

**U.S. Environmental Protection Agency
Science Advisory Board
Ballast Water Advisory Quality Review**

Pre-Meeting Comments from SAB Members

Developed in preparation for the June 16, 2011, teleconference of the chartered SAB for quality review of the draft SAB report,

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(as of June 15, 2011)

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Lead Reviewer Comments from David Dzombak:

This original report of the SAB addresses a complex topic that has been the subject of few systematic previous investigations. The SAB consulted a background paper prepared by the EPA Office of Water and the US Coast Guard, and information on some 51 existing or developmental ballast water management systems (BWMS) provided by EPA and other sources.

The four multi-part charge questions focus on (1) what is known about the performance of existing onboard treatment systems, (2) projections of how some systems without sufficient performance data might perform, (3) identification of impediments to development of onboard ballast water treatment technologies and recommendations for addressing these impediments, and (4) identification of the principal limitations of the available studies of ballast water treatment technologies, and recommendations for how these limitations can be overcome in future assessments.

The report goes beyond the charge questions, and includes focus on the scientific basis for the biological water quality standards that provide the basis for establishing the technology performance objectives, and discussion of alternatives to onboard treatment. While it may be useful to undertake a review of the relevant water quality standards and to examine alternatives to onboard treatment, in my view the mixing of these topics with the review of the treatment technology performance detracts from the focus, clarity, and impact of the report. This is particularly apparent in the Letter to the Administrator, and in the Executive Summary, which are not well focused on the charge questions.

The body of the report, except for Chapter 3 (Statistics and Interpretation) and the last part of Chapter 6 (the discussion of risk management approaches to reduce risk invasion), moves systematically through the charge questions and stays pretty well focused on evaluation of technology performance.

In my view, the evaluation of biological water quality standards and the discussion of a risk management approach for invasive species should be segregated in a chapter that is clearly separate from the response to the charge questions. Perhaps this material should even be removed from the report. If it is retained and segregated in a separate chapter, the related findings and conclusions should also be clearly segregated in the Letter to the Administrator and the Executive Summary. I recommend that the Letter and the Executive Summary be revised to focus strongly on the charge questions, and move through them systematically as is done in the body of the report in Chapters 4, 5, and 6.

1. Were the original charge questions adequately addressed?

I believe that the charge questions are pretty well addressed in the body of the report, but that the responses are not well summarized in the Executive Summary. In the body of the report, for example, the Panel makes clear the small number of technologies for which sufficient performance data are available to allow evaluation of performance, and the relatively large number of technologies that have been tested only in the laboratory. This

critical information is not mentioned in the brief summary of the response to Charge Question 1 on page 4.

Charge Question 2 asks for projection and speculation. In my view here the response should be very cautious. I urge the Panel to reconsider the paragraph on lines 7-25 of page 49 which addresses the likelihood of some technologies to achieve more stringent performance objectives. The statements are difficult to support and invite criticism.

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

I did not find technical errors. At a number of places in the report the issue of analytical detection limit and technology performance limit are discussed in close proximity. These are different issues and should be carefully distinguished.

By its nature the report is open to criticism of omissions, or inadequate emphasis on certain technologies or approaches. I did not identify any obvious omissions.

3. Is the Panel's draft report clear and logical?

As discussed in my introductory remarks, I believe that the organization and clarity of the Letter to the Administrator and the Executive Summary are weakened by not aligning well with the responses to the charge questions, and by over-emphasizing and mixing in with the response to the charge questions discussion of the biological water quality standards and alternatives to onboard water treatment.

I recommend that the evaluation of biological water quality standards and the discussion of a risk management approach for invasive species be segregated in a chapter that is clearly separate from the response to the charge questions. Perhaps this material should even be removed from the report. If it is retained and segregated in a separate chapter, the related findings and conclusions should also be clearly segregated in the Letter to the Administrator and the Executive Summary. I recommend that the Letter and the Executive Summary be revised to focus strongly on the charge questions, and move through them systematically as is done in the body of the report in Chapters 4, 5, and 6.

I also recommend that points of non-consensus be omitted from the Executive Summary (discussion of role of treatment at reception facilities on pages 8 and 9) and not included among primary conclusions in the body of the report.

