Preliminary Comments from Members of the Chartered SAB on the report, *Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*

List of comments received as of 1/18/11

Comments from lead reviewers

Comments from Dr. Claudia Benitez-Nelson

Comments on the SAB Mountaintop Mining Review of the Agency's draft report on "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams."
The Science Advisory Board had provided a number of detailed and constructive recommendations for improvement of the EPA's draft report on "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams." When reading the initial report, I had a number of concerns regarding the definition and applicability of conductivity measurements, issues related to regional differences in conductivity ranges, the focus on insects for setting criteria, and the use of extirpation in setting limits. I am very pleased to note that all of these concerns were thoroughly addressed by the SAB review panel. These comments will greatly increase the effective use of conductivity as an indicator of MTM-VF environmental impacts and the applicability of field-based studies in establishing other pollutant markers.

In response to specific Quality review questions:

1. Are the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

   Yes. I would like to commend the SAB Review Committee for their detailed and constructive comments in addressing each of the eight charge questions. These comments include, but are not limited to: better descriptions of what contributes to conductivity in these regions and linkages between specific ions and extirpation, a more explicit discussion of confounding factors, caution in focusing on macro-invertebrates, and a more detailed discussion of data analysis and uncertainty.

2. Are there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report?

   Yes, minor comment:

   Page 20, 2nd bullet, a reference appears to be missing.

3. Is the Committee's report clear and logical?

   No, minor comment:

   Page 29, Last para. The SAB Review explicitly states as an example that the application of conductivity should only be limited to those regions dominated by the salts of sulfate and bicarbonate. Yet the SAB review clearly shows in Table 1 and in pages 17-18 that even this assertion for the region of interest is incorrect. In order to ensure clarity, I suggest that an additional caveat that highlights this error be stated here in order to stress this critical point.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes. The SAB Review Committee provides a number of examples and references supporting their suggestions for modification of the report. The criticisms are very well reasoned and appropriate.

Comments from Dr. John Giesy

A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.

Questions
Response to quality review questions:

1. *Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?*

Yes. The report is well organized and well written. It is concise and to the point and gives excellent guidance to EPA

2. *Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?*

Yes. The US EPA requested the SAB to review the report and in that request directed the SAB to comment on specific aspects of the report. The SAB panel has addressed all of issues requested by the EPA.

The SAB panel did not address the use of multivariate statistical methods to address this issue. It is unclear why these methodologies were not used by the EPA and why this gap was not addressed by the SAB panel. While approaches such as multiple linear regression, principle components analysis and canonical correlations, factor analyses and partial correlations might, in the end be deemed inappropriate, I suggest that the panel consider making reference to multivariate statistical analyses. At a minimum, the EPA should be encouraged to present the results of the analysis that lead them to not consider these techniques. A section discussing the strengths and weaknesses of these methods should be added to the EPA report and a justification provided to explain why they were not applied and the less transparent method of data screening and selection used. The panel alludes to this in section 3.4 when pointing out that the data selection process will be one of the most controversial sections of the EPA report. I suggest that the end of section 3.4 of the report can be augmented to give more guidance on how EPA can address the issue of confounders more directly in the predictive model.

The emphasis the panel placed on a greater emphasis on the specific constituents of conductivity is “right on”. The request for a better justification of the method through a more rigorous discussion the physiological mechanisms of tolerance of invertebrates to the constituents of conductivity is especially appropriate guidance.

3. Is the Committee’s report is clear and logical?

Yes. The report is very well written and there are few errors in grammar or syntax. In my marked-up version of the report I have marked a few issues to be addressed. Better attention to topic sentences would improve some sections of the report. Some references are still missing.

. There is no such word as “percentile”..The correct term is “centile”. One would not use the term “perquatril” instead of “quartile” so do not use “percentile”. The confusion comes from using terms like rates per centile which is abbreviated as 5 per cent or 5 percent (%), which is the number occurrences per 100 (cent). Change percentile to centrile throughout the report.

4. *Are the conclusions drawn or recommendations provided supported by the body of the Committee’s report?*

Yes.

