size, that were initiated after the effective date of the new NWP 21 (18 March 2002).

i. <u>Outcome of Meeting</u>: The Corps division and districts committed to reviewing/comparing Corps and State lists of permitted coal mining activities, within the next 30 days, to determine extent of enforcement issue. A Corps intra-agency conference call would follow to discuss the issue.

j. <u>Future Actions</u>: Joint EPA/Corps memo that explains why a particular date was selected for the enforcement initiative, Corps/USEPA conference call or meeting re: enforcement issue in KY (and other states as necessary); Possible regional MOU/MOA with USEPA-R4 (and other regions as appropriate) that further defines specific agency roles and responsibilities in this initiative (beyond 1989 Enforcement MOA). Also need to involve the Department of Justice in this initiative.

<u>Attachments</u>

December 6, 2002 Public Notice Expiration of NWP 21 Authorizations
January 10, 2003 Public Notice PCN Requirements
January 10, 2003 Public Notice Regulatory Guidance Letter (mitigation)
Example Notification Letters to Summit Engineering
1989 Army and EPA Enforcement MOA
Fact Sheet Summary of 1989 Army and EPA Enforcement MOA

J:\shared\smith,chip\Mountaintop Mining\MTM Master Strategy

10

From: "Smith, Chip R Mr ASA-CW" <Chip.Smith@HQDA.Army.Mil>
To: "Dunlop, George Mr ASA-CW" <george.dunlop@us.army.mil>
Date: Thu, Apr 17, 2003 7:57 AM
Subject: Revised Info on New PCNs and Enforcement

See attached. Based on our pre-meeting the other day I added into our 8-point plan (which is now a 9-point plan) language on the Corps and EPA immediately sending out some sort of information letter or notice that is neutral, encouraging mining companies to contact us if they have questions about compliance requirements. I also added in language about later on, once we get better data, sending targeted letters to operations we have reason to believe may not be in compliance. Those letters would preceed the workshops we hope to hold to help mining companies understand requirments and complete their applications. Finally, in the enforcement section I added a clearer statement about us sending out Cease and Desist orders at some point (yet to be determined) but not until after the workshops and self-auditing parts of the plan have had a reasonable period to work. Although DOJ's view of all of this is not known, EPA (Peck) and Army (myself and Sudol) seemed to be in general agreement on this strategy when we met the other day.

I understand that there will be a meeting today at EPA at 9:30 to discuss the attached agenda.

Chip Smith
Office of the Assistant Secretary of the Army (Civil Works)
Assistant for Environment, Tribal and Regulatory Affairs
108 Army Pentagon 3E427
Washington, D.C. 20310-0108
703-693-3655 Voice
703-697-8433 Fax

CC: "Bill Leary (E-mail)" <William_L._Leary@ceq.eop.gov>, "Dave Vande Linde (E-mail)" <dvandelinde@mail.dep.state.wv.us>, "Greg Peck (E-mail)" <Peck.Gregory@epamail.epa.gov>, "John Cruden (E-mail)" <john.cruden@usdoj.gov>, Mark F Sudol <Mark.F.Sudol@hq02.usace.army.mil>, Katherine L Trott <Katherine.L.Trott@hq02.usace.army.mil>

Attachment(s):
Attachment File 1.htm
Attachment File 2.doc
Attachment File 3.doc
Attachment File 4.822

EXHIBIT 70

OASA(CW) April 17, 2003

Mountaintop Surface Coal Mining
Status and Way Forward

Authorizations – Existing and New Projects

Issue: The National Mining Association remains concerned about the informational requirements for obtaining new NWP 21 authorizations for existing operations, and about the time it is taking to process PCNs. NMA also hoped that the Corps could use information already on file from previous authorizations to reduce requirements, but the Corps reports that the files for previously authorized projects have little or no information applicable to the new NWP 21 requirements regarding stream impact assessments and compensatory mitigation. Obtaining new authorizations for existing operations is akin to applying for an authorization for a new project. The reason for this is that there are new requirements for obtaining an authorization under the revised NWP 21. If the Corps were to decide that all projects previously authorized under the old NWP 21 could be processed without the new NWP requirements, the Corps would be violating it's own regulations and both the Corps and mining companies would be vulnerable to lawsuits.

Applications: there are approximately 90 incomplete applications "pending" in the Huntington District for Kentucky, Ohio, and West Virginia.

Way Forward:

(1) Immediately send out a neutral information letter or notice explaining the need for obtaining new authorizations under certain circumstances, and encouraging mining companies to contact the Corps or EPA for information and advice.

(2) For those applications that are sufficiently complete to make appropriate minimal effects determinations, the Corps intends to accept Performance Bonds and/or Letters of Credit to allow some work to proceed, under permit conditions, while mitigation plans are completed and approved. Also, temporary impacts can be conditioned separately so, for example, work could be done on "sediment ponds" while the application process is completed for permanent impacts (up to 120 days)

(3) Reinvigorate the 1998-99 interagency effort to integrate 401, 402, 404, and SMACRA permit reviews and processes to streamline decision-making and minimize informational requirements

(4) Ask States to host and run permitting workshops in each of the 3 States so that the Corps can explain the new requirements and provide guidance on how best to generate a complete permit application (Corps can be ready in 15-30 days). Before the workshops, send out letters to mining operations that the agencies believe have the highest potential for requiring authorization to come into compliance.

(5) After the workshops, the Corps could be inundated with a slew of complete applications. HQ would work with the Districts to establish "tiger teams" to assist with the processing of NWP 21 PCNs, or accomplish other work, so that the NWP 21 PCNs can be processed as quickly as possible

(6) Establish interagency permit teams composed of regulatory and permit decision makers from Corps Tiger Teams, EPA, FWS, State DNR's and OSM, to review PCNs concurrently and work together to resolve issues in a "one-stop shopping" streamlined process to reduce the application backlog

(7) Continue to pursue a plan to establish a self-auditing program for each State to assist mining companies with efforts to come into compliance

(8) Explore options for developing and using In-Lieu-Fee Arrangements and Mitigation Banks for stream impacts

(9) Use the lessons learned to establish a prospective streamlined process to facilitate consistency of approach by all agencies so that information developed to satisfy requirements of one agency would be presented in a format that could be used by other agencies for their respective requirements

Enforcement

Background

- January 19, 1989 Army and EPA Enforcement MOA
- EPA is lead for "unpermitted" activities (4 categories)
- Corps is lead for violations at "permitted" activities
- Violations of both types a longstanding problem due to remoteness, lack of data, insufficient staff and resources, reluctance to shut down operations, etc.
- Violation estimates (data evolving): Kentucky = 70; Ohio = 54; and, West Virginia = 150

Way Forward

- Corps and EPA Regions 3 and 4 met March 27, 2003, along with OSM, and State staff to discuss issue and develop a plan of action, options include
  - Agencies will share date, records, photos, GIS, staff to refine estimates of the nature, scope, and location of violations
  - Agencies agreed to start a collaborative enforcement review
  - OSM recommends efforts concentrate on ongoing activities that never got 404 authorizations in watersheds of 50 acres or more and that were initiated after the new NWP 21 came out in March 2002
  - Best handled at the local level as opposed to DC driven
  - First, establish a Self-Auditing/Reporting program to achieve compliance on a voluntary basis by sending letters to mining companies with a deadline

2

- After an agreed upon time for self-auditing, Cease and Desist Letters would be sent to those mining operations that simply refuse to come into compliance

J:\shared\smith,chip\Mountaintop Mining\PCN strategy march 2003 public

3

Mountaintop Surface Coal Mining
April 17, 2003 Principal's Meeting
Agenda (4-11-03 draft)

- Purpose of the Meeting (Leary)
  - Regional Conditions (250 Acre Threshold/Stream Protocols)
  - Conclusion of the EIS
  - Compliance Initiatives
  - Enforcement Initiatives
  - CEQ Questions about dealing with permit application backlogs, impacts on mining companies unable to comply, plan for identifying operators still requiring authorization, enforcement options and timelines
- Principals' Perspectives (all)
- Proposed Compliance Eight Point Plan (Dunlop) and Discussion
- Consideration of Enforcement Initiatives (all)
- Regional Conditions (Dunlop) and Discussion
- Summary of Stream Protocols (Sudol)
- Conclusion of the EIS
- Summary of decisions and due outs (Leary)

Participants (may bring staff)

Council on Environmental Quality - Bill Leary
Corps of Engineers – Mark Sudol
Department of Justice - John Cruden
Department of Army - George Dunlop
Environmental Protection Agency – Ben Grumbles
Fish and Wildlife Service – Steve Williams
Office of Surface Mining - Jeff Jarrett
West Virginia - Matt Crumm

Mike Robinson - Ch 14 edits Page 1

4-338

From: <Rider.David@epamail.epa.gov>
To: <mrobinso@OSMRE.GOV>
Date: Mon, Apr 21, 2003 1:34 PM
Subject: Ch 14 edits

----- Forwarded by David Rider/R3/USEPA/US on 04/21/03 01:29 PM -----

Dave_Densmore@fws.gov To: David Rider/R3/USEPA/US@EPA
cc:
04/17/03 02:08 PM Subject: Ch 14 edits

See attached.........

David Densmore
Supervisor, Pennsylvania Field Office
U.S. Fish and Wildlife Service
315 S. Allen St., Suite 322
State College, PA 16801-4850
(814) 234-4090 x233 FAX: (814) 234-0748
----- Forwarded by Dave Densmore/R5/FWS/DOI on 04/17/2003 02:04 PM -----

Cindy Tibbott

To: Dave Densmore/R5/FWS/DOI@FWS

04/17/2003 12:42 PM cc:

Subject: Ch 14 edits

(See attached file: chivrewrite.wpd)(See attached file: chIVcomments.wpd)

ChIVrewrite was on the endangered species section, and Dave Rider says he
thinks they lost it; none of the changes were made.