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

The conclusions and recommendations for the most part are adequately supported in the body of the report. Some of the conclusions and recommendations are not brought forward into the Executive Summary with sufficient explanation.

Some conclusions and recommendations that are confusing and/or not sufficiently well supported are discussed below.

Summary of response to Charge Question 3a, pages 5-6 of ES: The support for the summary statements given here is unclear, and I couldn’t find the support on pages 53-60. The conclusion that “wholly new treatment systems” using “new technological devices” will be required to meet Phase 2 standards doesn’t seem to follow from the extended evaluations on pages 53-60. On what basis can it be concluded that “these new approaches will likely achieve higher performance”? This statement is not convincing, and again, does not follow from the discussion on pages 53-60.

Summary of response to Charge Question 3c, page 6 of ES: This summary statement is not well related to the discussion on page 69 of the report. The ES summary and the discussion in the main report should be synchronized. Both should be focused better on the question of impediments to development of onboard water treatment technologies. The topic sentence for the paragraph in the ES is focused on compliance monitoring and enforcement.

Lead Reviewer Comments from Taylor Eighmy:

Overall Comments:

1. General Thoughts:

This is a very thorough report that represents an immense amount of data collection, issue assessment, new thinking and reframing by a very specialized and accomplished committee. The committee is to be commended for its hard work and preparation of an excellent report.

2. The Effect of the Report:

As I read the report, it seemed to me that the committee has basically flipped the report around to a large degree so that the issues of BWM must be completely reexamined in a new way (using a risk-based approach). I am assuming this is intended, but the report recipients (Office of Water principally) might benefit from some language in the letter and summary that says something definitive like “The committee, while addressing the charge questions, is completely reframing the issue for your consideration.”

3. Some Larger Framing Issues about the Report:

In reading the report, I found myself wanting the following issues fleshed out a bit more. These are:

- The relative costs of implementing BWMS in international fleets or implementing land based treatment systems versus the likely infrastructure/human health/ecosystem services costs of a new invasion of a nuisance species like freshwater mussels.
- If the U.S. (or California) sets the stage for reinvention here, yet the world does not readily comply with these higher treatments standards or approaches, what will the effects be? Just look at how oil discharges are handled (or not) by the maritime community and you can sense that compliance is not always at the top of the
- The effect of climate change on invasive species success/failure; particularly the rate of invasion/success of invasion. Will this mitigate or accelerate given present and future (e.g., Artic) shipping routes, ballast water volumes, lack of international compliance?
- The perspective of a marine engineer or marine architect is not really reflected here given the apparent make up of the committee, though the impacts of many of the recommendations falls squarely on this discipline. How might that be addressed?
- Are there other risk management models that should be mentioned? I am no expert, but placing HACCP into the EPA risk modeling context might be useful (see <http://www.epa.gov/nrmrl/nrmrlatabases.htm>).

4. Mapping the Report to the Summary and to the Letter to the Administrator:

I found that the mapping was very evident, especially between the summary and the letter.

5. Report Organization:

The Committee might consider placing most/all of section 3 into an appendix. This section, though very clear and relevant, is very detailed and explanatory and might be just as useful in an appendix. This leaves the bulk of the report directly focusing on the charge questions.

Response to the Four Specific Questions:

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

Yes

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

It might be useful to identify other risk (or other decision management) management models that might be applicable... one that comes to mind is multi-criteria decision analysis or its various sub models.

3. Is the report clear and logical?

Yes, very much so.

