

**U.S. Environmental Protection Agency
Science Advisory Board
Ecological Processes and Effects Committee Augmented for Ballast Water Advisory**

Public Teleconference Call
October 26, 2010
2:00 to 6:00 pm Eastern Time

Minutes of the Meeting

Attendees:

Ecological Processes and Effects Committee (EPEC) Augmented for Ballast Water Advisory: Judy Meyer (Chair), Fred Benfield, Ingrid Burke, JoAnn Burkholder, Allen Burton, Peter Chapman, William Clements, Andrew Cohen, Loveday Conquest, Robert Diaz, Fred Dobbs, Lisa Drake, Charles Haas, Thomas W. La Point, Wayne Landis, Edward Lemieux, David Lodge, Kevin Reynolds, Amanda Rodewald, James Sanders, Mario Tamburri, Nicholas Welschmeyer (for full roster, see Attachment A).

SAB Staff Office: Iris Goodman, Designated Federal Officer

EPA Staff: Ryan Albert, EPA, Office of Water

Other Attendees: Names of those who requested the teleconference call-in number are provided in Attachment B.

Purpose: to discuss the draft working papers prepared by subgroups of the EPEC Ballast Water Advisory Panel as preliminary responses to the charge questions to the Panel.

Meeting Materials:

All materials discussed at the meeting are available at the SAB Web site, <http://www.epa.gov/sab>, at the October 26, 2010 Ballast Water Advisory Panel Meeting page.

Summary of Discussions:

This meeting was announced in the Federal Register¹ and proceeded according to the meeting agenda. **Iris Goodman**, Designated Federal Officer for the Panel, convened the meeting and noted that the Ballast Water Advisory Panel (or Panel) operates in accordance with the Federal Advisory Committee Act. This means that meetings are announced and open to the public, all materials prepared for or by the Panel are available to the public, and meeting minutes are prepared. She noted that discussions on the call would reference 4 draft working papers prepared by subgroups of the Panel that had been made available on the SAB web site: draft response to charge questions 1 and 2;² draft response to charge question 3;³ draft outline response to charge question 4;⁴ and a draft glossary and background text.⁵ She said that one written public comment had been received and posted, and that one person had registered in advance to provide oral comments at the meeting.

Dr. Meyer, Chair of the Panel, welcomed the group and reviewed the meeting objectives which were to: (1) hear from the public, (2) discuss the draft working papers developed by the three Panel subgroups, (3) identify areas of disagreement, and (4) identify cross-cutting issues among subgroups. **Dr. Meyer** reminded everyone that the draft working papers to be discussed reflected preliminary fact-finding as conducted by the subgroup in order to explore issues relevant to the Panel's charge questions. As such, the draft documents are a work in progress and do not represent consensus advice or recommendations, nor have they been reviewed or approved by the chartered SAB, nor do they represent EPA policy.

The following is a summary of the issues discussed and conclusions reached during the meeting.

A. Public comments

Dr. Raymond Vaughn, of New York State Attorney General's Office, provided oral comments on behalf of Koon Tang, P.E. from the Office of Invasive Species Coordination, NY Department of Environmental Conservation. **Dr. Vaughn's** remarks were based upon written comments provided to the Panel by Mr. Tang⁶; key points made were that independent testing facilities could use available IMO testing protocols to determine the efficacy of treatment systems to determine if treatment systems could meet multiple potential treatment standards, e.g., not just IMO standards but also standards 100X more stringent. **Dr. Vaughn** noted that a recent publication, *Density Matters: A Review of Approaches to Setting Organism-Based Ballast Water Discharge Standards*, provided a good basis for developing more formal procedures for verifying more stringent standards. He also noted that 10 treatment systems had received Type approval; these systems are summarized in Mr. Tang's written comments.

