

**Summary Minutes of the  
U.S. Environmental Protection Agency  
Science Advisory Board  
Quality Review Committee (QRC)  
Public Teleconference Meeting  
1:00 pm – 2:30 pm (Eastern Time)  
August 18, 2004  
Draft Report on the Environment**

Meeting Location: Room 3704 USEPA Woodies Building,  
1025 F Street NW, Washington, DC 20004

**PURPOSE:** The Quality Review Committees (QRC) for the review of the draft Science Advisory Board Committee report on EPA's *Report on the Environment 2003* met to conduct a public telephone conference review on August 18, 2004 from 1:00 – 2:30 pm. Attachment A is the Federal Register notice announcing the meeting (69 FR 48230, August 9, 2004). A meeting agenda is included as Attachment B and a Roster as Attachment C.

**LOCATION:** Participation in the teleconference was via phone for QRC members and in person by SAB Staff and some agency personnel.

**DATE AND TIME:** Wednesday, August 18, 2004. 1:00 pm – 2:30 pm Eastern Time.

**PARTICIPANTS:** The following individuals participated in this meeting: QRC Chair: Dr. Dom Grasso; QRC Members: Drs. Ellis Cowling, Kenneth Cummins, James Galloway, Genevieve Matanoski, Deborah Swackhamer; Review Panel Chair: Dr. Virginia Dale; SAB Staff: Mr. Tom Miller; Kathleen White (SAB Staff), Thomas Armitage; and EPA Staff: Denice Shaw (ORD), Ethel Brendt (OEI), and Julie Damon (ORD). Members of the public included: Pat Casino of General Electric, Ethel Brent, and Derek Swick (API). See Attachment D for the sign in sheet and Attachment E for the Panel's draft report.

**MEETING SUMMARY:** The Teleconference followed the agenda (Attachment B). A summary of the Teleconference follows.

1:00 pm	<u>Convene the Teleconference Call</u>	Mr. Thomas Miller, Designated Federal Officer
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Convene the Meeting and Introductory Remarks - Mr. Thomas Miller, QRC Designated Federal Officer (DFO) opened the meeting at 1:03 pm and took a roll-call of the members, followed by asking other participants to introduce themselves. Mr. Miller gave an overview of teleconference procedures and then outlined the purpose of the meeting. Mr. Miller noted that the meeting was being conducted consistent with FACA requirements but that the meeting being a substantive editorial review was actually a non-

FACA meeting. He noted that the QRC's purpose was to review the report and make a recommendation to the Board for its disposition of the report during its own publicly held FACA meeting (in this case on September 14, 2004).

1:05 pm      Welcome

Dr. Domenico Grasso,  
Chair QRC

Introduction of the Chair: Dr. Grasso then provided introductory comments noting that use of QRC's to review Draft SAB Committee Reports was directed by the SAB in its reorganization plan during 2003. The QRC looks at reports to see if they are clear and logical, responsive to the agency charge, contain technical errors, and whether the report's conclusions are supported by the body of the report. Dr. Grasso introduced Dr. Dale who Chaired the SAB review of the EPA ROE 2003.

Introduction to the Report on the Environment 2003 Review: Dr. Dale introduced the topic by noting that the Panel reflected the diversity of topics that were covered by the ROE 2003. She stated that the Panel was surprised and pleased at EPA's effort to do an assessment, the first of its kind, in which it looked at both health and ecological issues together. She also stated that the Panel was surprised that EPA would not revise ROE 2003 but agreed that it was likely a more effective use of resources to go forward with future ROE's that reflect the SAB comments that are in the Panel's draft report. She believes the future for such reports will be good if they do consider the comments of the Panel. She noted that the Agency has very limited resources to conduct these reviews. The Panel advised on some reorganization of the ROE and the need to early on explain the rationale for the report. She also suggested the ROE needed to consider some regional assessments as well as the national perspective. That would permit comparisons. She stated the Agency report largely relied on existing analyses and that in the future they should incorporate new analyses with statistical rigor. The Panel also suggests that the report be made more user friendly.