In the last section of the report, when addressing charge question 7, the panel seems to endorse the application of the SSD approach to other stressors. While the panel places several caveats on the application of the field-based SSD approach to other types of stressors, I do not think it goes far enough. It is highly unlikely that the approach will be successfully applied to determining field-based thresholds for other chemical pollutants. Some of the primary reasons for this are: the incomplete characterization of the residues present, interactions among residues, additive, supra-additive, infra-additive etc, speciation. What might be possible would be a field-based approach that includes aggregation and correction for interactions and speciation. I think that this section of the report is important and can be expanded. I would be concerned that based on the apparent endorsement of the panel for the transportability of this method that it will be applied to other locations or residues. The method is much less likely to be successful if applied to a residue such as cadmium. The experience obtained by researchers trying to apply similar methods to sediments could be used here as a “cautionary tale”. This is an important section of the report and should either be expanded or not addressed. This section reads like the panel was loosing momentum after dealing with the central issues of conductivity and MTM-VF issues in a restricted geographic region. I think that this final charge question does not follow well with the other charge questions and should be the subject of a separate panel that would focus on this single issue. Because it was sort of a final “what about this” question and not central to the US EPA report of the panels critique of the report, it was not handled in sufficient detail to be useful. As it is the panel seems to endorse the idea of applying the method to other stressors in other situations where it is not likely to be successful. I think that this is due to the fact that this was not a central question and the panel did not have the time to explore it more deeply. This section needs to be reevaluated and I suggest that the panel consider stating that this charge question was beyond the scope of what was reasonable relative to what was provided to the panel and should be the focus of a separate SAB panel.

Comments from Dr. Amanda Rodewald

Field-based aquatic life benchmark for conductivity in Central Appalachian streams

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

No, but I have several comments for the committee to consider.

As expressed by the committee, use of extirpation of genera as an effects endpoint raises many concerns. Indeed on page 2, lines 17-19 (and again on page 12 lines 14-16), the committee remarks that "the complete loss of a genus is an extreme ecological effect and not a chronic response. Thus, a benchmark based on extirpation may not be protective of the stream ecosystem". I agree with this assessment. However, if this was the committee's opinion, it seems then that the language should be stronger, not simply requesting further consideration but perhaps stating that it is not an appropriate endpoint.

The early statement that genera extirpation is an extreme effect and not a chronic response seems inconsistent with the subsequent discussion of the endpoint on page 24 (esp lines 31-40), where the committee recommends that the agency "might consider incorporating into the endpoint a safety factor, subject knowledge, or some other protocol for added protection". My impression from the initial statements was that the endpoint was, in the end, not very appropriate. In contrast, the latter statements suggested to me that the metric needed to be slightly modified.

The use of genera extirpation also does not seem to match the intent expressed in the original report (e.g., p. xxii of Executive Summary), where the authors assert that the benchmark will avoid loss of 95% of native species. The endpoint is at the genus-level, not species. The loss of species-rich genera could easily result in higher species-level losses.

On page 24, line 7, the committee correctly notes that the laboratory-based SSD analyses overlook concepts of "synecology". The authors might explain in more lay terms (e.g., how certain species interactions are critically important, such that there are occasions where the loss of a single species can result in cascading losses of others).

On page 21, the committee addressed potential confounding factors. On lines 34-36, they implied that most public comments were related to confounding factors and their treatment "may well be one of the most critical parts of the benchmark report". I agree. However, I was surprised to see fairly light discussion and recommendations (p 22). Can the committee be more specific in their recommendations?

3. Is the Committee's report is clear and logical?

Yes.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes.

Comments from Dr. James Sanders

1. Were the original charge questions to SAB Ad Hoc Committees adequately addressed?

Yes. The panel was asked to address eight questions concerning the draft report, and all were addressed to a considerable extent. The review was thoughtful and constructive. I do have some general comments below.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

I have some concerns with the findings and the way that the Panel addressed areas of concern. It is not my responsibility to review the EPA report here, and I will not do so. However, I have concerns about two aspects of this work and whether the Panel's recommendations are strong enough.

First, the Panel correctly point out that conductivity is at best a surrogate for the various constituent ions that are toxic. However, their comments and cautions need to be strengthened in my mind, throughout the document. This is especially the case in the letter to Administrator Jackson, which does not even state the concern, rather, it states that "Although conductivity is a surrogate...the resulting benchmark provides a degree of protection comparable to, if not greater than..." The letter should clearly lay out the reasons for why this surrogate measure can be misused, or has potential to not protect adequately. Language in the Executive Summary and the body is stronger, but I would argue not strong enough. I recommend that the Panel revisit these sections and give serious consideration to more cautionary wording. For example, I found the wording about this topic in the MTM-VF report to be much stronger and suggest that the discussions on p.3, lines 16-24 and p. 24, lines 16-28 in the MTM report be considered for the conductivity report.