B. Panel Discussion of Draft Working Papers

Charge questions 1 and 2: Discussion of the performance of shipboard systems

Dr. Tamburri gave an overview of the methods and findings as described in the draft text prepared by Subgroup 1. He noted that the subgroup assessed the performance of shipboard ballast water management systems (BWMS) based on available effluent testing data provided by EPA's Office of Water and the public. Their evaluations were based on categories of fundamental technologies, rather than on individual systems. He described the approach used by each subgroup member to independently score the technologies and noted that assessing the reliability of the data provided was a key criterion. At a minimum, the data package had to include methods and results from land-based or shipboard testing to earn a "reliable" rating. Additional criteria included whether scientific and technical literature provided corroborative information, whether the testing was conducted with reasonable and appropriate methods, and whether the technology was in operational use on active vessels. **Dr. Tamburri** noted there was agreement among the scores determined independently by subgroup members. The subgroup concluded

that five categories of technologies were considered to meet the proposed D2 / Phase 1 standards. **Dr. Tamburri** noted these five technologies dramatically reduce living organisms in the challenge water and drew parallels to reductions achieved in drinking water systems. The remaining technologies assessed were regarded as unlikely to have met D2 / Phase 1 standards. Their preliminary conclusions are presented in Table 1 of their draft text.

With respect to the charge question about whether BWMS can meet a “no living organism” standard, which the subgroup defined as “sterilization,” **Dr. Tamburri** said the subgroup found the data do not support this conclusion and that sterilization was likely impossible. He noted this issue is closely related to a “detection limit” approach, a topic of active research within the scientific community. Issues related to sampling methods are complex and the subgroup concluded that current detection limits are approximately at D2 standards, thus making it difficult to further interpret treatment performance capabilities based on the existing data provided. However, further refinements to technologies and sampling methods may make it possible to achieve 10 x D2 in the future. Drs. Drake, Sanders, and Welschmeyer concurred with Dr. Tamburri’s summary.

The Panel expressed their appreciation for Subgroup 1’s analysis of existing data. Four cross-cutting issues were identified and discussed: testing performance under different salinity regimes; treatment performance for particular operational parameters, such as treatment flow rates or applicability to different types of ships; how best to describe uncertainty of test results; and whether ships should be regarded as sources of potential contamination.

Charge question 3: Discussion of ballast water treatment system development.

Dr. Dobbs introduced this discussion by summarizing the difficulties in assessing the potential for new BWMS to meet treatment targets presented by USCG and EPA. These difficulties include the range in stringency of potential new standards, use of terms such as “no living organisms” or “sterile” discharges, and the presence of other shipboard sources of invasive organisms (e.g., from the hull or operator error). Panel members discussed a variety of ways to frame the issues, e.g., by focusing only on “end-of-pipe” measurements, by using risk assessment to clarify treatment goals and options; or by including land-based treatment systems. The Panel discussed whether they could address this range of issues without diverting them from their primary charge.

Dr. Meyer reminded the Panel that the charge to Subgroup 2 was to assess the degree to which BWMS could be improved by tweaking existing technologies as compared with improvements that could be achieved by breakthroughs from new treatment technologies. She also noted that aspects of risk assessment could be applied to BWMS without duplicating the National Research Council’s ongoing evaluation of propagule pressure related to invasive species introduced by ballast water.

Charge question 4: Discussion of limitations of available data and future assessment needs.

Dr. Cohen gave an overview of the annotated draft outline prepared by Subgroup 3, briefly summarizing the following topics: (1) ways to improve existing BWMS protocols, analyses, and reporting practices; (2) inherent limitations associated with testing BWMS performance, especially related to verifying low concentrations of viable organisms; (3) the relationship between test protocols used to certify BWMS technologies and other protocols that could be used for compliance and enforcement monitoring; (4) management approaches other than shipboard treatment that could reduce risk of invasions from ballast discharges, such as ballast water exchange, ship designs that reduce the volume of ballast required per unit cargo, and hazard management such as Hazard Analysis and Critical Control Points (HACCP), which emphasizes engineering process controls over end-of-pipe measurements; (5) potential advantages and limitations of onshore treatment of ballast water; and (6) consideration of how multiple approaches could be combined, including use of voyage-based risk assessment.

The Panel discussed their views on the draft outline. Some panelists liked how it addressed systems and processes, not just technology. Others cautioned that attempting to address all aspects of minimizing invasions from ships would draw the Panel from their primary charge to assess the effectiveness of technologies. Others noted that the effectiveness of BWMS technologies must be considered within the context of practical considerations about ship operations, including how compliance monitoring is implemented. In response to a question, **Dr. Albert** summarized his views on onshore treatment of ballast water. He pointed out the Agency has an immediate need for information on shipboard capabilities. He also summarized several potential constraints for onshore treatment, such as safety and other operational issues related to de-ballasting; limitations due to POTWs primarily designed to treat fresh, not saline water; issues related to siting and construction of on-shore facilities; and potential environmental inequities between U.S.- based onshore facilities and those in other countries. A panelist asked if there were data that could be used to characterize the type and magnitude of de-ballasting issues and comparative costs for shipboard vs. onshore treatment; **Dr. Albert** replied he would look for such data, but cautioned it would likely be dated. Other panelists noted there could be disparities in who bears the cost of treatment between shipboard or onshore treatment. Another noted that technologies to achieve 10 x D2 standards could likely be developed in about 5 years, but that meeting 100 x or 1,000 x D2 standards will require development of new technology over the longer term, and that it is reasonable to investigate onshore treatment and infrastructure within this long-term context.