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

Yes

Lead Reviewer Comments from Keith Moo-Young:

The purpose of this report is to provide advice on technologies and systems to minimize the impacts of invasive species in vessel ballast water discharge. Vessel ballast water discharges are a major source of non-indigenous species introductions to marine, estuarine, and freshwater ecosystems of the United States. EPA, The U.S. Coast Guard (USCG) are currently taking into consideration changes in ballast water discharge standards. SAB reviewed a Background and Issues Paper” prepared by OW and 28 USCG, June 2010, as well as information on 51 existing or developmental ballast water management systems (BWMS) provided by OW and the public. Four charge questions were given to the SAB:

- Charge question 1: Performance of shipboard systems with available effluent testing data
- Charge question 2: Potential performance of shipboard systems without reliable testing
- Charge question 3: System development
- Charge question 4: Development of reliable information

The SAB concluded that five categories of existing BWMS achieved significant reductions in 35 organism concentrations and were able to comply with the least stringent standard. However, technologies assessed by the committee are not able to meet the higher standards. The committee proposed that a new system would need to be developed. Moreover, the committee recommended a risk based system approach for setting the new goals. In addition, the committee suggested use of improved sampling protocols for verifying discharge concentrations, use of surrogate performance measures, development of reliable protocols for compliance monitoring, and consideration of on-shore reception facilities to treat ballast water discharges.

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

The charge questions were addressed by the committee. The committee did a thorough job of evaluating and assessing the technologies and compiling the information into an clear presentation of their results.

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

The report contains a few typos.

e.g., Page 8 line 19 “please see section 6.4

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

The body of the report has compiled background resources and information which provide justification for performance of current and future ballast water management systems. The report is difficult to read and follow, since the background information is provided without specifically answering the charge questions. I would suggest that information such as section 3 should be placed into an appendix. Section 3 provides valuable information that supports the

evaluation and assessment of BWMS, however, it is not referenced frequently enough to encompass 15 pages of the main document that strives to answer the charge questions.

In reading the body of the report, the charge questions were answered starting on page 46. The body of the report, section 2-6 is difficult to follow. The report should be revised to follow the format of other SAB reports to the administrator that provide key findings and synopsis of the major conclusion and answered to the charge questions upfront.

The executive summary provides clearer justification on the charge questions. However, the letter to the Administrator needs to include additional information that is provided in the executive summary as it relates to answering the charge questions.

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

This report need to make a strong statement on the future research needs required to achieve a higher standard. The committee recommended a new system be developed using a risk based framework. The new system may take years to develop and assess. Moreover, it could take years before it is implemented in the industry. Thus, to reduce the impact of ballast water, the USCG and EPA must maximize the utilization of the best technologies available today. To reduce the risk by utilizing the best available technology, both agencies need to provide industry with an achievable goal based on the best available technology.

In addition, the report should request that EPA and USCG develop a current Best Management Practice Manual for Ballast Water Management Systems prior to developing new guidelines and guidance.

Lead Reviewer Comments from Kathleen Segerson:

1. Responsive to charge question? Yes
2. Technical errors? No.
3. Clear and logical? Yes, but see comments below
4. Conclusions supported? Yes, but see comments below.

Comments:

My comments relate to Sections 6.4 to 6.7, and Appendix C.

The report admits that the discussion in these sections and this Appendix goes beyond the charge questions. This is fine, but in my view the report would be significantly improved by identifying at the outset the basic conclusion stated on p. 111, lines 12-18:

[i]nsufficient attention has been given to integrated sets of practices and technologies including (1) managing ballast uptake to reduce presence of invasives, (2) reducing invasion risk from ballast discharge through operational adjustments and changes in ship design to reduce or eliminate need for ballast water, (3) development of voyage-based risk assessments and/or HACCP principles, and (4) options for treatment in reception facilities.

This appears to be an ‘over-arching’ conclusion, and should be stated as such. While this goes beyond the charge, it seems necessary to put the report (and the responses to the more-narrowly focused charge questions) in the proper context. I would strongly urge the committee to consider highlighting this at the beginning of the report, before moving into the more focused answers to individual charge questions. This would, of course, require some revisions not only to the report itself but also to the letter to the Administrator and the Executive Summary. For example, right now the letter states:

The SAB recommended a risk-based systems approach for setting goals and implementing ballast water management, use of improved sampling protocols for verifying discharge concentrations, use of surrogate performance measures, development of reliable protocols for compliance monitoring, and consideration of on-shore reception facilities to treat ballast water discharges. (bold added)

The two bolded parts of this relate to the above over-arching conclusion, and seem fundamentally different from the other recommendations included in this same sentence (which relate to on-ship treatment). Identifying this over-arching conclusion separately would set the stage for then moving into the more specific (narrowly focused) recommendations that relate directly to the charge questions.