#### Review of the Draft Report

Review Panel – SAB Panel on EPA's Report on the Environment

Current Chair - Dr. Virginia Dale, ORNL

Designated Federal Officer (DFO) - Dr. Thomas Armitage, SAB Staff

Discussants - Drs. Deborah Swackhamer, Genevieve Matanoski, Kenneth Cummins, James Galloway, Ellis Cowling

**a) Dr. Ken Cummins** detailed comments are in Attachment F to these minutes. During the telephone conference Dr. Cummins noted his very strong support of the agency effort and the review panel's report. He emphasized the following points:

- i) The Agency's decision to not revise the draft ROE 2003 actually makes this SAB activity an Advisory rather than a Review. The fact that there is not to be a revised ROE 2003 indicates the need for the SAB to be involved in a review of the next ROE document. He asked that the draft

Panel report ask the Agency to clarify its intent and commitment to develop future ROEs.

ii) The SAB EPEC 'report card guidelines' did not seem to be noted prominently in the ROE or the draft Panel report.

iii) He suggested that the draft Panel report note the value of using the "space-for-time substitution" tool in establishing time patterns.

iv) Dr. Cummins suggested that the draft Panel report clearly call on the Administrator to commit to providing staff and resources to sustain future ROE efforts.

v) Dr. Cummins suggested that the report advise the Agency to include some information on Global Climate Change.

Dr. Dale's Response noted that:

i) the Panel was also surprised at first that the ROE 2003 was to remain a draft but that after discussion the Panel was positive in its opinion to support EPA's expressed intent to do a second ROE that is now planned for release in 2006 – this is a better use of scarce resources at EPA. The "draft" wording will remain with ROE 2003 to ensure people do not loose sight of that issue. The draft Panel report will clarify this point.

ii) the EPEC report card guidelines were in fact discussed in the ROE and the panel report. EPEC also consulted with EPA personnel responsible for ROE and their Report Card was discussed during that consultation. The draft Panel report will clarify this point.

iii) the draft Panel report will clarify the value of the space-for-time substitution tool issue.

iv) the letter to the Administrator and the report will clearly call for EPA to commit the resources necessary for development of future ROEs.

**b) Dr. Ellis Cowling** reinforced Dr. Cummins comments on the ROE non-revision issue. He suggested that:

i) the SAB report strongly advise the Administrator to make the ROE a recurrent assessment and that this term be used to emphasize the need for the assessment to be done repetitively and that the staff and funds to permit this be provided.

ii) the SAB Panel's report should always "track" with ROE 2003 so that readers will know of the limitations to ROE 2003.

Dr. Dale agreed with both of these recommendations and will add the dimension of his first recommendation to the clarification discussed above in relation to Dr. Cummins similar recommendation. She will use the term suggested as it fits into the letter and the report itself. She also agreed to the comment suggesting that the SAB report be carried alongside of ROE 2003 for the stated purpose.

c) **Dr. James Galloway** agreed that the review Panel had done an excellent job. He noted that future ROEs should be much improved if the Agency does take the SAB Panel's advice into consideration as it develops those reports. His specific comments are included in Attachment G. He emphasized the following points:

- i) The report would become quite large and require a more complex process to develop if the Panel's advice is taken. He wondered if the Agency would be able to do so.
- ii) The draft Panel report suggests that ROE should not link environmental and health conditions to specific policies unless there is a clear link between the two and that the ROE should not specify policy solutions to problems. He agrees with both but points out that it is difficult to define what is a "clear relation" and what is not.
- iii) The ROE focuses mostly on the area within and immediately adjacent to the U.S. The U.S. contribution to problems with oceans is more global. The U.S. contribution to conditions is important, but it is difficult to relate changes to U.S. changes alone. Other nations also influence this issue.

Dr. Dale noted that the body of the report mentions the issue of linking environmental and health changes to specific policy actions. The draft letter can be revised by moving some of that wording from the text into the letter. The Agency does recognize the additional work that accommodating the Panel's advice will require. She suggested that the ROE could be done as a web based report and that the additional work required of the Agency could be focused on updating specific parts of the report each year and not the full ROE.

d) **Dr. Genevieve Matanoski** stated that the reviewers had done a phenomenal job. Her comments are in Attachment H. She noted the length of the letter in relation to the executive summary and noted their similarities. In addition, there is substantial detail in the draft Panel report. This, is of general interest to the Board, and guidance is to be developed on formats of reports in the future. Letters will be shorter and more focused on the Administrator's need. Multiple documents could be used in the future. One would be shorter and more general and summarize for the Administrator the important points. Another might be more detailed and longer for the technical audiences inside and outside EPA.