Second, the use of loss of species as an endpoint is troubling to me. I agree with the Panel's concerns here, and wonder if they considered recommending that a much more protective endpoint be put into use? There are recommendations for a more protective endpoint in the review, but these are buried within the text for the most part. I recommend that the Panel's concern about endpoints be strengthened.

3. Is the Committee's report is clear and logical?

Yes, in general. The review is very well and clearly written.

I again recommend that the Panel revisit sections dealing with conductivity as a surrogate, and the assumptions therein. I agree with Panel recommendations that a given benchmark cannot be widely used, but must be developed for each region and subregion based upon available data on major ion (and even trace ion) constituents, and I have concerns that such benchmarks will be misused without stronger direction. The discussions on pp. 16-17 are very good, and address these concerns. Perhaps the Panel will consider moving some of these concerns and constraints higher up in their recommendations?

The Table 1 (p. 18) is very hard to read. I recommend it be reformatted and enlarged in the final version.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes. The Panel is to be commended for preparing a concise, readable review. In addition, with the exception of my comments above, the letter to Administrator Jackson and the Executive Summary are both excellent summaries of the review and its findings.

Comments from other SAB Members

Comments from Dr. Ingrid Burke

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes. The Committee's review is very thorough and addresses all of the charge questions adequately. Further, the recommendations are very logical and "wise", with large implications (the use of extirpation as an endpoint being too catastrophic, the use of particular benchmarks only being appropriate to a limited geographic area, study limited to macroinvertebrate genera, the important question about whether other indicator ions or ratios were tested, etc). I think the Committee did a great job.

One thing that could enhance the original report, and the review, would be a request for "transferable lessons" from the WV study (Charge Questions 7 and 8). While the Committee notes that the results are limited in geographic scope, it also notes that the process used to identify benchmarks could be useful elsewhere. It could be that the greatest value of the Report would be in a section (or even diagram) on "protocols for establishing benchmarks across an array of sites with different geologic and biological characteristics".

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

Not that I can see.

3. Is the Committee's report clear and logical?

It is very clear and logical.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes.

Comments from Dr. Terry Daniel

General comments

Quality Review Questions

1. YES: The original 8 charge questions to the SAB Panel reviewing the EPA Conductivity Benchmark method report were adequately addressed;
2. NO: There do not appear to be any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's review;
3. YES: The Panel's report is clear and logical;
4. YES: The conclusions drawn and the recommendations provided are supported by the body of the Panel's review.

Some specific/editorial comments

Letter to Administrator

However, we caution the Agency not to apply the conductivity benchmark beyond the environmental conditions (e.g., geographic region, relative composition—or ionic signature—of the ions that make up total conductivity) for which it has been validated.

[In the executive summary this idea is represented by "Further, the Panel recommends that the benchmark value not be applied to other areas of Ecoregions 69 and 70 beyond the boundaries of the geographic coverage of the current data set, without additional validation." The executive summary version seems a more restrictive criterion for generalization than the version in the letter.]

Executive Summary

P1

Using field measures of the presence or absence of macroinvertebrate (insect) genera and conductivity, the Agency calculated the conductivity concentration below which 95% of occurrences of a genus were observed. This value was termed the extirpation concentration (XC95) because the genus was effectively not found in areas where conductivity exceeded that concentration.

[The benchmark conductivity criterion is very complex and this reader never did quite work out what it is. For example, are the reported probabilities (percents) based on counts (none, one or some) of individual animals, individual species or individual genera at a given sample site with a measured conductivity?]

P 2

A depletion concentration, defined as the level of a stressor that results in a specified reduction in abundance, may be a more appropriate endpoint than extirpation for development of a conductivity benchmark.

[Were appropriate counts of individuals recorded in the WV/KY studies, or only presence-absence data viz. the specified genera? That is, can the existing data be used to test the proposed more stringent criterion?]

Although the WV database did not include fish, amphibians, or long-lived macroinvertebrates such as mollusks, it would be instructive to compare the differential response to conductivity among organisms such as these where possible. Rare species also were excluded from the analysis. Rare species often are among the most sensitive taxa in a community, and their elimination from the data pool could skew the results towards more tolerant organisms.
[Could the existing data (the WV/KY data) support tests to determine whether the suggested measures result in different conductivity criteria? If not, does the panel suggest that EPA proceed to employ the extirpation criterion for now and start new research to improve the methods, or must implementation await the new research?]