In addition, while the report makes numerous references to the committee's inability to reach agreement or consensus on certain issues related to on-shore treatment, it appears as though the committee did agree with the conclusion above. The body of the report also suggests that the committee agreed to the recommendation on p. 112, lines 30-37:

EPA should conduct a comprehensive analysis comparing biological effectiveness, cost, logistics, operations, and safety associated with both shipboard BWMS and reception facilities....

However, on p. C-5 (line 28-29) of the appendix, the recommendation to do a comprehensive analysis addressing cost, operations and safety is presented as "View B", suggesting that the people holding View A did not agree with this recommendation. (It is not clear what "View A" is on the issue of "Need for further study".) If, in fact, the committee reached agreement on the recommendation on p. 112, then this seems to be a key recommendation that follows from the above over-arching conclusion, and should be stated as such.

In this case, I do not see the need for Appendix C and would recommend deleting it, along with the prominent references, including a reference in the letter, to the fact that the committee did not reach agreement on some issues related to onshore reception facilities. The appendix and the corresponding statements seem irrelevant, given that the committee was not charged with evaluating onshore reception facilities. If the committee had been charged with doing the analysis recommended above, then this discussion would be relevant, but it was not. The body of the report already identifies a number of issues that would have to be considered in doing a comprehensive analysis. It is important that the report point these out, but it is not within the scope of the report to try to resolve these issues. In fact, if the committee agrees with the need for further study, there is no need to highlight disagreements at all. It would be sufficient simply to say that currently there is insufficient information or no clear consensus on onshore facilities and hence the need for further study. Given that, the appendix and these statements distract from rather than adding to the report.

Some other comments related to the appendix:

1. It is not clear who the "we" is in View A.
2. Much of the discussion here appears to be a reaction to comments made during teleconferences. I don't think the SAB is being asked to respond to verbal comments by EPA.

Finally, isn't the discussion in Section 6.5 on "Approaches Other than Ballast Water Treatment" really part of the overall recommendation regarding taking a risk-management approach? If so, it seems that 6.5 and 6.6 should be combined. In fact, all three sections (6.4, 6.5, and 6.6) relate to risk management, i.e., thinking more broadly about the problem and how to reduce the risk of invasions. In this sense, the over-arching recommendation above is to take a broader, systems view of the problem and evaluate alternatives within that broader framework.

Comments from Terry Daniel:

General comments

WOW! This is a very impressive well-written report that covers an enormous range of biological, ecological and engineering concerns. The authoring Panel is to be highly commended for a very thorough and deep analysis and for a clear and compelling report.

The US general public (at least those of us living inland) is very likely largely unaware of the health and ecological risks of ballast water discharges and the many complex issues involved in reducing those risks. Thus, efforts of the EPA to meet their responsibilities in protecting the country's coastal waters and ports against this international hazard, including the painstaking research of the Agency and careful external reviews as exemplified by this report, are not adequately appreciated. This report and the cooperative efforts of the EPA and the Coast Guard should be translated into a publicly accessible form and widely distributed—especially in a time when the Agency and its mission are often being cast as unnecessary and even counterproductive to the wellbeing of the nation.

Specific Quality Review questions

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

Yes, and in several places the questions were expanded and addressed at greater depth.

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

No errors or omissions were noticed, though this reviewer does not have the requisite expertise to make that determination in all of the many areas addressed.

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

Yes, the Panel has provided a very impressive and readable analysis of complex technical issues with clear and well-justified recommendations for EPA. The issues on which the Panel did not achieve full consensus were clearly identified and both sides were clearly and evenly presented.

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

Yes. The recommendations toward a more comprehensive risk-based approach were especially well supported. The issues on which there was a divergence of opinion did not appear to dilute the key conclusions and recommendations of the Panel.

Comments from George Daston:

I found this report to be well written, with the conclusions well supported by the information contained in the review. The panel is to be commended for coordinating so much expertise in engineering, statistics and ecology, and for offering sound, pragmatic advice.

We were asked to address four specific questions as part of the quality review.

Question 1: Are the original charge questions to the SAB Panel adequately addressed?