(See attached file: chivrewrite.wpd)(See attached file: chIVcomments.wpd)

CC: <Forren.John@epamail.epa.gov>, Jeff Coker <JCOKER@OSMRE.GOV>

Mike Robinson - chivrewrite.wpd Page 1

IV. Environmental Consequences

J. THREATENED AND ENDANGERED SPECIES

~~Endangered, threatened, candidate, and special concern species known to inhabit the study area were identified through correspondence with the appropriate Kentucky, Virginia, West Virginia, and Tennessee state agencies, plus the regional United States Fish and Wildlife Field Offices. Letters requesting threatened and endangered terrestrial species information were sent to the Virginia Department of Conservation and Recreation, the West Virginia Division of Natural Resources, the Tennessee Department of Environment and Conservation, and the Kentucky Natural Resources and Environmental Protection Cabinet. Responses to these letters included lists of federal and state listed threatened, endangered, and sensitive species broken down by county. These responses and habitat information are summarized in Appendix F of this EIS.~~

~~On September 24, 1996, the FWS concluded formal consultation with OSM pursuant to section 7 of the Endangered Species Act (ESA) on surface coal mining and reclamation operations conducted under State and federal regulatory programs adopted under SMCRA and its implementing regulations. This programmatic consultation lead to FWS issuance of a biological opinion and conference report that found surface coal mining and reclamation operations conducted in accordance with properly implemented State and federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats.~~

As described in Chapter II, Section A.3.k, ~~Currently,~~ the federal agencies are conducting informal consultation with FWS to determine the extent to which mountaintop mining and/or proposed programmatic changes may affect federally listed species in the EIS study area.~~, what effect the proposed action may have on the listed species or critical habitats that are in the EIS study area.~~ The EPA is in the process of writing a Biological Assessment that will identify federally listed species which are likely to be adversely affected by mountaintop mining and the EIS proposed action. ~~Furthermore, the~~ The preliminary findings of ~~the environmental assessment~~ this effort indicate that several of the federally listed endangered and threatened species cited in Appendix F may be affected by mountaintop mining. These species include the Indiana bat (*Myotis sodalis*), blackside dace (*Phoxinus cumberlandensis*), Virginia Northern flying squirrel (*Glaucomys sabrinus fuscus*), clubshell (*Pleurobema clava*), Cumberland bean pearly mussel (*Villosa trabalis*), little-wing pearly mussel (*Pegias fabula*), Northern riffleshell (*Epioblasma torulosa rangiana*), tan riffleshell (*Epioblasma florentina walkeri*), Applachian monkeyface pearly mussel (*Quadrula sparsa*), birdwing pearly mussel (*Conradilla caelata*), Cumberland combshell (*Epioblasma brevidens*), Cumberland elktoe (*Alasmidonta atropurpurea*), Cumberland monkeyface pearly mussel (*Quadrula intermedia*), dromedary pearly mussel (*Dromus dromus*), oyster mussel (*Epioblasma capsaeformis*), pink mucket pearly mussel (*Toxolasma cylindrella*), purple bean (*Villosa perpurpurea*), rough rabbitsfoot (*Quadrula cylindrica strigillata*), and shiny pigtoe (*Fusconaia cor (=edgariana)*). Although all of the listed species in Appendix F will be considered in the Biological Assessment, special attention will be given to the previously mentioned species. Measures to avoid adversely affecting the federally listed species will also be considered in the Biological Assessment. Information about the findings of the Biological Assessment and the informal consultation will be provided in the final EIS.

1 *Mountaintop Mining / Valley Fill EIS* *Draft - December 2002*

EXHIBIT 71

Mike Robinson - chivrewrite.wpd Page 2

IV. Environmental Consequences

Action 25 specifies that, based on the outcome of the informal consultation with FWS, EPA, COE, OSM, and their state counterparts will identify and implement program changes, as necessary and appropriate, to ensure that future mining is carried out in full compliance with the ESA. This action would apply to any of the alternatives selected.

~~In reviewing the field level coordination, consultation, and reporting procedures carried out by SMCRA and CWA regulatory authorities in authorizing mountaintop mining activities in Appalachia, the agencies have identified a number of the procedures specified in SMCRA regulations and the 1996 programmatic biological opinion that have not been followed. Of particular concern is the inconsistent interpretation of the requirements of the biological opinion by State regulatory agencies and some OSM offices. For example, in many cases these State agencies have not provided sufficient site specific information to enable timely FWS review of project proposals, and they are often unwilling to incorporate FWS recommendations for the protection of listed and proposed species, particularly when those recommendations pertain to indirect or cumulative effects. In many instances, explanations and concurrence procedures have also not occurred. Consequently, the level of protection for listed and proposed species envisioned in the programmatic biological opinion, or that would have been obtained through project by project section 7 consultations with the federal regulatory authority, does not appear to have been achieved.~~

~~Under the No Action Alternative and Alternatives 1, 2, or 3 (Action 2), the Corps would be responsible for consulting with FWS to meet the requirements of the ESA. Alternatives 2 and 3 emphasize coordination between the SMCRA agency and FWS prior to the final Corps/FWS consultation step.~~

~~Action 25 in Alternatives 1, 2, and 3 call for the federal agencies to consult with FWS on program changes on MTM/VF activities, and the development of coordination procedures to ensure that mining projects are carried out in compliance with the ESA. The same requirement would apply under the No Action Alternative.~~

~~There are no significant differences among the No Action Alternative and Alternatives 1, 2, and 3 in terms of their ability to protect endangered and threatened species.~~

2 *Mountaintop Mining / Valley Fill EIS* *Draft - December 2002*

Mike Robinson - chIVcomments.wpd Page 1

IV.A.2. Irreversible and Irretrievable Commitment of Resources, 3rd paragraph, third sentence, "Consequently, the effects of MTM/VF on aquatic resources are irreversible for a buried stream segment, but may not be significant to the hydrologic regime within the larger watershed." Considering that the accuracy of this statement depends on one's definition of "hydrologic regime," it should be deleted. (For example, my definition of hydrologic regime includes natural thermal and flow periodicity and and good water quality.)

Same paragraph, later: "Reclamation techniques exist to equal or exceed natural forest regeneration and productivity. In the cases where these techniques are applied, the loss of resource may be no less reversible than timbering; and in some cases productivity gains surpassing forestation on native soils." I am not aware of attempts by Burger or anyone else to develop a natural forest – i.e., one with a diversity of commercial and non-commercial species and understory species, as opposed to commercially harvestable stands on a small scale. Most biologists would probably argue that the loss of the natural forest IS probably irreversible, as the unique combination of flowing streams, species diversity, organic matter, etc. has been lost. At the very least, it is FAR LESS REVERSIBLE than timbering, which at least leaves seed sources and native soils in place. These sentences should be removed.

Next paragraph, first sentence: "While loss of individuals of certain species within the mined areas may be irreversible, individuals of other species may be mobile enough to relocate to adjacent interior forest tracts." Although the claim that wildlife just moves somewhere else when development happens is a claim that is made frequently by developers, it is contrary to accepted biological principles. Displaced wildlife will move into adjacent habitats and likely find that they are already occupied by more fortunate members of their species, and competition for food and nesting locations will simply mean that the displaced ones die or fail to reproduce, etc. This is a myth that we don't want to help perpetuate by including it in the EIS.

Section IV.B.1.a Direct Stream loss from MTM/VF, 1st paragraph after Table IVB-1, first sentence: In an effort to condense things, some important language was omitted from the earlier version of this sentence. Suggested rewrite (additions in bold): "Studies show that while invertebrates and microbiota in headwater streams are only a minute fraction of living plant and animal biomass, **they play a critical role in providing organic matter to downstream reaches by converting leaf litter to finer particles that are more easily used as a food supply for downstream aquatic life."**

Same section, fifth paragraph after Table IVB-1 (paragraph begins with "Similar effects to headwater...), 2nd & 3rd sentences: "As discussed by Yuill in the post-mining land use report, suitable developable land is in short supply in some parts of the West Virginia study area. Consequently, creation of flat land suited for roads and development often places fill material in streams." This will probably be seen as a thinly-veiled attempt to downplay the impacts of MTM, especially since we are not aware of large numbers of road and development projects in the study area of WV that have or propose to place fill in streams. Furthermore, Yuill's study more or less says that MTM has created plenty of developable land in the study area, contrary to these statements.

Mike Robinson - chIVcomments.wpd Page 2

Section IVB1b Indirect stream impacts, 6th paragraph, last sentence: "No findings were made that the impacts downstream of MTM/VF constitute significant degradation of the watershed." If impaired aquatic life, and selenium above state water quality standards, resulting in streams being placed on the 303(d) list don't constitute "significant degradation," what would?

Section IV.B.1.e. Mitigation, 2nd paragaph. The last sentence reads as if the COE and SMCRA agencies are the ones responsible for doing the mitigation.

IV.C, Soils & Vegetation, Direct Impacts, 3rd paragraph. The summary of the terrestrial impacts data from the Landscape Scale Cumulative Impacts study leaves out the data on disturbed land that existed prior to 1992 (Baseline condition). Because this impacts on the total loss of forest in the area (it's part of the true cumulative impact), it should be included. Suggested language: "The cumulative impact study (USEPA, 2002) estimated (by adding past impacts, impacts from permits issued in the last 10 years, and projecting 10 years into the future) that under the no action alternative, 1,408,372 acres (2,200 square miles), or 11 percent of forest habitat in the study area would be lost due to mining."