Body of the Review

P 5
Charge Question 2: The derivation of a benchmark value for conductivity was adapted from EPA's methods for deriving water quality criteria. The water quality criteria methodology relies on a lab-based procedure, whereas this report uses a field-based approach. Has the report adapted the water quality criteria methodology to derive a water quality advisory for conductivity using field data in a way that is clear, transparent and reasonable?
[Did the EPA report present any direct comparisons between results of the WV/KY field method and results from appropriate lab methods? How confident is the SAB panel of the superiority of the field method, and is there any direct evidence to back that up? Should the support for the field method be characterized more in terms of "clear, transparent and reasonable" (i.e., do field methods produce data/information that better meets these criteria than lab methods) as presented in the charge question?]

P 4
a common regional generic (?) pool

P 10
Furthermore, the figure caption is misleading, and should be revised to note that data used to develop the benchmark are from the WV portion of Ecoregions 60 and 70, not from the full ecoregions (which span the states of PA, KY, TN, WV and MD).
[should this be 69?]

Fig 3
[Better matching of the x- and y-axis scales would more clearly show the differences in effects of conductivity.]

P 14
Accepting a loss of 5% of genera could have the effect of eliminating entire groups of related species that are vulnerable to 9 elevated concentrations of particular dissolved ions for mechanistic reasons particular to their 10 taxa.
[Is this consistent with the prior statements of the conductivity criterion? I read the earlier versions as indicating "less than 5% of the occurrences of a given genus," not 5% of all genra.]
P 23

how is the interval reported for the benchmark (confidence interval of 95-305 µS/cm about the benchmark of 300 µS/cm) derived?
[In paragraph 1 of the SAB review the CI is given as "225 to 305 µS/cm."]

A summary/conclusion paragraph would be very useful. This is a long and winding review, sometimes supporting and sometimes not the EPA method, so the reader is left at the end with a "so what?" question. Should the EPA apply the described conductivity method or not? What changes are needed to make it useful now? What new research is recommended to support improvements in the future?

Comments from Dr. George Daston

1. Were the original charge questions adequately addressed?

I believe that the charge questions have been adequately addressed. The one charge question that I would have liked to have seen addressed in greater detail is question 3, which asks about the level of scientific support for a causal link between conductivity and genera loss. While I think the Committee's response is a good one, I would like to see the committee ask for more research on what aspect(s) of conductivity are responsible for the effects. While it is likely that more than one component is important (including total osmotic load), it would be helpful to know whether there are particular components that are more or less problematic. Having such information would make the method more generally applicable to other sites, even those that do not have the same ionic composition.

2. Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

I did not note any technical errors or omissions. I found the Committee's report to be thorough.

3. Is the Committee's report logical and clear?

I found the report to be logically presented and easy to follow. There was good consistency between the body of the text, the Executive Summary and the cover letter.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

I believe that the Committee's conclusions and recommendations are supported by the text.

Comments from Dr. Costel Denson

A General (Minor) Comment

The **Executive Summary** is well written, and clear. It might be a bit easier, however, to capture its essence were the charge questions to be stated specifically, along with the related comments. (Please see the Executive Summary for the MM and VF report)

Were the original charge questions to the SAB committee adequately?

Eight charge questions were presented to the SAB committee for its review. The committee addressed each of these questions adequately and in considerable detail, providing useful insight and recommendations in every case.

Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the committee's report?

None that was obvious to this reviewer. However, some of what is discussed is outside this reviewer's area of expertise.

Is the committee's report clear and logical?

The committee's report is laid out in a clear and logical way. Each charge question is presented and discussed, and the associated recommendations are presented with that particular question.

Are the conclusions drawn or recommendations provided supported by the body of the committee's report?

The conclusions that are drawn and the recommendations that are provided are judged to be supported by the body of the report.

Comments from Dr. David Dzombak

Comments of David Dzombak on SAB Review of EPA's "Draft Report on A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams

1. Comment on whether the original charge questions to SAB Standing or Ad Hoc Committees were adequately addressed.

   The charge questions were adequately and comprehensively addressed.

2. Comment on whether there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report.

   I found no technical errors or omissions in the report, or issues that were inadequately addressed.