Her specific comments follow.

i) She supported Dr. Galloway's concerns on the issue of linking environmental and health changes to specific policies. She agrees with the idea of only doing so when the issue is clear but also sees linking trends to specific policies.

ii) It might be useful for the Agency to consider always having the ROE to be drafted.

Dr. Dale agreed that the specific vs. general issues relative to document detail was important for the Board to resolve and give guidance on in the future.

e) **Dr. Swackhamer** noted that many of her comments had been noted by those discussants preceding her on the call. She agreed that the review was excellent. Her specific comments are included in Attachment I. She emphasized the following points:

i) She agrees with the draft Panel report's recommendation on providing an integrated picture of ecological integrity. She recognizes, though, that this is an enormous task and that not all of the science is available to do this. Much science is underway in this area. The draft report could acknowledge this difficulty.

ii) She questioned the need to summarize within each section of the body of the report the conclusions that are also in the Executive Summary.

Dr. Dale agreed with the state of science on integrated indicators. The report should qualify its statement in that regard. She noted that the summarization of points made in each section was due to the length of the report and was done to assist readers. She would rather not go back and remove that redundancy. Dr. Swackhamer agreed that it was not necessary to do so.

Dr. Grasso noted that the letter and the executive summary were redundant and that it might be good to shorten the letter. The Board discussed this at its June 2004 meeting and is trending toward making the letter one and one-half pages in length and focused on the needs of the Administrator and using the executive summary as a longer form that is more directed at senior science managers. Dr. Matanoski suggested that the letter could be recast with about four major recommendations that were aimed at the Administrator and things within his control (e.g., resource allocation for future ROEs). Changing the letter now would anticipate comments that will be made later by the Board.

Conclusion of the QRC Review: Dr. Grasso called an end to the discussion and asked the DFO to poll the members for agreement. Mr. Miller asked the members to vote when called upon. He then polled the members, and all agreed to send the report forward with the expectation that the changes agreed to in this meeting be made.

Dr. Grasso adjourned the meeting.

Respectfully submitted

*/ Signed /*

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Thomas O. Miller  
Designated Federal Officer

Certified as True

*/ Signed /*

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Dr. Domenico Grasso  
Chair, ROE Quality Review Committee

## Attachment F

### **1. ROE Review – Dr. Ken Cummins 7/31/04**

On the whole, I find the draft SAB report on EPA's Report on the Environment (ROE) to be very well done. The original charge questions have all been addressed in a careful, thoughtful, and logical manner.

I have a few comments and concerns.

- 1) I find the statement on p.1 of the Review (bottom of paragraph 1) to be quite unusual: "...does not intend to revise..." So why are we "reviewing" this review? If all that will be accepted is "...advice for use in developing future ROE", then this exercise constitutes an advisory, not a review. I find this stance by EPA surprising and in conflict with the role of SAB as I see it. Clearly, SAB should have been involved when "revision" was still an option.

The statement in paragraph 2 on p. 2 of the review – "The ROE should contain an opening chapter that clearly lays out the purpose and vision of the report and sets forth the criteria for selecting the indicators and questions in the report" – is so important that it makes it very clear that having revision be out of bounds at this point is a nearly fatal flaw.

- 2) I am surprised that, throughout the report, there is no mention of EPEC's report card guidelines on ecosystem attributes which I believe can serve as a guide to organizing an approach to establishing indicators of environmental status and trends in human health as it does in ecosystem condition. The form of the EPEC document, especially the Executive Summary, can serve as a model of how such information should be communicated to the public and political and regulatory bodies.

I think this is an example of EPA's frequent failure to effectively build on past endeavors in developing future direction and initiatives. The whole area of risk assessment would be another example.

- 3) I believe it should have been made more clear that without implementation of the recommendation to allocate funds and personnel to sustain the ROE effort on a continuing basis (bullet one in the letter to Administrator Leavitt), most, if not all of the other recommendations will never see the light of day. This is particularly true of the call for the implementation of much greater statistical rigor (bullet 7 in the letter to Administrator Leavitt). Staff assignments dedicated to the task of continuing to improve and expand the ROE in the long run in clearly pivotal.
- 4) I think the statement on p. 6 (paragraph 1) of the review is either backward or needs to be made on some basis of equal footing. For example, the EPEC report provides at least as suitable guidelines for indicators of ecosystem health as those in the human health arena.
- 5) Page 7 of review under "Other Recommendations". I believe space- for- time substitution should be identified as another tool for establishing trend patterns.
- 6) Finally, I wholeheartedly endorse the call for much more and annual attention in the ROE of global climate change. We all know why EPA has bypassed this issue and it has absolutely nothing to do with good, solid science. It's time to get in the game.