Section IVC1, 5th paragraph: " However, regardless of the tree species, the reduction in the time required to re-establish a forest community equal or better than that which existed on the disturbed areas prior to mining will also provide other environmental benefits...". For the reasons stated in our comments above, few biologists would agree that a "forest community equal or better than that which existed" will develop on these sites, even in hundreds of years. Burger's "better than that which existed" concept for reforestation refers only to the ability to quickly produce marketable timber, not a diverse terrestrial ecosystem.

Section IVD2, Wildlife Populations, 7th paragraph: "There will also likely be an increase in game species such as whitetail deer and turkey due to an increase in grasslands and the diversification of habitats." This hasn't been studied. Whitetail deer and turkey need forests and are present in unmined forests. The perception that they "increase" with surface mining likely has as much to do with increased visibility (you can see a long way on these mines without all those darn trees in the way) as it has to do with any population response. The sentence should be deleted.

Section IVI1b, Data collection & analysis, 1st paragraph, 3rd line: "...demonstrations that avoidance and minimization also include adequate mitigation....". Avoidance and minimization come first, followed by mitigation for unavoidable impacts. Suggested re-write: ....demonstrations that impacts to waters of the United States have been avoided and minimized to the maximum extent practicable, and that compensatory mitigation is offered to offset unavoidable aquatic impacts...."

(936)

John Forren
05/21/2003 03:27 PM

To: rhunter@mail.dep.state.wv.us, DAVE VANDE LINDE <dvandelinde@mail.dep.state.wv.us>, Cindy_Tibbott@fws.gov, Katherine.L.Trott@HQ02.USACE.ARMY.MIL, Jeff Coker <JCOKER@OSMRE.GOV>, Mike Robinson <MROBINSO@OSMRE.GOV>
cc: Gregory Peck/DC/USEPA/US@EPA, Kathy Hodgkiss/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, William Hoffman/R3/USEPA/US@EPA
Subject: Briefing Outline

MTMBriefOutline.wpd

As promised on the conference call today....

EXHIBIT 72

BRIEFING
Mountaintop Mining/Valley Fills (MTM/VF)
Draft Programmatic Environmental Impact Statement

I. Context: Brief History of MTM/VF Issue
- Pre-1998 Federal Programs
- 1998 *Bragg* Lawsuit against WV SMCRA Program and Corps
- Settlement Agreement (Federal Claims only)
    - EIS
    - 250-acre limit on use of NWP 21 and Cumulative Impact Consideration
    - Interagency MOA

II. Development of EIS
- Initial direction - focus on limiting size of valley fills
- Preliminary version of DEIS: FOIA
- Change of Direction - focus on programmatic improvements
- Cost and Time/Delay Issues

III. Key Substantive Conclusions/Directions in the DEIS
- Three Action Alternatives - Focus on "programmatic" improvements
- Technical Studies includes as Appendices - Key Findings
- Economic Analyses

IV. Schedule
- Release of the DEIS and Comment Period
- Anticipated Release of the Final EIS
- Agencies with Records of Decision
- Implementation and Follow up

V. Anticipating Issues
- Process v. Environmental Protection
    - Where's the meat? What is being proposed that will improve environmental protection? What proposals will place limits on MTM/VF?
- NWP21/thresholds/cumulative impacts
- Limits under SMCRA - Buffer Zone Rule
- Economic Analyses - Does Data Support More Limits on MTM/VF?
- Technical Studies - Do Studies Show Significant Adverse Environmental Impacts?

From: "Mike Robinson" <MROBINSO@OSMRE.GOV>
To: <dperino@ceq.eop.gov>, <millett.john@epamail.epa.gov>, <mitch_snow@fws.gov>, <David.W.Hewitt@HQ02.USACE.ARMY.MIL>, <Katherine.L.Trott@HQ02.USACE.ARMY.MIL>, <Mark.F.Sudol@HQ02.USACE.ARMY.MIL>, <SmithCR@HQDA.Army.Mil>, <Suzanne.Fournier@LRDOR.USACE.ARMY.MIL>, <Steven.E.Wright@Lrh01.usace.army.mil>, <Jon.J.Fleshman@lrl02.usace.army.mil>, <JGREATHOUSE@mail.dep.state.wv.us>, <Diana.L.Bailey@NAO02.USACE.ARMY.MIL>, "Michael Gauldin" <MGAULDIN@OSMRE.GOV>
Date: Mon, Jun 2, 2003 10:25 AM
Subject: Hostile Q&A draft

Here's the "hostile" Q&A draft as last edited by Greg Peck. Some are not suited for web posting, but were developed in anticipation if they were asked on the teleconference with media on 5/29.

CC: <Forren.John@epamail.epa.gov>, <Hodgkiss.Kathy@epamail.epa.gov>, <Hoffman.William@epamail.epa.gov>, <Peck.Gregory@epamail.epa.gov>, <Rider.David@epamail.epa.gov>, <Smith.Bonnie@epamail.epa.gov>, <Suriano.Elaine@epamail.epa.gov>, <cindy_tibbott@fws.gov>, <Clint_Riley@fws.gov>, <dave_densmore@fws.gov>, <diane_bowen@fws.gov>, <Charles.K.Stark@HQ02.USACE.ARMY.MIL>, <andrew.hagelin@HQDA.Army.Mil>, <Suzanne.L.Chubb@LRDOR.USACE.ARMY.MIL>, <James.M.Townsend@lrl02.usace.army.mil>, <dvandelinde@mail.dep.state.wv.us>, <rhunter@mail.dep.state.wv.us>, "Dave Hartos" <DHARTOS@OSMRE.GOV>, "Jeff Coker" <JCOKER@OSMRE.GOV>

Attachment(s):
Attachment File 1.doc
Attachment File 2.822

EXHIBIT 73

>>> Michael Gauldin 05/27/03 12:16PM >>>
Here are some hostile questions we can expect in some form or another. At the moment I have given any thought to how one might respond to them, but I'll think on it.

Q. An earlier version of this EIS, made public at the end of the Clinton Administration, included limits on the size of valley fills. The Bush Administration, however, has removed those limits and made other changes aimed at watering down the environmental restrictions on mountaintop mining. Given the devastating environmental impacts of mountaintop mining, which have been documented time and time again, how can you justify these changes?

While this EIS does not recommend restrictions on valley fills, the Bush Administration tightened requirements on valley fills with the 2001 reauthorization of a CWA Section 404 General Permit, Nationwide 21. This permit requires that, if avoidance is not possible, stream impacts be minimized and aquatic functions be replaced or restored through mitigation. These requirements also apply to any mining proposal processed as a CWA Section 404 Individual Permit. Each fill proposal is evaluated on a case-by-case basis to catalogue the aqyatic impacts and set mitigation.

As the data from studies were compiled and the statutory requirements reviewed, the agencies saw no legal or technical basis upon which to base a fill restriction at this time. Site-specific conditions dictate how big fills can be without degrading downstream watersheds. Some streams are already degraded and larger fills may be appropriate. Other streams are high quality and no fills or smaller fills may be more suited to those situations. In some cases one or two larger fills are preferable to many small fills relative to overall watershed health. One size restriction does not fit all circumstances. The agencies will continue studying whether general restrictions may be appropriate in the future.

Q. Earlier this year the Bush Administration created a team here in Washington which spent about three months re-writing this EIS. Why was it necessary to bring them to Washington? If it's true that they were only editing the document and not completly re-writing it, why did it take 14 weeks? What political appointees participated in or influenced that team and what specific changes did political appointees incorporate into this EIS? What coal industry representatives participated in the writing or editing of this EIS?

The EIS encompasses nearly 4,000 pages, over 30 technical studies, and programmatic review of Federal CWA, SMCRA, ESA, CAA, and counterpart state requirements. Any EIS undergoes agency headquarters review by policy staff and attorneys. Meeting in Washington was the best way for four Federal agencies and OSM to consolidate comments, circulate new drafts, and finalize the document. No political appointees or coal industry representatives participated.

Q. This EIS seems more than anything else to be a document aimed at encouraging more coal production at the expense of the environment. To what extent was this EIS influenced by the President's Energy Policy?

The EIS principally evaluates environmental, economic, and social impacts as prescribed by NEPA. The alternatives in the EIS are framed in the context of CWA, SMCRA, ESA, and CAA. While the expansive coordination proposed by the EIS may clarify requirements for the regulated community, application of the combined and complimentary technical expertise of the agencies on coal mining proposals will improve project design and lessen environmental impacts. None of the aforementioned acts preclude coal mining. In fact, one of the main tenets of SMCRA is that coal mining can be conducted in an environmentally sound manner to meet the Nation's energy needs.

Q. What involvement did Steve Griles, Deputy Secretary of the Interior, have in the development of this EIS?

Mr. Griles was briefed early in 2001 on the status of the EIS by OSM career staff prior to confirmation of current OSM Director Jeff Jarrett. Other than receiving routine briefing papers prepared by OSM for the Department, Mr. Griles has not been involved in finalizing the document.

Q. Does the Fish and Wildlife Service endorse all the recommendations of this EIS?

The Fish and Wildlife Service is a co-lead and signatory of this draft EIS. They have fully participated in the preparation of this EIS from its inception.

Q. Was the release of this EIS delayed by disagreements between the Corps of Engineers and EPA? If so, what was the nature of the argument and how has it been resolved?

EPA and the COE are discussing use of the terms of the Bragg settlement agreement (i.e., the 250-acre watershed threshold for NWP 21 permits) as a COE Regional Condition applicable beyond West Virginia and following the final EIS. This discussion has not significantly delayed finalization of the EIS.