The charge questions posed to the review panel were all adequately addressed in a very transparent way.

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

I found no technical errors or omissions in the report.

Question 3: Is the Panel's report clear and logical?

I found the report to be clearly and logically presented. I was interested to see in the body of the report a discussion of employing combinations of treatment methods, or non-treatment approaches such as mid-ocean transfer of ballast water, or treatment of water as it enters the ship. Perhaps the concept of combining treatment strategies can be added to the Executive Summary and/or the letter to the Administrator.

Question 4: Are the conclusions drawn or recommendations provided supported by the body of the Panel's report?

I found the conclusions of the report to be well documented and supported.

Comments from Otto Doering, III:

This is an excellent comprehensive report that includes the range of issues integral to answering the charge questions. I strongly support the recommendation that a HACCP approach be taken to the balast water issue to effectively deal with this invasives concern (as exemplified by lines 1-9 on page 3). I appreciate the cautions about meeting a 'no living organisms standard'. The committee outlines critical steps from goal setting to sampling protocols to on-board pilot testing of new equipment and technologies (p.68) that will be required to address the balast water issue. The committee has recognized the real world limitations imposed by the geography, vessel differences, port differences and other characteristics of the maritime industry that make this a challenging task. The committee gives good guidance to EPA and other agencies involved as to what might be done to move forward constructively on the balast water issue and improve protection from invasives.

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

Yes, and the panel included thorough consideration of critical issues very relevant to the charge questions that might not have been explicitly in the charge question. This made the report more useful and increased its validity to all stakeholders.

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

None that I could find

3. Is the Panel's draft report clear and logical?

Yes

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

Yes.

My only suggestion would be that in the letter to the administrator in the assessment of the status of existing technology (p.1 line 38 to p.2 line3) it might be made even more explicit through an added phrase or sentence that there is no technology available today to reliably meet these standards.

I commend that panel for this report!

Comments from Bernd Kahn:

The SAB Committee prepared a remarkably thorough and well-thought-out Ballast Water Treatment report. My responses to the four quality review questions are:

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

Yes.

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

No.

3. Is the Panel's draft report clear and logical?

Yes

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

Yes

I suggest the following minor corrections:

- p. I, 1.28: Insert quotation mark before 'Background'.
- p. ii, 1.3: Delete comma behind '100x'; also on p.8, 1.8.
- p.1, 1.15: Delete 'to be' before 'released'.
- p.2, 1.45: Add 's' to 'include'.
- p.46, 1.23: Replace '1b' with '1a' behind 'Conclusion'.
- p.70, 1.5-8: Italicize the charge question, as elsewhere.
- p.97, 1.30 and 35: Should 'Table 6.6' be 'Table 6.5'?
- p.119, 1.17-18: Delete; this duplicates 1.14-16.
- p.126, 1.32-33: Delete; this duplicates 1.30-31.

Comments from Nancy Kim:

The Panel must have spent a great deal of energy and time in developing the contents of the report, given the scientific reviews of the BWMS data, and should be commended. They provided many useful suggestions to EPA on ways to move forward.

1. Were the original charge questions to the Panel adequately addressed?
Yes.
2. Are there any technical errors or omissions in the report or issues that are inadequately dealt with in the Panel's report?
None that I detected
3. Is the Panel's report clear and logical?
Yes, for the great majority of the report.

Letter to the administrator

The last sentence in the penultimate paragraph leaves the reader hanging. One possible solution is to add another sentence that would give the reader a sense of the importance of the lack of consensus, e.g. consensus was reached on all major conclusions, consensus was reached on every major issue except one... , etc. It may also be useful to point to places in the document where the reader could get more information if consensus could not be reached on major conclusions.

Executive Summary

Page 8. The concept of reception facilities is discussed under Alternatives to shipboard treatment of ballast water. Consider defining reception facilities for readers not familiar with this area.

Body of the Report

Page 39. The Panel should review the 3rd and 5th bullets on this page to see if the language can be modified to help clarify the bullets' meaning.