Discussion of cross-cutting issues

Dr. Meyer turned to the discussion of issues raised by the Panel that cut across the four charge questions to the Panel. These cross-cutting topics are: (1) statistical and sampling issues, (2) additional operational factors that affect the performance of shipboard treatment, (3) using systems-based approaches to ballast water management, (4) onshore treatment of ballast water, and (5) compliance monitoring and testing. Dr. Meyer asked

the Panel whether additional work should be done on these issues. After discussion, the Panel proposed creation of five additional subgroups for the purpose of preparing draft text on these issues for the full Panel to consider as it develops its responses to charge questions.

The issues to be considered by the proposed new subgroups are summarized below.

Statistical and sampling issues. This subgroup would consider statistical issues related to verifying very low concentrations of organism, including need for large sample volumes; how to characterize uncertainty in test results; and semantic issues related to word choice and interpretation (e.g., “zero organisms,” “no detected organisms,” “viable organisms”). The proposed members of this subgroup are: Drs. Conquest, Burkholder, Diaz and Drake.

Operational factors that affect shipboard treatment performance. This subgroup would consider additional factors that affect shipboard treatment performance. These factors include type of vessel, shipboard conditions, and operational parameters during treatment (e.g., flow rates, salinity regimes). The proposed members of this group are: Drs. Tamburri, Drake, Welschmeyer, Conquest, Sanders, and Mr. Reynolds.

Systems-based approaches for ballast water risk management. This subgroup would consider issues related to implementing hazard or risk management approaches, given the operational realities aboard working ships. They will also explore connections among risk management options, including risk assessment methods, voyage-based risk assessment, and process-based assessment hazard analysis (i.e., Hazard Assessment and Control Points, or HACCP-like methods). The proposed members of this subgroup are: Drs. Haas, Landis, Lodge and Cohen.

Onshore treatment issues: This subgroup would consider issues related to balancing near-term and long-term needs for technology assessments, and how to define the boundaries of the onshore discussion within the text in order to maintain a primary focus on the charge questions to the Panel. The proposed members of this subgroup are: Drs. Haas, Cohen, Lodge, Dobbs and Mr. Reynolds.

Compliance monitoring and testing: The Panel agreed to defer discussion on this topic until after the full Panel had the opportunity to review the draft text on this topic prepared by Subgroup 3 for the November 4, 2010 teleconference.

Identification of next steps and planning for next meeting

Dr. Meyer thanked members for their input and reviewed the next steps to develop the Committee’s advisory report. She said the next meeting on November 4, 2010, from 11 a.m. to 2 p.m. would also be a teleconference and that Dr. Sanders would serve as delegated chair in her absence. She said that after the subgroups had developed their draft responses, the full Committee would meet again to deliberate on the draft responses. She indicated that, in addition to the next face-to-face Committee meeting, two

Committee teleconferences would be held to discuss and reach agreement on the advisory report before it was sent to the chartered SAB for quality review. She said that Iris Goodman would contact members to make scheduling arrangements. The teleconference was adjourned at 6:00 pm.

Respectfully Submitted:

Certified as Accurate:

/Signed/

/Signed/

Iris Goodman,
Designated Federal Officer

Dr. Judith L Meyer, Chair
SAB Ecological Processes and
Effects Committee

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from Panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings.