ADNR 24

U. S. Army Corps of Engineers
Mountain Top Mining / Valley Fills (MTM / VF) Briefing Brochure
May-June 2003

Surface Coal Mining---
The way forward

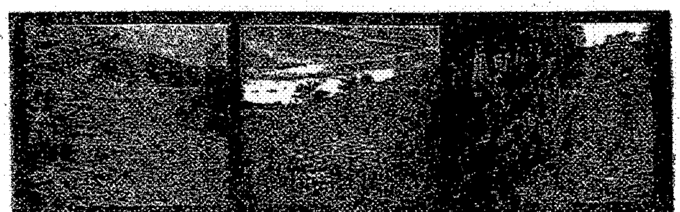


photo credit: Kentucky DSMRE

> The Corps of Engineers, EPA and other federal and state agencies are undertaking vigorous coordinated efforts to help bring mountain-top mining operations into full compliance with improved Clean Water Act regulations. Our goal is to implement a science- and watershed- based regulatory regime that is successful in providing the regulated community with the most practical regulatory tools to assure Americans the continued sustainable use of America's coal resources.

OASA CW INTERNAL WORKING PAPERS
NOT SUBJECT TO FOIA

EXHIBIT 74

SECTION I: OVERVIEW OF SURFACE COAL MINING

Coal is important to Americans.
America cannot meet its energy needs or advance its energy independence without coal. The U. S. relies on coal to maintain its economic strength and will continue to do so for the foreseeable future. Appalachia produces about 40% of the nation's coal (431.2 million tons) annually. 50% of the electricity generated in the United States comes from coal-fired power plants, and clean-burning Appalachian coal can greatly contribute to America's Clear Skies initiatives. Coal mining provides Appalachia with 53,000 jobs and approximately $1.5 billion in direct annual tax revenues to local, state, and federal governments. However, at this time, most if not all coal mining operations in Appalachia are economically stressed to the point of insolvency.
< http://www.energy.gov/HQPress/releases01/maypr/energy_policy.htm >
< http://fossil.energy.gov/coal_power/cct/cct_ipo/cct_ipo00.shtml >

Surface mining is a significant part of the Appalachian coal industry.
Surface mining is generally the most economical form of coal mining. Of the estimated 55.3 billion tons of recoverable coal reserves that remain in the Appalachian region (over 100 years supply at the current rate of recovery), about one third can be surface mined. The term "mountaintop mining and valley fills" (MTM / VF) describes a type of surface mining that is relatively common in Appalachia. In MTM / VF mining, the overburden of rock and dirt that is removed from near-surface coal seams at the top of steep Appalachian mountains and ridges is deposited in the adjacent ravines and valleys. The fill areas are referred to as "valley fills".

photo credit Virginia DMME

The U. S. Army Corps of Engineers issues permits for valley fills.
Valleys often include waters and watersheds that are part of headwater ecosystems. When waters are impacted, valley fills become subject to Section 404 of the Clean Water Act (CWA) that regulates fill material placed into "waters of the United States". The Army Corps of Engineers is the primary federal authority responsible for issuing Section 404 permits. This is accomplished either by a Section 404 individual permit (IP), or through the use of the Section 404 general permit (GP) known as Nationwide Permit 21 (NWP 21). The Section 404 program is just one of several State and Federal permitting programs applicable to surface coal mining.

Litigation against surface mining has often focused on the permitting process, significantly Kentuckians for the Commonwealth, Inc. v. Rivenburgh. <http://www.osmre.gov/mtindex.htm> An unprecedented interagency effort is currently studying the permitting of surface mining and, as a result, steps have already been taken to improve those processes. These recent actions are summarized in Section II.

There are many operations that require, but do not yet have, an NWP 21 authorization. Due to the effects of litigation, recent actions to restructure the permitting program, and other factors within the mining industry, the Corps currently faces a backlog of permit requests to be processed. For example, only twenty-five Nationwide Permit 21 (NWP 21) permits have been issued in the Corps' Huntington District since January 29, 2003. At present the Corps' NWP 21 backlog consists of approximately:

- 90 submissions received but determined to be incomplete
- 8 complete submissions advanced to Pre-construction Notification (PCN)
- 15 submissions in post-PCN evaluation
- 6 submissions evaluated and ready to issue
- 4 non-compliant operations under enforcement
- Potentially 200 ongoing operations that have not yet submitted applications for permits

Actions are being taken to address the need for permits and to improve the NWP 21 authorization process.
Insights gained during the interagency programmatic review and other initiatives have yielded a greater understanding of how mining operations relate to the various regulatory programs. Future actions will provide important environmental protections and enable mining activities to continue within an efficient and effective regulatory structure. These actions will focus on:

- identifying and stopping un-permitted mining operations,
- identifying bottlenecks and streamlining the regulatory process for operations that require permits under multiple programs (Clean Water Act section 402 and section 404 programs; the Surface Mining Conservation and Reclamation Act program; etc.), and
- utilizing scientific assessment tools to determine the degree to which a water body's ecological functions would be unavoidably impacted, and how those unavoidable impacts might be sufficiently mitigated.

Upcoming actions planned by the Corps and other agencies to address this problem are summarized in Section III.

The "way forward" reflects the Corps' intent to:

- ensure that NWP 21 will continue to be available to accomplish sustainable use of coal resources;
- communicate our policies with clarity to the regulated community, and ensure that those policies are practicable, predictable, and consistent.
- assist the regulated community to comply with the new permitting requirements, particularly the new requirements of the commonly utilized Nationwide Permit 21 (NWP 21);
- apply state-of-the-art technology and science to advance environmental stewardship;
- implement a strengthened, more thorough permitting process to help permitees, the permitting agencies, and the courts avoid costly litigation; and
- focus the agencies' enforcement resources on uncooperative operators by directing the most stringent enforcement options toward them and reserving lesser levels of enforcement for cooperative mining operators.

3

SECTION II: RECENT ACTIONS

Summary

Federal agencies, State, and local governments, in voluntary partnerships with stakeholders and in response to litigation, have in recent months undertaken an unprecedented collaborative effort to:

- Consider the problems associated with assessing the cumulative effects of multiple fills within a watershed. Although the effect of a single fill in a valley that contains only an ephemeral stream may be "insignificant", the overall effect of many such fills may not be.
- Require appropriate and practicable mitigation in all cases where waterbodies are impacted, even where the impact is considered to be minimal
- Conduct a programmatic review of all permitting procedures and policies related to surface mining to assure greatest efficiency and efficacy.

Examples

• Forty-four Nationwide Permits were reissued.
On January 15, 2002, the Corps reissued its forty-four Nationwide Permits. Nationwide Permits are general permits designed to provide streamlined authorizations for those projects that have no more than minimal environmental impacts. Eleven NWPs (including NWP 21 for Surface Coal Mining) and seven General Conditions were actually modified. Due to the modifications, in order to continue work in waters of the United States, those mining operations with previous authorizations under NWP 21 are required to be reauthorized and to comply with new requirements for providing appropriate and practicable compensatory mitigation to replace aquatic functions lost as valley streams are filled with mining overburden (valley fills).
< http://www.usace.army.mil/inet/functions/cw/cecwo/reg/2002nwps.pdf >
< http://www.lrh.usace.army.mil/or/permits/Public Notices/02-248-21-1.pdf >

• EPA's definition of "fill material" was adopted by the Corps.
On May 9, 2002, the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency published in the Federal Register a final rule to harmonize differences between existing EPA and Army Corps of Engineers regulations by adopting EPA's effects-based approach to the definition of the term "fill material." The Corps' longstanding "primary purpose" test has been replaced with an effects based test – that is, fill material is that material placed in waters of the U.S. which has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water. Examples of fill material include rock, sand, soil, clay, plastics, construction debris, wood chips, and overburden from mining or other excavation activities, including coal slurry.

• Regulatory Guidance Letter 02-2 and the National Wetlands Mitigation Action Plan
On December 24, 2002, the Bush Administration affirmed its commitment to the goal of no net loss of our Nation's aquatic resources by undertaking a series of actions to improve the ecological performance of compensatory mitigation under the Clean Water Act and related programs. Implementation of the 16 action items contained in the National Wetlands Mitigation Action Plan will help ensure effective restoration and protection of the functions of our Nation's wetlands. The specific action items focus on achieving ecologically sustainable

mitigation informed by science, improved accountability and performance monitoring, and on providing information and options to those who need to mitigate for losses of aquatic functions, including mountain top coal mining operations.
< http://www.lrl.usace.army.mil/orf/Mitigation/RGL 02-2.pdf >
< http://www.lrl.usace.army.mil/orf/Mitigation/Mit.Action.Plan.24Dec02.pdf >

• The draft MTM / VF Programmatic Environmental Impact Statement was released.
On May 29, 2003, the second draft of this extensive, interagency study was released. This document provides a roadmap for agencies to collaboratively improve the permit application and review procedures. It also identifies the data needed to support quality decision-making, where that data is available, and where it is lacking in the current process. The final version of the PEIS will be completed before the end of 2003, after an opportunity for further public review and comment.
< http://www.epa.gov/region3/mtntop/index.htm >

• Three new Regional Conditions to NWP 21 were established.
In June, 2003, the Corps promulgated three new "regional conditions" to NWP 21 as an interim measure. The Corps is committed to using science-based bio-assessment tools to fully and accurately determine environmental impacts and to better determine mitigation requirements. Where such tools are not already available to be used, the Corps has placed three new conditions on the use of NWP 21 that:

1) establish a "250-acre watershed" threshold above which individual permits, rather than the NWP 21 general permit, are required
2) require bio-assessments to aid in avoiding and minimizing aquatic impacts wherever practicable, and assessing cumulative impacts on the aquatic environment, and
3) require appropriate and practicable compensatory mitigation to offset unavoidable impacts to waters, and require that mitigation actions are based on the biotic and hydrologic functions of the aquatic resources impacted.