## Attachment G

### **Dr. Jim Galloway's Comments:**

Subject: Review of draft SAB report entitled, "Review of EPA's Draft Report on the Environment 2003".

Date: August 11, 2004

On July 15, I was provided with the draft SAB report entitled, "Review of EPA's Draft Report on the Environment 2003" and asked to review the SAB report within the context of SAB's QRC activity. The specific questions I was asked to address were:

- a) Whether the original charge questions to the SAB Standing or Ad Hoc Committee were adequately addressed;
- b) Whether there are any technical errors or omissions, or issues that are inadequately dealt with in the Committee's report;
- c) Whether the Committee's report is clear and logical; and
- d) Whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.

#### General Comment on SAB panel review:

The SAB panel has done an excellent job in reviewing EPA's Draft Report on the Environment 2003. In general the panel has thoroughly addressed its charge questions, and my answers to the QRC's charge questions are all positive. I have made several comments on the panel's response to their individual charge questions (Item #1 above). Some of these may be more appropriate be in response to the other question to the QRC committee, but it seemed to be easier for me to put them all together.

As final note, if the panel's comments to EPA are taken seriously, future reports should be much improved. They will however, also be much longer. The Panel has suggested numerous expansions of the report, and at some point the report may become too unwieldy and the process to produce it too cumbersome. This is especially true if the report is to be issued on an annual or bi-annual basis (what is the reporting frequency?).

#### Specific Responses to the four questions to the QRC.

- a) **Whether the original charge questions to the SAB Standing or Ad Hoc Committee were adequately addressed.**

The original charge questions to the EPA panel were:

#### **Question 1**

Please comment on the approaches, processes, or frameworks used in describing the environmental status and trends and how to measure and manage for environmental results. Do you have any suggestions to enhance the scientific analysis and presentation of the information?

#### Comments:

Page 3, lines 41-42: is the ROE really the "first ever assessment of the environment in the context of human and ecological health" or is the first EPA assessment? There have been others. A recent one,

though it did not include human health, was the 2002 report on The State of the Nation's Ecosystems, from the H. John Heinz III Center for Science, Economics and the Environment, funded in part with federal funds.

Page 4, lines 19-21: the recommendation to use 'regional and local indicators where appropriate' begs the question, 'what is appropriate?'. It also has the potential to greatly increase the scope and size of the report. Perhaps another alternative is to keep the report 'national' but to use some regional examples where the data are especially compelling and the trends clear.

Page 6, lines 41-44: the committee recommends "The ROE should not attempt to link current environmental and health conditions and trends to specific policies or programs, except in cases where a policy or program is the obvious and undisputed explanation for a significant trend or status. The ROE should not suggest policy and program solutions to the problems described." I agree with the last sentence of this comment. I also agree that the ROE should only relate trends to policy when there is a clear relationship. The problem comes in defining what is a clear relation and what is not. I would hope that EPA would be encouraged to show how environmental conditions and/or trends have been altered by specific policies.

## **Question 2**

Do the discussions of indicators in the *Technical Document* accurately portray the current state-of-the-science? Are the conclusions supported by the scientific information provided given the existing data gaps and limitations?

### Comments:

Page 10, lines 16-17: Does the panel report detail at some point what the 'outdated science' topics are?

Page 10, lines 23-28: most of the topics mentioned in this paragraph concern the USA and its margins. However, the topic concerning the influence of global climate change on seawater chemistry (really it should be composition) concerns the global oceans. While the USA contribution is important it will be difficult to relate changes in USA greenhouse emissions with changes in ocean composition,

Page 10, lines 30-31: It seems to me that this would result in a significant expansion of the report and that the information will be very detailed. It will be important that this information be presented in clear and readily understandable form.

Page 11, line 18: I recommend that the word 'excellent' be removed. The panel is reviewing the EPA report and not the Heinz Foundation report.