Page 76 and 77. Table 6.2. Line 19 has a row heading of fresh and the two subsequent columns state two salinity ranges or two or three salinity ranges. It isn't clear to what the last two entries are referring – fresh water salinity, the two ranges in the next two rows referring to brackish and marine or something else? This section also discusses different ranges and mentions 3 ranges in some places. What are the three ranges? Is any clarification needed?

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

Minor comments

1. Page 10, line 5. Remove s from management.
2. Page 10, line 39, remove c in reception.
3. Page 18, line 39. Change are to is.

4. Page 37, Figure 3.4. It isn't clear to me why two graphs are displayed.
5. Page 53, line 10. Change mean to means.
6. Page 53, line 14. Add be between may and impossible.
7. Page 66, line 13. Remove be.
8. Page 70, line 8. I suggest starting a new paragraph with the sentence that begins Bearing in mind...to separate the charge question from the Panel's thoughts.
9. Page 76, Table 6.2, lines 25 and 26. There is no entry under Panel Alternatives. Should the word "same" be added as is done on lines 12 and 13?
10. Page 89, line 28. Comma after lacking.
11. Page 106, line 5. Change found to find.

Comments from Kai Lee:

The draft report and letter to the Administrator are very good. I should add that I am not a technical expert in the relevant fields. **The various parts of the charge are met, I do not see technical errors or omissions, the language is clear, and the findings are supported.**

The problem of introduced species in coastal and freshwater ecosystems is a vexing one. As the companion study by the National Academy of Sciences points out, ballast water is a significant vector for potentially invasive species, although it is not the only one. The existing method of control, ballast water exchange, is known to be imperfect, and this procedure is voluntary under international law. Invasive species carried in ballast water are a threat that accompanies the significant benefits of international maritime trade.

The SAB report makes the important point that risk management to address this problem should be done in a systems framework, rather than focusing solely on numerical standards for the density of living organisms in ballast water. Indeed, since they are living, reducing the concentration of such life forms alters the probability of invasion but does not eliminate it. The National Academy finds that there is presently no adequate scientific basis for linking invasion probabilities to particular discharge standards. The SAB sensibly suggests that EPA, the Coast Guard, and the maritime industry take a broader look before moving toward numerical discharge limits.

This is a frustrating finding from an environmental perspective, since the existing approach is known to be incompletely effective. But the SAB and Academy studies outline paths forward that are scientifically sound. Whether Congress should provide the resources to pursue those paths may lie beyond the reach of scientific advice, however.

Comments from Cecil Lue-Hing:

General Comments

The Panel has done an excellent job of reviewing the EPA document/report and has offered some very useful comments and recommendations in response to the four major Charge Questions.

Quality Review Questions

1 – Were the original charge questions adequately addressed?

Yes, the original charge questions were adequately addressed

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

None that I have encountered.

3 – Is the Panel's report clear and logical?

Yes

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

Yes.

Specific Comments

While the treatment of ballast water per se is not necessarily a difficult technical issue, the overall management of ballast water is made complex by issues not related to the quality of the ballast water to be treated, e.g., vessel size, type, design, and function. In addition, available treatment systems need to be retrofitted to restricted and tortuous space limitations in existing vessels, which were originally designed to simply pump ballast water in and out of the vessel.

The Panel deserves to be commended for navigating this difficult topic and to develop the suggestions and recommendations offered to the EPA. I expect that these recommendations will serve the EPA well.

Cost Analysis

My interpretation of the charge questions did not include a specific EPA request for the Panel to conduct a cost analysis or cost comparison of existing/competing systems. The fact that the Panel did this work can be regarded as value added. The fact that the Panel was divided on the issue of costs is not surprising since these cost exercises are congenitally contentious.

Transmittal Letter

The transmittal letter is concise and informative.

The Executive Summary

The executive summary is well written, easy to read, and highlights the important points in the Panel's report.

Comments from L.D. McMullen:

I thought the report was excellent and very detailed. I thought Chapter 2 "Introduction" provided the reader with an excellent background on the issue and introduced the need to address the issue with a risk-based management plan approach. This lead into the discussion in Chapter 3 "Statistics and Interpretation" which use a great introduction to the charge questions. The letter to the administrator was short but I feel it was adequate for the topic. If more detail is needed, it can be found in the executive summary. I found the process for narrowing the treatment options to 5 to be interesting. I don't disagree with the approach, but the result will be very conservative and may miss some promising treatments that do not have published performance data.