< http://www.usace.army.mil/inet/functions/cw/cecwo/reg/2002nwps.pdf >

SECTION III: UPCOMING ACTIONS

• Enforcement against non-complying mining operations

Recent EIS related data collection has given state and federal authorities "reason to believe" that there are numerous non-permitted mining operations taking place throughout Appalachia. Identifying the operators who deliberately disregard regulatory requirements has therefore become a high priority. The EPA has statutory responsibility for enforcement action against un-permitted operations. Similarly, identifying operators who are exceeding their permitted authority or who are not meeting their permit requirements is a high priority that is the responsibility of the Corps of Engineers.
< http://www.lrl.usace.army.mil/orf/CWA Section 404 Permit Program.pdf >

• Assistance to keep cooperating mines working (9-Point Plan)

There is a "backlog" of mining operations that are now technically un-permitted because their permits have expired and their submissions for new permits have not been fully processed. Many of these operations only recently submitted their renewal applications, due in part to the general confusion that has existed in the past year about permitting requirements. Most applications that have been received are not complete by the new standards.

Litigation in the U.S. District Court that covers West Virginia and Kentucky caused many operators to believe that they would have to cease operations at some existing projects, and that new authorizations could not be provided. Also, due to court order, the Corps' Huntington District could issue no new permits for surface coal mining operations unless fills had constructive purposes from May 8, 2002, to January 29, 2003. Consequently, the regulatory environment was fraught with uncertainty, making it difficult for the Federal government to issue clear guidance for new authorizations. Yet all old NWP 21 authorizations expired in February 2003, and could not be extended or grandfathered.

photo credit Kentucky DSMRE

To deal fairly with cooperating operators who find themselves in this situation, the Corps and its partners are pursuing a NINE POINT education and voluntary compliance strategy, but reserve the right to use enforcement tools for willful, flagrant, or repeat violators at any time. The nine elements of this action plan include:

1) distribute an informational notice explaining the need for obtaining new authorizations under certain circumstances, and encouraging mining companies to contact the Corps or EPA for information and advice (May 20, 2003)
2) collaborate with States to hold permitting workshops to explain the new NWP requirements and provide guidance on how best to generate a complete permit application (June-July 2003)
3) establish Corps "Tiger Teams, using personnel from other districts to augment staff in districts where needed, to expedite processing of NWP 21 Pre-Construction Notices (June 2003)
4) establish interagency teams to simultaneously, rather than sequentially, process permit applications (June 2003)
5) implement a "self-audit" program to assist mining companies with efforts to come into compliance (May 2003)
6) use Performance Bonds and/or Letters of Credit to allow some work to proceed under permit conditions, while mitigation plans are completed and approved
7) When appropriate, develop and use In-Lieu-Fee Arrangements and Mitigation Banks to facilitate mitigation activities[1]
8) continue interagency efforts to (a) integrate the processing of 401, 402, 404, and SMCRA permits to the greatest extent possible, and (b) ensure that the information required in permit applications is limited to that information actually necessary and useful to the agencies' decision-making process
9) develop standard presentation formats for use by operations that require permits from more than one agency, so that applicants can submit commonly required data in a fashion that meets the needs of all agencies rather than each agency requiring its own distinct presentation format.

- Development and adoption of Stream Assessment Protocols

The Corps, in partnership with other Federal and State agencies, is developing innovative stream assessment protocols that can be applied to specific types of streams and specific hydro-geologic areas. The protocols will focus on the identification and measurement of biotic and abiotic characteristics of stream environments as indicators of stream health and function. Once coordinated with the States and public, these new standards can replace the non-science-based, one-size-fits-all standards that have proven inadequate for assessing the quality and functional value of streams and mitigation projects. Stream Assessment Protocols are an excellent example of a staff level initiative on the part of Corps and state environmental regulators to develop better, science-based regulatory tools for greater efficiency and efficacy.
< http://www.usace.army.mil/inet/functions/cw/cecwo/reg/vol2-01.pdf >
< http://155.80.93.250/orf/info/EKYStreamAssess/eastkystreamassessment.htm >

[1] See Federal Register Notice, November 7, 2000, Federal Guidance on Use of In-Lieu Fee Arrangements for Compensatory Mitigation Under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act ("In-Lieu Fee Guidance") < http://www.lrl.usace.army.mil/orf/mitigation/ilffedreg.pdf >; Federal Register Notice, November 28, 1995, Federal Guidance on the Establishment, Use and Operation of Mitigation Banks ("Banking Guidance"); and also < http://www.epa.gov/owow/wetlands/facts/fact16.html >

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Appalachian Regional Coordinating Center
Three Parkway Center
Pittsburgh, Pennsylvania 15220

DEC 2 2 2003

Mr. Jim Hecker
Trial Lawyers for Public Justice
1717 Massachusetts Avenue, N.W. #800
Washington, D.C. 20036

Re: OSM-2003-00042/OS-2003-00727/FWS-2003-00771

Dear Mr. Hecker:

This is in response to your Freedom of Information Act (FOIA) request related to the preparation of the Environmental Impact Statement (EIS) on mountaintop mining and valley fills in the Appalachian coalfields (64 Fed. Reg. 5800, Feb. 5, 1999). This request is limited to information received, sent, or originated since April 15, 2002. Specifically, you requested:

1. Written and electronic documents that are part of the administrative record for this EIS;
2. Letters, memos, e-mails, telefaxes or other records of communications between employees or agents of your agency and anyone outside the executive branch of the United States related to the EIS;
3. Letters, memos, e-mails, telefaxes or other records of communications sent by or among members of the agencies of the EIS Steering Committee related to the EIS.

This is the Department of the Interior's (DOI) final response to your request and supplements our responses to you dated July 29, August 8, and October 30, 2003. Enclosure A lists the remaining documents we are releasing in response to your request. Enclosure B lists the documents, and portions thereof, we are withholding for the reasons cited.

EXHIBIT 75

Enclosure B
MTM/VF EIS FOIA
Requester: J. Hecker

The following documents, or portions thereof, are being withheld for the reasons cited:

Exemption 5 U.S.C.552(b)(4): "Trade Secrets, commercial or financial information obtained from a personal and privileged or confidential"

Exemption 5 U.S.C.552(b)(5): "Inter-agency or intra-agency memoranda or letters which would not be available by law to a party other than an agency in litigation with the agency"

Exemption 5 U.S.C.552(b)(6): "Personal Information affecting an individual's privacy"

Item No.	Date	Subject
B-1.	April 15, 2002	Fax from Cathleen Short, FWS, to Benjamin Tuggle, Sam Hamilton, Mamie Parker, David Densmore of FWS; Subject: Mountaintop Mining Draft EIS-Preferred Alternative. Entire document withheld (5 pages) under Exemption (b)(5) as deliberative process privileged.
B-2.	April 15, 2002	E-mail from Cathleen Short, FWS, to Sherry Morgan and other FWS recipients, Subject: Steve Griles' meeting on April 29 on mountaintop mining EIS (includes an additional April 15 e-mail from Sherry Morgan to same recipients on same subject). Entire document Withheld (1 page) under Exemption (b)(5) as deliberative process privileged.
B-3.	April 15, 2002	E-mail from Cathleen Short, FWS, to Mamie Parker and other FWS recipients, Subject: Steve Griles' meeting on April 29 on mountaintop mining EIS. Entire document withheld (1 page) under Exemption (b)(5) as deliberative process privileged.
B-4.	April 15, 2002	E-mail from Robin NimsElliott, FWS, to Diane Bowen, FWS, regarding Steve Griles' meeting on April 29 on mountaintop mining EIS; transmits other e-mails on same subject from Cathleen Short and Sherry Morgan, FWS, with copies to multiple FWS recipients. Entire document withheld (2 pages) under Exemption (b)(5) as deliberative process privileged.
B-5.	April 16, 2002	E-mail from Mamie Parker, FWS, to Sherry Morgan, Dave Densmore, Sam Hamilton, Cynthia Dohner, FWS; Subject: Mountaintop Mining Conference call mining (includes two additional FWS e-mails, same subject). Entire document withheld (3 pages) under Exemption (b)(5) as deliberative process privileged.
B-6.	April 16, 2002	Mountaintop Mining EIS Alternative B. Entire document withheld (1 page) under Exemption (b)(5) as deliberative process privileged.
B-7.	April 22, 2002	E-mail from Sherry Morgan, FWS, to Dave Densmore, Jeff Underwood, and Sue Essig, FWS; Subject: Steve Griles' meeting on mountaintop mining (includes two additional FWS e-mails, same subject). Entire document withheld (1 page) under Exemption (b)(5) as deliberative process privileged.
B-8.	April 23, 2002	E-mail from Nancy Broderick, OSM-HQ, to Mike Robinson, OSM-ARCC, forwarding example documents. Entire document withheld (11 pages) under Exemption (b)(5) as deliberative process privileged
B-9.	April 24, 2002	E-mail from Sherry Morgan, FWS, to Dave Densmore, Benjamin Tuggle, Sue Essig, and Jeff Underwood, FWS, regarding MTM conference call on Friday. Entire document withheld (1 page) under Exemption (b)(5) as deliberative process privileged.

TLPJ

TRIAL LAWYERS FOR PUBLIC JUSTICE, P.C.

January 21, 2004

Via Email (forren.john@epa.gov)

Mr. John Forren
U.S. Environmental Protection Agency
Region III (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Re: Supplemental Comments on Draft Programmatic Environmental Impact Statement (DEIS) on Mountaintop Removal Mining/Valley Fill Activities in Appalachia, announced at 68 Fed. Reg. 32487 (May 30, 2003).

Dear Mr. Forren:

The West Virginia Highlands Conservancy and the Ohio Valley Environmental Coalition submit the following supplemental comments on the Draft Environmental Impact Statement (DEIS) for mountaintop removal mining and valley fills in Appalachia. These comments supplement prior comments submitted on January 5, 2004.