3. Comment on whether the Committee's report is clear and logical.

   The report is very detailed and it is clear that the Committee put a great deal of thought into their responses to the charge questions. The report is organized according to the eight charge questions and is easy to follow. I have some specific suggestions to improve the clarity of parts of the body of the report which are given below. Comments on and recommendations pertaining to the letter to the Administrator and the Executive Summary are given in my comments under (4).

   (a) Page 13, lines 33-39: I suggest that the text be revised to respond more directly to the specific charge question asked. Also, in line 34 I recommend that "perfect" be replaced with "ideal" or "optimum."
   (b) Page 13, line 40: I recommend that "perfect" be replaced with "ideal" or "optimum."
   (c) Page 19, lines 7-10: In these important introductory overview comments, the Committee's summary answer to the charge question should be provided.
   (d) Page 22, lines 29-36: In these important introductory overview comments, the Committee's summary answer to the charge question should be provided.
   (e) Page 25, lines 28-31: The parentheses should be removed, and the important statement within should be incorporated into the main text of the paragraph. Much of the rest of the response to the charge question goes on to discuss significant limitations to transferability of conductivity benchmarks to other regions.

4. Comment on whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.

   The main conclusions drawn and recommendations made as presented in the letter to the Administrator and the Executive Summary are supported by the body of the Committee's report.

The letter to the Administrator brings out the main conclusions and easy to follow. The letter does not explicitly list the specific charge questions, which is appropriate considering that there were eight charge questions.

The Executive Summary does not explicitly list the specific charge questions, and it should, especially because of the very specific nature of the eight charge questions given to the Committee for this particular review. The organization of the main body of the report is by charge question, and the Executive Summary is also organized in this manner but without listing the charge questions explicitly. An Executive Summary should read like a mini-version of the entire report (this is what distinguishes and ES from an Abstract). Thus, the charge questions should be listed explicitly. Further, a reader knowledgeable about SAB processes and role who reads only the Executive Summary of an SAB report wants to know what charge questions are being addressed.

Comments from Dr. James Johnson

1. Were the original charge questions to SAB Standing or Ad Hoc? Committees adequately addressed?

   The original questions were thoroughly addressed.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

   None that I could detect.

3. Is the Committee's report is clear and logical?

   Yes.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

   Yes.

Comment:

The panel's review comments are about the same length as the document reviewed. This is indicative of the thoroughness of the panel. It also suggests to me the need for greater guidance in the preparation of documents sent to the SAB and/or in the preparation of panel review documents.

Comments from Dr. Bernd Kahn

Both reports are well written, and my responses to the quality review questions for both are yes, no, yes, and yes, respectively.

Minor comments for the Field-based Conductivity report are:
p.1, l.8: For the benchmark conductivity value of 300, the upper-95% confidence bound of 305 appears strangely close.
l.13-15: Not clear why any value below 95% occurrence of a genus is defined as 'extirpation'?
p.3, l.16: By what metrics is 'amount' reported?
p.11, Fig. 3: Why the distinction between micromhos and microSiemens?
p.20, l.30: Reference is missing.

Comments from Dr. Agnes Kane

Aquatic Life Benchmark for Conductivity

This is a clear, succinct review of the Agency's draft report that thoroughly addresses all of the charge questions. There are no technical errors or omissions and the recommendations to strengthen the scientific basis are appropriate. The SAB panel was cautious about applying this benchmark to other geographic regions. The concerns expressed by the panel are very important and should be discussed in detail in the Agency's revised report. The recommendation to address organics, trace metals, and trace minerals is also very important. Overall, this is an excellent SAB report.

Comments from Dr. Madhu Khanna

Comments on the Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

   The charge questions appear to have been adequately addressed.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

   This is outside my area of expertise and thus I am not able to comment on technical errors

3. Is the Committee's report is clear and logical?

   Yes

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

   The report is comprehensive and the conclusions are supported by the body of the report

Comments from Dr. Nancy Kim

Comments on the Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams

1. Were the charge questions adequately addressed?

Yes.

2. Are there any technical errors or omissions in the report or issues that are not adequately dealt with?

None that I noticed.