ATTACHMENT A: COMMITTEE ROSTER

U.S. Environmental Protection Agency Science Advisory Board Ecological Processes and Effects Committee Augmented for the Ballast Water Advisory

CHAIR

Dr. Judith L. Meyer, Distinguished Research Professor Emeritus, Odum School of Ecology, University of Georgia, Lopez Island, WA

MEMBERS

Dr. E. Fred Benfield, Professor of Ecology, Department of Biological Sciences, Virginia Tech, Blacksburg, VA

Dr. Ingrid Burke, Director, Haub School and Ruckelshaus Institute of Environment and Natural Resources, University of Wyoming, Laramie, WY

Dr. G. Allen Burton, Professor and Director, Cooperative Institute for Limnology and Ecosystems Research, School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI

Dr. Peter Chapman, Principal and Senior Environmental Scientist, Environmental Sciences Group, Golder Associates Ltd, Burnaby, BC, Canada

Dr. William Clements, Professor, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO

Dr. Loveday Conquest, Professor, School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA

Dr. Robert Diaz, Professor, Department of Biological Sciences, Virginia Institute of Marine Science, College of William and Mary, Gloucester Pt., VA

Dr. Wayne Landis, Professor and Director, Department of Environmental Toxicology, Institute of Environmental Toxicology, Huxley College of the Environment, Western Washington University, Bellingham, WA

Dr. Thomas W. La Point, Professor, Department of Biological Sciences, University of North Texas, Denton, TX

Dr. Amanda Rodewald, Associate Professor, School of Environment and Natural Resources, The Ohio State University, Columbus, OH

Dr. James Sanders, Director and Professor, Skidaway Institute of Oceanography, Savannah, GA

CONSULTANTS

Dr. JoAnn Burkholder, Professor, Department of Plant Biology, Center for Applied Aquatic Ecology, North Carolina State University, Raleigh, NC

Dr. Andrew Cohen, Senior Scientist and Director, Biological Invasions Program, San Francisco Estuary Institute, Oakland, CA

Dr. Fred Dobbs, Professor and Graduate Program Director, Ocean, Earth and Atmospheric Sciences, College of Sciences, Old Dominion University, Norfolk, VA

Dr. Lisa Drake, Senior Scientist, Science Applications International Corporation, Key West, FL

Dr. Charles Haas, L.D. Betz Professor of Environmental Engineering, Civil, Architectural and Environmental Engineering, College of Engineering, Drexel University, Philadelphia, PA

Mr. Edward Lemieux, Director, Center for Corrosion Science Engineering, Naval Research Laboratory, Washington, DC

Dr. David Lodge, Professor, Biological Sciences, University of Notre Dame, Notre Dame, IN

Mr. Kevin Reynolds, Senior Marine Engineer, The Glostén Associates, Seattle, WA

Dr. Mario Tamburri, Associate Professor, Chesapeake Biological Laboratory, Maritime Environmental Resource Center, University of Maryland Center for Environmental Science, Solomons, MD, United States

Dr. Nicholas Welschmeyer, Professor of Oceanography, Moss Landing Marine Laboratories, San Jose State University, Moss Landing, CA

SCIENCE ADVISORY BOARD STAFF

Dr. Thomas Armitage, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

Ms. Iris Goodman, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

Attachment B:

Members of the public who requested the call-in number for this teleconference.

Ryan Albert, EPA Office of Water

Allegra Cangelosi, Senior Policy Analyst, Northeast-Midwest Institute

Richard Everett, U.S. Coast Guard

Rian V. Hooff, Ballast Water Program Manager, Oregon Dept. of Environmental Quality

Nick Juliano, Associate Editor, Inside EPA

Raymond Vaughan, New York State, Office of the Attorney General

Linda M. Wilson, New York State, Office of the Attorney General

Materials Cited

The following meeting materials are available on the SAB website, <http://www.epa.gov/sab>, at the October 26, 2010, Ecological Processes and Effects Committee meeting page:

<http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/abadb979c14301e6852577ad00507b29!OpenDocument&Date=2010-10-26>

¹ Federal Register notice announcing the meeting (75 FR 62386-62387)

² EPA SAB Ballast Water Advisory Subgroup 1, Draft Response to Charge Question 1 & 2: Performance of shipboard systems with available effluent testing data. 10/20/2010.

³ EPA SAB Ballast Water Advisory Subgroup 2, Draft Response to Charge Question 3: System Development. 10/20/2010.

⁴ EPA SAB Ballast Water Advisory Subgroup 3, Outline of Response to Charge Question 4: Limitations of existing studies and reports. 10/20/2010.

⁵ Background and Glossary to accompany Subgroup Drafts. SAB Ballast Water Advisory. 10/20.2010.

⁶ Comments from Koon S. Tang, NYS Department of Environmental Conservation