Pages 14 and 15, Atmospheric ozone: this section is more of a tutorial than a review.

Page 17, line 29: Shouldn't EPA be working with the USGS on this?

Page 19, lines 23-29: again, EPA is being requested to add a large amount of additional topics to future versions of the report.

Page 22, lines 29-30: in future panels, if the expertise is not available, can it be obtained from outside experts?

Page 22, lines 38-46 and Page 24, lines 1-10: this material while important seems much more detailed than other comments the panel's report.

Page 25, lines 37-38: what is the basis for 'seven or fewer' chosen?

### Question 3

Conventional Agency practice has been to measure and reduce emissions and subsequent exposure to pollutants. Can you suggest how measurements for human health and ecological condition impacts resulting from environmental perturbation could be more effectively addressed?

#### Comments:

Page 27, line 23: Will the readers of the panel's report be familiar with the term 'Bradford-Hill'?

Page 27, lines 34-39: I agree that the USDA and FDA will certainly have these data sets. The broader question is to what degree is the ROE a report on EPA's environmental findings, compared to a report on the all federal agencies' environmental findings. The panel correctly, in my mind, recommends that it should be the latter, but I wonder if it beyond the scope of what EPA can do.

Page 30, lines 8-16: This is a good recommendation but again it will greatly increase the scope of the report, and will also change the nature of the question being asked from "what is the impact of US activities on US ecosystem and human health", to "what is the impact of global activities on US ecosystem and human health" and its converse, "what is the impact of US activities on global ecosystem and human health?". These are all good and important questions but they are all large questions. At some point, someone will have to decide what to include and what not to include.

### Question 4

The draft ROE focuses on indicators at the national scale. Regional indicators are highlighted in a few case studies. How useful are national indicators in presenting information on the quality of the environment? How much consistency is necessary in indicator measurements and data quality across the country? Should more detailed regional data and indicators be accommodated in a national overview of the environment, and how could these regional data be accommodated?

#### Comments:

I have no comments on this section.

### Question 5

The *Public Report* is intended to summarize the *Technical Document* for a broad, non-technical public audience. Does the *Public Report* accurately and adequately reflect the technical content, including the gaps and limitations, of the *Technical Document*?

#### Comments:

I have no comments on this section.

**b) Whether there are any technical errors or omissions, or issues that are inadequately dealt with in the Committee's report.**

Other than what is mention above, I have no additional comments

**c) Whether the Committee's report is clear and logical.**

Other than what is mentioned above, I found the report to be clear and logical.

**d) Whether the conclusions drawn or recommendations provided are supported by the body of the Committee's report.**

Other than what is mentioned above, I am satisfied with the committee's report.

## Attachment H

### 4. Dr. Genevieve Matanoski Comments

#### Letter

Page i - Line 1-3. How restrictive do you want to make this? An examination of trends may need interpretation of changes in trend based on policies. I agree that focus should not be on policies as you have stated. This is also in executive summary. In the body of the report page 6 - line 41-44, the language indicates that use of information on specific policies should be limited to trends. I would suggest that the exception there in line 43-44 be added to the other two sections.

Line 41-42. Does this mean that the human disease is a secondary result of changes in ecosystems and they omitted that concept? I have trouble understanding what are the directions from this section, line 22-42, but perhaps it would be clear if I read the original report. This paragraph is somewhat different than many of the others which suggest the deficiencies in the current approach and the advantages of the suggested new direction.

#### Report

Page 21 Line 3. States

Page 27 Section 2. The first sentence is clear. However, the last part is confusing. Using acute effects is no a "bias". It could simply be part of the potential effects. They should justify why these are preferred measures for rapid identification of change so that action can result.

Page 27 Section 4. When examining health effects related to the environment it may be important to discuss the weight of that change compared to other risk factors or confounding variables related to that health outcome. For example, if the environmental change produces effects on only 5 to 10 percent of cases but personal risk factors account for 95 percent of cases (attributable risk), the effects of environmental modification may be impossible to see. Thus, this section should also note the effects of other risk factors on the disease.

TOM: This is something we might discuss as we talk about letters and reports. In future documents, we may wish to consider how specific we are in our recommendations. Some of these items especially may become Committee specific. Then they will not carry over to new Committees reviewing the same topic as an annual ROE. It would probably be less helpful to the Agency.