We demonstrated in our initial comments that mountaintop removal mining and valley fills (MTM/VF) are associated with violations of the stream water quality criteria for total selenium in West Virginia. We criticized the DEIS for falsely claiming that "the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S." DEIS, p. II.D-9. We also criticized the DEIS for failing to propose any remedies for those selenium violations.

5-5-2

A new study released by the U.S. Fish and Wildlife Service (FWS) confirms the seriousness of the selenium problem. During the spring and summer of 2003, FWS conducted a survey of selenium in fish, water, and sediments in streams in southern West Virginia. In a January 16, 2004 letter to the West Virginia Department of Environmental Protection (attached), the Supervisor of FWS' Pennsylvania Field Office, David Densmore, concludes that:

- Selenium was present in all fish samples.
- Selenium concentrations in fish in three watersheds exceeded the toxic effect threshold level for whole fish.
- Selenium is bioavailable in West Virginia streams, and violations of the EPA selenium water quality criterion may result in selenium concentrations in fish that could adversely affect fish reproduction.

Reply to:
National Headqua
1717 Massachusetts A
Suite 800
Washington, DC 200
Phone: (202) 797-860
Fax: (202) 232-7203

West Coast Office
One Kaiser Plaza
Suite 275
Oakland, CA 94612-
Phone: (510) 622-815
Fax: (510) 622-8155

E-Mail: tlpj@tlpj.org
Web Site: www.tlpj.o

Mr. John Forren
January 21, 2004
Page 2

- In some cases, fish tissue concentrations were near levels believed to pose a risk to fish-eating birds.

In light of this study, the DEIS has no scientific basis for claiming that MTM/VF operations do not cause or contribute to significant degradation of waters of the U.S. The FWS study demonstrates that significant degradation is already occurring. EPA's 404(b)(1) Guidelines prohibit activities that cause significant degradation of aquatic ecosystems. 40 C.F.R. § 230.10(c). Therefore, the DEIS must address this issue and propose remedies to eliminate all existing and potential stream degradation due to selenium contamination from MTM/VF activities. 5-5-1

Sincerely,

James M. Hecker

James M. Hecker

Counsel for the West Virginia Highlands Conservancy and the Ohio Valley Environmental Coalition

01/21/2004 10:19
01-19-2004 12:33PM FROM-MOUNTAIN ST JUSTICE 304-344-3145 T-388 P.002/008 F-327

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
Suite 322
315 South Allen Street
State College, Pennsylvania 16801

January 16, 2004

Allyn Turner
Director, Division of Water and Waste Management
West Virginia Department of Environmental Protection
414 Summers Street
Charleston, WV 25301

Dear Ms. Turner:

During the spring and summer of 2003, we conducted a survey of selenium in fish, water, and sediments in various waterbodies in southern West Virginia. Because U.S. Environmental Protection Agency studies for the draft Environmental Impact Statement on Mountaintop Mining/Valley Fills found high selenium concentrations in waters downstream of valley fills, and selenium is highly bioaccumulative and toxic to fish and wildlife, we were interested in determining whether the waterborne selenium downstream of valley fills is accumulating in fish tissues to ecologically relevant levels. In addition, because mercury is associated with coal and also bioaccumulates, we initially included mercury in our chemical analysis.

We conducted our sampling May 28-30, and August 19-21, 2003. Most of the streams we sampled were previously sampled for selenium in water by EPA or WVDEP. As a cost-saving measure, we did not collect water samples in those locations; however, we did collect a sediment sample at each location. When sampling stream fish, we targeted primarily creek chubs and blacknose dace. These species are efficient bioaccumulators of selenium (bioaccumulation factors of 4,545 and 4,590, respectively; Mason *et al.* 2000), and would be expected to serve as a food source for birds such as the belted kingfisher and great blue heron. Selenium in fish consumed by these birds could be transferred to offspring in bird eggs, resulting in embryo mortality or deformity (Lemly 2002).

We also sampled East Lynn and Beech Fork Lakes in Wayne County, and one stream in each of their watersheds (Trough Fork and Miller's Fork, respectively). The East Lynn watershed is heavily mined, while the Beech Fork watershed is relatively undisturbed by mining. For the lakes, we targeted bluegill, largemouth bass, gizzard shad, and white crappie. Samples included whole fish, fillet (left side, skin on, scaled), and eggs.

Table 1 provides results for streams in the Little Coal/Coal River, Big Coal River, and Mud River watersheds, and one sedimentation pond downstream of a valley fill at the head of Trace

01/21/2004 10:19
01-19-2004 12:34PM FROM-MOUNTAIN ST JUSTICE 304-344-3145 T-388 P.003/008 F-327

Branch. Table 2 provides results for East Lynn and Beech Fork Lakes, and Trough and Miller's Forks.

Mercury analysis was conducted only on samples collected in May. Mercury was found in only one stream fish sample (creek chubs from Stanley Fork), but was present in many of the lake fish samples. Mercury was not found in any of our sediment samples, or in any of four water samples. Because of the low incidence of detections in the stream samples, we did not submit the August stream samples for mercury analysis.

Selenium was present in all fish samples. As a guideline for evaluating the ecological significance of the selenium concentrations, we used Lemly (2002). Based on a synthesis and interpretation of scientific literature, Lemly has established "toxic effect thresholds for selenium in aquatic ecosystems," which he describes as "levels at which toxic effects begin to occur in sensitive species of fish and aquatic birds. They are not levels that signify the point at which all species die from selenium poisoning" (p. 31). Lemly's values and associated biological effects in fish are 8 ppm (dw) for fillets[1] (reproductive failure); 10 ppm for eggs (reproductive failure); and 4 ppm for whole fish (mortality of juveniles and reproductive failure). For reproductive failure in birds, Lemly cites 7 ppm in food chain organisms.

Creek chubs and blacknose dace collected from Trace Branch, Sugartree Branch, and Stanley Fork (where EPA or WVDEP had previously identified selenium water concentrations above the EPA chronic water quality criterion of 5 µg/l) contained selenium at concentrations above Lemly's 4 ppm toxic effect threshold level for whole fish. Our water sample from a valley fill sedimentation pond at the head of Trace Branch hollow contained 6.44 µg/l selenium, and bluegill captured in the pond contained 6.89 ppm selenium. Selenium levels in fish samples from the Trace Branch pond and Sugartree Branch were just below the 7 ppm threshold value for reproductive failure in birds.

Fish from several streams where other agencies had documented stream selenium concentrations greater than the EPA criterion did not exceed the Lemly threshold values. Among many possible explanations for this is evidence that other water quality parameters, especially sulfates, can interfere with selenium uptake (Great Lakes Environmental Center 2002). In studies related to the EIS for mountaintop mining, EPA identified high sulfate concentrations at many sampling locations.

No fish or fish eggs collected from Beech Fork Lake or East Lynn Lake contained selenium at concentrations above Lemly's thresholds. However, tissue selenium concentrations were generally higher in the East Lynn samples, and long-term monitoring of this situation is advisable. Selenium concentrations in creek chub samples from both Trough Fork and Miller's Fork were low relative to other streams in our survey.

Our results show that selenium present in surface waters in southern West Virginia is bioavailable, and that violations of the EPA selenium water quality criterion may result in

[1]Note that Lemly's fillet values are for skinless fillets, and our samples were skin-on.

01/21/2004 10:19
01-19-2004 12:34PM FROM-MOUNTAIN ST JUSTICE 304-344-3145 T-388 P.004/008 F-327

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. It is likely that benthic invertebrates in some of these streams would be similarly contaminated, thereby posing a risk to birds that depend upon aquatic insects as a food supply (e.g., Louisiana waterthrush). Accordingly, we believe that the potential for release of selenium during and after mining should be assessed to ensure that future permits are not issued where there is a likelihood that selenium water quality standards will be violated. We are aware that the West Virginia Geological Survey has analyzed the selenium content of coal in various locations (www.wvgs.wvnet.edu/www/datastat/te/Maps/Semapmax.gif). If those results can be correlated to the selenium water and fish data, it may be possible to develop coal and/or overburden analysis requirements for permit applicants that would characterize the degree of selenium risk associated with a given application.

If you have any questions regarding this information, please contact Cindy Tibbott of my staff at 814-234-4090, ext. 226.

Sincerely,

David Densmore
Supervisor

Literature Cited

Great Lakes Environmental Center. 2002. Draft aquatic life water quality criteria for selenium. Traverse City, MI.

Lemly, A.D. 2002. Selenium assessment in aquatic ecosystems: Aguide for hazard evaluation and water quality criteria. New York: Springer-Verlag New York, Inc. 162 pp.

Mason, R. P., J-M. Laporte, and S. Andres. 2000. Factors controlling the bioaccumulation of mercury, arsenic, selenium, and cadmium by freshwater invertebrates and fish. Arch. Environ. Contam. Toxicol. 38:283-297 (as cited in Great Lakes Environmental Center 2002).