2. Is the report clear and logical?

Yes. However, I could not determine what the Panel's overall recommendation is. For example, the letter to the Administrator applauds the Agency's efforts in the third paragraph and lists some good qualities of the approach. The next paragraph questions the report because the benchmark was based on the effect that "was defined as a loss of an entire genus from a region and was based only on common taxa." That paragraph goes on to list other serious concerns. The report expands upon those concerns. Are the concerns so serious that the Panel is recommending that EPA start over or are these areas of uncertainty that should be added to or emphasized in the report? This same issue arose with some of the responses to other charge questions in that the concerns seemed major, but I wasn't sure what the Panel's recommendation was to EPA.

3. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes.

Comments

1. The graphs in Figure 3 have very different scales and units. The graphs on the left hand side have y axes that go from 0 to 0.3 or 0.6 while the y axes on the right hand side go from 0 to 1. The units for the x axis differ (uS/cm versus umhos/cm). Since I am not familiar with this literature, comparing the graphs on the right hand side to those on the left hand side was difficult. Including data or graphs adds to the Panel's report; could these graphs be redone to make them easier for someone to interpret if they have limited knowledge in this area?

Minor comments.

Letter to the Administrator.
Page 1, line 32. The sentence uses the phrase full suite of impacts. As I read the MTM-VF report, the Panel cautioned that the report did not include the full suite of impacts (e.g. the letter

to the Administrator, last sentence of the first paragraph says cultural and aesthetic resources were not included in the review. Recommend deleting full.

Executive Summary and Report

1. Page 1, line 7. Should uS/cm be written out the first time it is used?
2. Page 14, line 23. Should TMDL be written out?
3. Page 4, line12. Is the word "conditions" referring back to the minimum data requirements in the previous sentence? If it is, suggest replacing the word conditions with requirements.
4. Page 7, line 9. The sentence uses the words "these data were deemed adequate…" It isn't clear if it is EPA or the Panel who made the decision that the data were adequate. Suggest inserting either EPA or the Panel deemed the data were adequate…

Comments from Dr. Kai Lee

I have reviewed the SAB panel reviews of the Mountaintop Mining and Aquatic Life Benchmark studies. I believe the panel has answered the charge questions. Accordingly, I would support approval of the panel reviews, unless serious concerns are raised by public commentators or in the SAB discussion in January 19. My opinions should be weighed against the fact that I have no significant expertise in the subjects discussed.

Comments from Dr. Cecil Lue-Hing

Review of SAB Mountaintop Mining Panel Draft Report on **Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.**

In its charge to the SAB, the EPA on behalf of ORD requested that the SAB review the draft report with attention directed to eight specific charge questions. To conduct this review, the SAB established a Panel on the Ecological Aspects of Mountaintop Mining and Valley Fills.

General Comments

In general, the SAB found that the use of a field-based data approach to establish a benchmark for conductivity was appropriate because of the extensive data base available for the study region, and the constraints imposed on the study, e.g. the removal of potential major confounding factors from the database. The SAB also found that while the study was well done, there were several areas where the substance of the draft report could be enhanced and offered recommendations for improvement. The SAB also cautioned that the conductivity benchmark not be applied beyond the specific geographic region for which it was developed without additional validation.

Quality Review Questions

1-Were the original charge questions adequately addressed?
The charge questions were adequately addressed including the offering of suggestions and recommendations where they were requested, and otherwise where the Panel felt that they were appropriate.

2- Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Panel's report?
It is not clear from the SAB report the extent to which the EPA report was restricted by data availability with respect to parameters such as selenium, trace metals and dissolved organic carbon which were mentioned quite frequently as deserving further attention.

3-Is the Panel's report clear and logical?
Yes, with very minor exceptions such as noted above.

4-Are the conclusions drawn or recommendations provided supported by the body of the Panel's report?
Yes. The recommendations follow from the discussions provided by the Panel's report.

Specific Comments

Transmittal Letter – page 1, line 39; the implication here is that only **insects** were studied On page 2, lines 2-3, we have **– the benchmark is based almost exclusively on data for aquatic insects. Question – Is there a need for reconciliation of these two statements?**

Executive Summary – page 3, lines 25-26; here it is not clear whether these other potential confounding factors were not included because relevant data were not available, or whether they were available but not included.

Comments from Dr. James Mihelcic

Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

I felt all 8 charge questions were addressed.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

None that I was aware of.

3. Is the Committee's report is clear and logical?

Yes

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes

Comments from Dr. Horace Moo-Young

Review of Field-Based Aquatic Life Benchmark for Conductivity in
Central Appalachian Streams

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes, the charge questions were adequately addressed.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

No technical errors were seen.

3. Is the Committee's report clear and logical?

Yes. The report is clear and logical.