## Attachment I

### 5. Dr. Deborah Swackhamer's Comments

Overall, I felt it was a thorough and excellent review of the ROE. Suggestions and comments are offered to perhaps improve the SAB report, and are organized around the questions given to the QRC members.

#### a) **Were the Charge Questions adequately addressed?**

Yes. The review appears to have been quite thorough, and organized to specifically address the charge questions.

#### b) **Are there errors or omissions, or issues not adequately dealt with, in the review?**

Specific comments follow (page number, line number)

12., 32-34: The report may wish to specifically identify the Integrated Atmospheric Deposition Network (IADN) of the Great Lakes, which has more than a decade's worth of trend data on tens of air toxics – the sampling sites were specifically chosen to represent “background” for monitoring time trends of compounds entering the Great Lakes via long range transport and are often used to represent North American “background” concentrations. The trends for these data have been extensively interpreted in the literature by both the US and Canada. I can provide these citations if they are useful to the committee.

26., lines 17-34: One of the most destructive stressors on freshwater fisheries communities is invasive aquatic species that affect food web structure and productivity at every trophic level. This may wish to be included in this discussion. The Great Lakes fisheries are mentioned as an example, and invasive species are one of the most notorious stressors of this fishery.

27., 36: add PCBs to the examples in parenthesis. I suggest this because PCBs cause so many fish consumption advisories across the nation (second only to mercury) and the clear exposure route of fish consumption by humans and environmental contaminant effects.

29., 35-45: The report may wish to specifically mention the use of NHANES results as a means of linking exposure with potential effects.

30., 20-23 (and in related summary statements): I completely agree with the report's recommendation that an integrated picture of ecological integrity is needed. I am sensitive to the enormity of this challenge, however. There are VERY few hierarchal, or integrated, indices that combine indicators in a meaningful (statistical or otherwise!) manner – this is a subject of intense debate and current research, and answers are few and far between at the moment. I suggest some acknowledgment of the difficulty of this – for example, while the conceptual figure offered by the report (p. 31, Figure 1.0) is sound, I know of no accepted mechanisms to produce a quantitative measure of the third column, “Synthesis of Ecological Health”.

35., 13: The report of SOLEC 2003 is finalized and this citation should be added to the 2001 reference.

#### c) **Is the review clear and logical?**

While I think the review is clear (see specific comments below), the layout of the report is a bit confusing and quite redundant. They have an executive summary (very good) that summarizes the report, plus there is a summary at the beginning of the response to the five charge questions, then the full responses to the charge questions. Thus many things are repeated three times. I do not think there needs to be a summary at the beginning of each response, but that specific recommendations be bolded throughout or grouped at the end. The audience for this will either read the executive summary, or be invested in reading the details – I

doubt there is an audience to pander to that will page through and only read the summaries to the questions. The most awkward example of this is Section 5.1, A., where there is a page of text before the summarized recommendations – this text is very redundant with what follows in section B.

Whether this change is made or not, the overall outline structure is unclear – if one is going to use numbers (e.g. section 5.2) then don't use letters with it – this is further complicated with bolds and italics such that one is never clear where one is in the report. Use 5.1 and 5.1.1 etc. to delineate sections. Use bold at highlight top level sections and italics to highlight subsections, which is the convention of most documents.

Specific comments on clarity: (page number, line number)

x., 32: this point is vague until one reads the detailed text – perhaps expand it.

5., 27-28: while other places in the report are clear about the necessity of including and incorporating global climate change in future ROEs, this bullet could be stronger. "...strongly recommends.." seems too mundane a phrase for such a gross omission in this ROE.

10., 20: I am aware of very few "regional criteria and benchmarks" for water – the Great Lakes Water Quality Initiative criteria are the only I am aware of; does the committee have more in mind?

32., 19 (and several other places): the report is understating things when it states that national averages lose information; they produce a meaningless metric of any kind in most cases!

**d) Are recommendations and conclusions supported in the body of the review?**

Yes they are. The final recommendations are all excellent and well-thought out.

**Typos: (page number, line number)**

v., 18: spell out UNC

v., 23: capitalize "research"

v., 45: spell out NCORE, RSMAS

1., 36: synthetic should be synthesized (someone really likes to use this word incorrectly... see also 28., 33)

12., 19: concentration should be plural.

32., 10: "this" should be "these"