Location, collection date, lat/long	Sediment[1] Se (ppm dw)	Water Se and Hg (µg/l)	Fish species & tissue	Mean fish size (mm)	Tissue Se (ppm, dw)	Tissue Hg[2] (ppm, dw)
Beech Fork Lake June 3, 2003 38.3833, -82.36219	ND (<0.238)	ND (Hg <0.100 Se <2.50)	Bluegill - 5 whole fish	160	0.600	ND
			Bluegill - 3 gravid females	149	0.635	ND
			Largemouth bass - 3 whole fish	328	0.871	0.613
			White crappie - 5 fish	125	0.600	0.360
			Largemouth bass - fillets from 1 gravid female	455	1.76 dw, 0.422 ww	2.16 dw, 0.517 ww
			Largemouth bass - fillets from 1 gravid female and 1 male	408 (f) 370 (m)	1.26 dw, 0.490 ww	0.368 dw, 0.143 ww
			Bluegill - eggs from 3 fish	153	1.08	ND
			Largemouth bass - eggs from 1 fish (same fish used for fillet, above)	455	2.96	ND
			Largemouth bass - eggs from 1 fish	400	2.48	ND
Trough Fork June 4, 2003 38.04561, -81.25049	ND (<0.248)		Creek chub	7.5-10 (5 fish)	0.564	ND
Miller's Fork June 4, 2003 38.04561, -82.25049	ND (<0.243)		Creek chub	7.5-8.5 (5 fish)	0.713	ND

[1] Mercury was not detected in sediments. The detection limits ranged from 0.917 to 0.0990 ppm.

[2] Mercury detection limits for tissue samples ranged from 0.145 to 0.200 ppm.

Table 1. Results of sediment, water, and fish tissue analyses for selenium and mercury in samples collected from various waterbodies in southern West Virginia.

Location, collection date, lat/long	Other agency station code	Other agency Se water (mean, ug/l)	Sediment Se (ppm)	Water Se and Hg (ug/l)	Fish species (whole fish)	Mean fish size (mm)	Fish Se (ppm, dw)	Fish Hg[2] (ppm,dw)
Little Coal/Coal River Watersheds								
Spruce/White Oak Branch 28-May-03 37.86299, -81.803831	EPA MT 39	ND (<2.99)	ND (<0.229)		Creek chub	101	1.86	ND
					Creek chub	146	1.43	ND
					Creek chub	72	3.19	ND
Coal/Trace Branch Pond 29-May-03 37.87704, -81.84137			0.525	Hg-ND (<0.100) Se- 8.44	Bluegill	152	6.89	ND
Coal/Left Fork Beech 28-May-03 37.905423, -81.846021	EPA MT 34B	22.7	0.486		Creek chub	142	3.05	ND
Coal/Trace Branch 29-May-03 37.87665, -81.83786	WVDEP WVKC-10-T-19	6.4	ND (<0.240)		Creek chub	158	5.5	ND
					Creek chub	100	6.04	ND
Big Coal River Watershed								
Ewing Fork 20-Aug-03 37.91067, -81.32799	EPA MT 69	ND (<2.99)	0.221	Hg 1.5 Se ND (<2.6)	Blacknose dace	77	2.9	
Clear Fork/Sycamore Creek 20-Aug-03 37.93762, -81.42259	EPA MT 81	ND (<2.99)	0.113	Hg 1.01 Se ND (<2.6)	Blacknose dace	71	2.45	
					Creek chub	109	0.845	
Clear Fork/Rockhouse Creek 19-Aug-03 37° 57.952, -81° 30.096	WVDEP WVKC-47A	<5	0.455		Blacknose dace	77	1.86	
					Creek chub	92	1.33	
White Oak/ Left Fork 19-Aug-03 38 03 0.7, 81 31 41	WVDEP WVKC-35E	7	1.49		Creek chub	98	1.73	
Seng Creek 20-Aug-03 37° 59.981, 81° 29.274	WVDEP WVKC-42	16	0.479		Blacknose dace	84	2.75	
					Creek chub	135	2.08	
Buffalo Fork 20-Aug-03 37.899, -81.331	EPA MT 64	13	0.387		Blacknose dace	72	0.81	

01/21/2004 10:19
01-19-2004 12:39PM FROM-MOUNTAIN ST JUSTICE 304-344-3145 T-383 P.007/008 F-327

Table 2. Results of sediment, water, and fish tissue analyses for selenium and mercury in samples collected from East Lynn and Beech Fork Lakes, and Trough and Miller's Forks, Wayne County.

Location, collection date, lat/long	Sediment[1] Se (ppm dw)	Water Se and Hg (ug/l)	Fish species & tissue	Mean fish size (mm)	Tissue Se (ppm, dw)	Tissue Hg[2] (ppm, dw)
East Lynn Lake June 2, 2003 38.04561, -82.25049	ND <0.238	ND <.0999 Hg <2.5 Se	Bluegill - 5 whole fish	89 - 113	1.60	ND
			Gizzard shad - 5 whole fish	89 - 100	3.29	ND
			Largemouth bass - 1 whole fish (female, eggs removed)	260	1.72	0.340
			Largemouth bass - 2 whole fish	272	3.84	0.370
			White crappie - 2 whole fish	201	0.863	0.175
			Largemouth bass - fillets from 5 fish	337	3.25 dw, 0.772 ww	1.00 dw, 0.238 ww
			Gizzard shad - eggs from 1 fish	285	3.54	ND
			Largemouth bass - eggs from 1 fish (remainder analyzed whole - see above)	260	3.17	ND
			Largemouth bass - eggs from 3 fish	343	4.73	ND

01/21/2004 10:19
01-19-2004 12:39PM FROM-MOUNTAIN ST JUSTICE 304-344-3145 T-388 P.008/008 F-327

Table 1 (continued).

Location, collection date, lat/long	Other agency station code	Other agency Se water (mean, ug/l)	Sediment Se (ppm)	Water Se (and Hg (ug/l))	Fish species (whole fish)	Mean fish size (mm)	Fish Se (ppm, dw)	Fish Hg[1] (ppm,dw)
Mud River Watershed Mud/Rushpatch Branch 21-Aug-03 38.04968, -81.93302	EPA MT 02	ND (<2.98)	ND (<0.0879)	Hg 0.952 Se ND (<2.5)	Blacknose dace	59	0.907	
					Creek chub	109	<0.461	
Mud/Stanley Fork 30-May-03 38.08508, -81.95601	EPA MT 15	12.1	ND (<0.245)		Creek chub	185	4.13	0.28
					Creek chub	84	5.11	ND
Mud River 21-Aug-03 38.09191, -81.97446	EPA MT 23	12.9	0.134		Creek chub	108	1.4	
Mud/Sugartree Branch 30-May-03 38.09084, -81.95282	EPA MT 16	38.8	0.192		Blacknose Dace	75	6.52	ND
					Creek chub	104	6.85	ND

[1] Mercury detection limits for fish tissue samples ranged from 0.145 to 0.200 ppm. August 2003 fish samples were not submitted for mercury analysis.

Recommendations for Pre-Mine Assessment of Selenium Hazards

Associated With Coal Mining in West Virginia

prepared by

A. Dennis Lemly, Ph.D.
Senior Scientist in Aquatic Toxicology

January 5, 2004

Background on Selenium

Selenium gained recognition among research scientists, regulatory authorities, and fisheries managers in the late 1970's when the landmark pollution episode took place at Belews Lake, North Carolina. Selenium released in the waste from a coal-fired power plant entered the lake, killed the fish community, and caused residual impacts for many years after selenium inputs were stopped (Cumbie and Van Horn 1978; Lemly 1985a, 1997a, 2002a). The primary lessons learned from Belews Lake were: (1) Even small increases in waterborne selenium can lead to devastating effects on aquatic life, and (2) Once selenium bioaccumulation in the aquatic food chain begins it is too late to intervene — pre-pollution assessment and management are key to preventing impacts. The lessons from Belews Lake were instrumental in the development of USEPA's current national freshwater criterion for selenium (5 µg/L [micrograms per liter]). Since the Belews Lake episode, a tremendous amount of research on the toxicology, environmental cycling, and hazard assessment of selenium has taken place (e.g., Frankenberger and Engberg 1998, Lemly 2002b). In addition to learning about its toxic potential, much information has been gained on the sources of selenium and how it reaches the aquatic environment, particularly with respect to coal mining and the coal industry (Lemly 1985b, 2004, Dreher and Finkelman 1992, Vance et al. 1998).

Need for Pre-Mine Assessment

The lessons from Belews Lake, supported by over two decades of research findings from many other locations throughout North America (Lemly 1997b, 1999, 2002b; Skorupa 1998a, Hamilton 2004), underscores the need to take a preventive approach to selenium pollution rather than attempting to deal with it after contamination has taken place. With respect to coal mining this means pre-mine assessment. Failure to adopt this approach can only worsen the selenium pollution and associated ecological risks that have emerged in West Virginia. Selenium-related violations of the federal Clean Water Act need not occur if careful pre-mine assessment is used to guide mine permit decisions. Clearly, much attention is focused on management and regulatory authorities in the state, and it is imperative that environmentally sound actions be taken in order to stem the escalating threat of widespread selenium pollution. Using pre-mine evaluation can safeguard natural resources by allowing site-specific risk assessment and risk management to take place. This is the prudent, environmentally responsible course of action.

Adopting this approach will benefit the state and the mining industry by demonstrating that all activities are being developed and implemented with the goal of preventing selenium pollution, thereby minimizing water quality issues that may lead to litigation by federal agencies and conservation groups.

Recommended Procedure

Geological assessment is the first step to understanding the environmental risk of selenium at prospective coal mines. It is essential to determine selenium concentrations of coal and overburden that are to be moved because once these materials are exposed to air and precipitation they can leach substantial quantities of selenium (e.g., Davis and Boegly 1981, Heaton et al. 1982), which begins the mobilization process and threat to aquatic life. Because selenium concentrations vary widely in coal and waste rock at a mine site (e.g., Heaton and Wagner 1983, Desborough et al. 1999), a thorough representation of the geographic area and depth of disturbance must be made. This entails making a minimum of one core drilling per 5 acres, extending into the coal bed that is to be extracted. Two samples (about 450 grams each) are taken from each core: one consisting of overburden material and one of the coal itself. Each sample is evaluated using a passive leaching test (see Heaton et al. 1982, Desborough et al. 1999). The first step is to crush the coarse sample with a hammer to produce approximately pea-size or smaller material. The resultant material is mixed and some is put into a beaker with deionized water (pH 5.0-6.0) in a ratio of 1 part sample to 20 parts water (use 5-20 grams of sample and 100-400 milliliters of water). Let stand for 48 hours, decant and filter (0.45 micrometer mesh) the liquid, acidify it to pH <2.0, and analyze the liquid for selenium concentration using a method with a detection limit <1 µg/L (part-per-billion). The results of these tests will generate a spatial profile of selenium mobility at the prospective mine site and allow a screening-level evaluation of hazards to aquatic life that an be used to guide subsequent assessment and regulatory decisions.