4. Are the conclusions drawn or recommendations provided supported by
the body of the Committee's report?

Yes.

Comments from Dr. Eileen Murphy

Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

Yes

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

No

3. Is the Committee's report clear and logical?

Yes

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

Yes

Comments from Dr. Stephen Roberts

Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.

1. Were the original charge questions to the SAB adequately addressed?

Yes. The report is very well written and provides detailed responses to each of the charge questions.

2. Are there any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

This is not my field, so it is difficult for me to answer with confidence. It appears that all of the technical issues were addressed, however.

3. Is the Committee's report clear and logical?

Yes. The report is clear and logical.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

The basis for the conclusions and recommendations are reasonably clear from reading the body of the report.

Comments from Dr. John Vena

Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.

1. Were the original charge questions to SAB Standing or Ad Hoc Committees adequately addressed?

   Exit compliments to the Mountaintop Mining Panel for the comprehensiveness and thoroughness of their review. In my opinion each of the eight charge questions were adequately addressed.

   The charge question one response gave excellent recommendations that follow clear and logical explanations of concerns. Several areas are noted by the panel in response to charge question two where the report can be improved in clarity and Justification of the approach. In response to charge question three the panel gives a systematic assessment of two linkages for causality. The panel makes important points and recommendations are carefully presented. For charge question four excellent additions are recommended and well justified. Charge question five was answered very effectively. The panel in response to charge question six gave an excellent overview of benefits of the new approach that provided superb comments on extirpation as an endpoint. For charge question seven the panel suggested important conditions for application of the method to a new region. Important caveats were noted in response to charge question 84 ply method to other pollutants.

2. Are there are any technical errors or omissions in the report or issues that are not adequately dealt with in the Committee's report?

   To my knowledge there are no major technical errors or omissions.

3. Is the Committee's report is clear and logical?

   The cover letter is concise and the bulleted text very effectively highlights the major recommendations. The letter captures the sentiments of the full review report.
   The executive summary is well done and provides an excellent overview of changes in recommendations to the report based on responses to each of the charge questions.
   In the executive summary it would be helpful to the reader to state how each section relates to the response of each of the charge questions.

4. Are the conclusions drawn or recommendations provided supported by the body of the Committee's report?

   In my opinion the report is well written, comprehensive in responses to the charge questions and is well referenced.

Comments from Dr. Thomas Zoeller

The following comments are provided in response to the 12/28/2010 memo by DFO Dr. Tom Armitage concerning the Quality Review of the SAB workgroup's document of 12/28/2010 entitled, *"Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams"*. This memo asked contributing SAB members to specifically address the four quality review questions from the vantage point of our own expertise. These questions are:

1. whether the original charge questions to SAB Standing or Ad Hoc Committees were adequately addressed;

2. whether there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report;

3. whether the Committee's report is clear and logical; and

4. whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.

Overall, the SAB review of EPA's draft report is thorough and well organized. However, the cover letter to the Administrator is not clear to this reviewer. Specifically, in the first paragraph of the second page of the letter, the SAB panel begins to articulate their concerns about specific issues of the report and about the approach. This needs to be more fully developed because currently it is not understandable. It should be possible to articulate why the committee had concerns about these weaknesses without going into too much detail. Perhaps a problem was that with 8 charge questions, it might be difficult to address these in the cover letter without becoming bogged down in details. However, the most important should be addressed. This lack of clarity does not appear in the Executive Summary or in the body of the review document.

Quality Charge Question #1 - whether the original charge questions to SAB Standing or Ad Hoc Committees were adequately addressed:

The review document itself is very well organized and appears to be thorough and comprehensive. The discussion of each charge question within a chapter or section of the report makes this document very responsive to the charge and the discussion appears to be clear and focused.

Quality Charge Question #2 - whether there are any technical errors or omissions in the report or issues that are inadequately dealt with in the Committee's report:

This reviewer did not detect any overt technical errors or issues that were incompletely or inadequately addressed. It is not possible to determine fully whether omissions were made, but there were certainly no omissions relative to the original charge questions themselves.

Quality Charge Question #3 - whether the Committee's report is clear and logical:

This is not my area of expertise, but the writing was clear and logical enough that I could follow easily. Overall well done.

Quality Charge Question #4 - whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report:

The conclusions were not well articulated in the cover letter, but the conclusion derived for each charge question was well supported by the discussion in the document.