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

Yes in great detail.

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

I did not find and errors or omissions.

3. Is the Panel's draft report clear and logical?

Yes. However, it seemed that the report was using primarily wastewater treatment experience in determining what will work and what will not. I feel that drinking water treatment is as relevant if not more since the end goal of biological control of ballast water is the same as with drinking water treatment. I think this can be corrected by using "water treatment" and not make reference to wastewater, drinking water or industrial water treatment.

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

Yes

Comments from Eileen Murphy:

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

Yes. This was a very well-written and understandable report. Charge questions were clearly delineated and addressed.

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 am not expert enough in this error to know if there are technical errors or emissions. However, the assessment process whereby the panel evaluated and assessed data (described in section 4 of the report, page 40) was fair and thorough.

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

The report was well-written, thorough and easy to follow. It is a very long report with a lot of preliminary information about ballast water regulations and statistical methods. As a nonexpert in this area, I did find the preliminary information useful. I found that the report presentation process used by the panel was fully and logically articulated. I could follow the panel's thinking and logic throughout the report.

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

Yes

Comments from Duncan Patten:

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

The panel gave extensive responses to the charge questions and at times seemed to expand on the questions themselves. The panel also chose to develop a comprehensive discussion on the statistical aspects of determining levels of ballast "contamination". This discussion is very appropriate to the panel's role in assessing treatment systems.

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

Not obvious to me.

3. Is the Panel's draft report clear and logical?

The panel's report reads clearly and comprehensively. It has worked step-wise through the questions and discussion which allows the reader to better understand the issues.

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

Yes.

Letter to Administrator: How long (or short) and how comprehensive the letter to the administrator should be continues to be an issue in evaluating reviews by SAB panels and committees. Often the letter appears to be too long and thus the information passed to the administrator gets lost in the verbiage. In the case of this report, the letter to the administrator seems a bit truncated thus critical points (points that need emphasis) may not be included. I think it is up to the chair of the panel to review the letter again to make sure she is comfortable with the level of information and guidance offered in the letter. If the Executive Summary is considered and extension of the letter to the administrator, then the letter as it is appears acceptable.

Comments from Thomas Zoeller:

The following comments are provided in response to the Memorandum dated June 1, 2011 concerning the quality review of the SAB draft report entitled, “*Efficacy of Ballast Water Treatment Systems: A Report by the EPA Science Advisory Board (5-31-11)*”. The Quality Review Charge questions are:

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

The original charge questions are described in neither the letter to the Administrator or in the Executive Summary, perhaps because they are many and the responses are both complex and original. Although it may be reasonable to exclude these to keep those sections short, the letter to the administrator and specific sections of the executive summary might be developed just slightly more to provide clarity. In addition, it might help the reader to have the charge questions briefly summarized.

Otherwise, the charge questions were directly, clearly and comprehensively addressed in the main body of the document.

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

This reviewer did not identify technical errors or omissions.

3. Is the draft report clear and logical?

In general, the document is clear and logical. The SAB panel appears to be making a recommendation (i.e., “Risk Management-based...”) that may transcend the specific charge questions themselves, but that is extremely important to be articulated. Moreover, the background and theoretical material provided by the SAB panel appears to be original and quite important to the Agency. Therefore, it may be useful to frame this more completely in the letter to the Administrator and in the Executive Summary.

Additional editorial comments:

Line 29 of Letter: “...51 existing or developmental ballast water...” might be changed to “51 existing or in development ballast water...”

Paragraph beginning on line 35 might be expanded to provide a little more context and detail. This paragraph makes two separate recommendations that are complex but highly important. These include the conclusion that new systems must be developed to meet future standards and the recommendation for an integrated approach (i.e., “risk-based”) to protect from invasive species and port water fouling. The term “risk-based” is well explained in the body of the document, but is not intuitive in the letter to the Administrator and this might be addressed briefly.

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

The recommendations are clear and the support for those recommendations rational.