Evaluating Selenium Concentrations

The traditional approach to evaluate waterborne selenium concentrations is to compare them to the USEPA national freshwater criterion (5 µg/L). Concentrations exceeding the criterion should be viewed as posing unacceptable risk to aquatic life because of the likelihood

3

of bioaccumulation in the food chain. However, there is a growing body of scientific information which indicates that toxic impacts to aquatic life can occur when selenium levels reach 2 µg/L, particularly if the selenium is predominantly in the selenite form (which is the case for coal mine selenium), and the contaminated water enters a wetland, pond, reservoir, or other impoundment (Frankenberger and Engberg 1998, Skorupa 1998a, Hamilton and Lemly 1999, Lemly 2002b). Because of these findings, a value of 2 µg /L has been recommended by several selenium experts as the concentration limit necessary to protect fish and wildlife (Peterson and Nebeker 1992, Maier and Knight 1994, Skorupa 1998b, Hamilton and Lemly 1999, Lemly 2002b, Hamilton 2004), and USEPA has begun a review/revision process for their national freshwater criterion (USEPA 1998, Hamilton 2003). Moreover, based on broad experience dealing with a variety of selenium contamination issues, including coal mining wastes, the U.S. Fish and Wildlife Service and a number of state water quality agencies have adopted a value of 2 µg/L as their management or regulatory standard (see Engberg et al. 1998, Skorupa 1998b, Hamilton and Lemly 1999). I recommend that 2 µg /L be adopted as the maximum acceptable concentration of selenium in wastewater, drainage, and leachate associated with coal mining activities in West Virginia.

Comprehensive Assessment

By examining the results of the leach tests and applying a 2 µg Se/L water quality objective, field sites whose disturbance by mining would pose a hazard to aquatic life can be quickly identified. If clear dangers are evident — i.e., leachate selenium concentrations exceed 2 µg/L — then it is desirable to examine the operational characteristics of the proposed mine in the context of a 5-step comprehensive assessment that includes provisions for altering mine operations, establishing TMDLs for discharges and, in one scenario, not permitting the proposed mine to be developed at all (see page 5). This approach will allow site-specific hazard evaluation based on local hydrology and biological conditions, and provide a precise fine-tuning of the screening-level assessment generated by the leach tests. The methods used for hydrological, biological, and hazard assessment are techniques that have been field tested and published in the peer-reviewed literature (Lemly 2002b). Technical guidance is available for those unfamiliar with specific components of the procedure (email contact: dlemly@vt.edu).

4

Comprehensive assessment will provide the information necessary for policy makers to reach environmentally sound, scientifically defensible decisions on mine permit applications.

PRE-MINE ASSESSMENT OF SELENIUM HAZARDS

1. GEOLOGICAL ASSESSMENT
▽
Selenium content of coal and overburden
▽
Leachate test
▽
Selenium mobility characterization
▽
2. MINE OPERATION ASSESSMENT
▽
Waste disposal methods
▽
Waste volume projection
▽
Daily selenium load projection
▽
3. HYDROLOGICAL ASSESSMENT
▽
Delineate and characterize Hydrological Unit (HU)
▽
Estimate selenium retention capacity of HU
▽
Projected selenium concentrations
▽
4. BIOLOGICAL ASSESSMENT
▽
Aquatic life present in HU
▽
Sensitivity to selenium
▽
Priority species
▽
5. HAZARD ASSESSMENT
▽
Determine hazard level of projected selenium concentrations

▽	▽
High, moderate, or low hazard	Minimal or no hazard
▽	▽
Determine allowable selenium load (TMDL)	Mining is permissible
▽	
Identify mine operations needed to meet load	
▽	
Evaluate feasibility of mine in meeting environmental goals	

▽	▽
Environmental goals met	Goals not met
▽	▽
Mining is permissible	Mining is not permissible

References

Cumbie, P.M., and S.L. Van Horn. 1978. Selenium accumulation associated with fish mortality and reproductive failure. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 32: 612-624.

Davis, E.C., and W.J. Boegly, Jr. 1981. Coal pile leachate quality. *Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers* 107: 399-417.

Desborough, G., E. DeWitt, J. Jones, A. Meier, and G. Meeker. 1999. *Preliminary Mineralogical and Chemical Studies Related to the Potential Mobility of Selenium and Associated Elements in Phosphoria Formation Strata, Southeastern Idaho.* U.S. Geological Survey Open File Report 99-129. USGS, Denver, CO.

Dreher, G.B., and R.B. Finkelman. 1992. Selenium mobilization in a surface coal mine, Powder River Basin, Wyoming, U.S.A. *Environmental Geology and Water Science* 19: 155-167.

Engberg, R.A., D.W. Wescot, M. Delamore, and D.D. Holz. 1998. Federal and state perspectives on regulation and remediation of irrigation-induced selenium problems. Chapter 1 (pages 1-25) in W.T. Frankenberger, Jr., and R.A. Engberg, editors. *Environmental Chemistry of Selenium.* Marcel Dekker, Inc., New York, NY.

Frankenberger, W.T., Jr., and R.A. Engberg. 1998. *Environmental Chemistry of Selenium.* Marcel Dekker, Inc., New York, NY.

Hamilton, S.J., and A.D. Lemly. 1999. Water-sediment controversy in setting environmental standards for selenium. *Ecotoxicology and Environmental Safety* 44: 227-235.

Hamilton, S.J. 2003. Review of residue-based selenium toxicity thresholds for freshwater fish. *Ecotoxicology and Environmental Safety* 56: 201-210.

Hamilton, S.J. 2004. Selenium toxicity in the aquatic food chain. *Science of the Total Environment* (in press).

Heaton, R.C., J.M. Williams, J.P Bertino, L.E. Wangen, A.M. Nyitray, M.M. Jones, P.L. Wanek, and P. Wagner. 1982. *Leaching Behaviors of High-Sulfur Coal Wastes From Two*

Appalachian Coal Preparation Plants. Technical Report LA-9356-MS. Los Alamos National Laboratory, Los Alamos, NM.

Heaton, R.C., and P. Wagner. 1983. *Trace Element Characterization of Coal Preparation Wastes*. Technical Report LA-9626. Los Alamos National Laboratory, Los Alamos, NM.

Lemly, A.D. 1985a. Toxicology of selenium in a freshwater reservoir: Implications for environmental hazard evaluation and safety. *Ecotoxicology and Environmental Safety* 10: 314-338.

Lemly, A.D. 1985b. Ecological basis for regulating aquatic emissions from the power industry: The case with selenium. *Regulatory Toxicology and Pharmacology* 5: 465-486.

Lemly, A.D. 1997a. Ecosystem recovery following selenium contamination in a freshwater reservoir. *Ecotoxicology and Environmental Safety* 36: 275-281.

Lemly, A.D. 1997b. Environmental implications of excessive selenium. *Biomedical and Environmental Sciences* 10: 415-435.

Lemly, A.D. 1999. Selenium impacts on fish: An insidious time bomb. *Human and Ecological Risk Assessment* 5: 1139-1151.

Lemly, A.D. 2002a. Symptoms and implications of selenium toxicity in fish: The Belews Lake case example. *Aquatic Toxicology* 57: 39-49.

Lemly, A.D. 2002b. *Selenium Assessment in Aquatic Ecosystems: A Guide for Hazard Evaluation and Water Quality Criteria*. Springer-Verlag Publishers, New York, NY.

Lemly, A.D. 2004. Aquatic selenium pollution is a global environmental safety issue. *Ecotoxicology and Environmental Safety* (in press).

Maier, K.J., and A.W. Knight. 1994. Ecotoxicology of selenium in freshwater systems. *Reviews in Environmental Contamination and Toxicology* 134: 31-48.

Peterson, J.A., and A.V. Nebeker. 1992. Estimation of waterborne selenium concentrations that are toxicity thresholds for wildlife. *Archives of Environmental Contamination and Toxicology* 23: 154-162.

Skorupa, J.P. 1998a. Selenium poisoning of fish and wildlife in nature: Lessons from twelve real-world examples. Chapter 18 (pages 315-354) in W.T. Frankenberger, Jr., and R.A.

Engberg, editors. *Environmental Chemistry of Selenium*. Marcel Dekker, Inc., New York, NY.

Skorupa, J.P. 1998b. Selenium. Pages 139-184 in P.L. Martin and D.E. Larsen, editors. *Guidelines for interpretation of the Biological Effects of Selected Constituents in Biota, Water, and Sediment*. National Irrigation Water Quality Program Information Report No. 3. U.S. Department of the Interior, Denver, CO.

Vance, G.F., R.B. See, and K.J. Reddy. 1998. Selenite sorption by coal mine backfill material in the presence of organic solutes. Chapter 15 (pages 259-280) in W.T. Frankenberger, Jr., and R.A. Engberg, editors. *Environmental Chemistry of Selenium*. Marcel Dekker, Inc., New York, NY.

USEPA (US Environmental Protection Agency). 1998. *Report on the Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation*. Publication EPA-822-R-98-007. USEPA, Washington, DC.