

**Minutes of the
U.S. Environmental Protection Agency
Hypoxia Advisory Panel
Public Meeting
September 6 - 7, 2006**

Committee Members:

Dr. Virginia Dale
Dr. Judy Meyer
Dr. Hans Paerl
Dr. Bill Crumpton
Dr. Mark David
Dr. Daniel Conley
Dr. Richard Lowrance
Dr. Clifford Snyder
Dr. Denis Gilbert
Dr. Walter Boynton (September 6 only)
Dr. Andrew Sharpley
Dr. Don Wright
Dr. James Opaluch
Dr. Kyle Mankin
Dr. Tom Simpson
Dr. Alan Blumberg
Dr. Ken Reckhow
Dr. Bob Howarth
Dr. James Sanders
Dr. Cathy Kling

Date and Time:

September 6 - 7, 2006

Purpose:

The Hypoxia Advisory Panel will discuss how to respond to the Agency's charge.

SAB Staff:

Dr. Holly Stallworth, Designated Federal Officer
Dr. Thomas Armitage, Designated Federal Officer
Dr. Anthony Maciorowski, Associate Director for Science
Dr. Vanessa Vu, Director
Mr. Richard Albores, Deputy Director for Management

Other EPA Staff:

Rick Greene, Kavya Kasturi, Katie Flahive, Darrell Brown,
John Wilson, Diane Regas, Bonnie Thie, Greg Colianni,
Maureen Tooke, Amy Parker, Daniel Kaiser, Rob Wolcott,
Ben Grumbles

Other: Bill Herz, The Fertilizer Institute
Janice Ward, U.S. Geological Survey
Amena Saiyid, Bureau of National Affairs
Michelle Perez, Environmental Working Group
Dean Lemke, Iowa Department of Agriculture and Land Stewardship
James Baker, Iowa Department of Agriculture and Land Stewardship
Alan Lewitus, National Oceanic and Atmospheric Administration
Cheryl Hogue, Chemical and Engineering News
Jim Porterfield, AFGE
Lisa Kelley, NCGA
Susie Bruninga, NACWA
Jesus Peralta, GF Industries
Don Parrish, AFBF
Laura Beaven, Inside EPA

Attachments: Attachment A: Agenda
Attachment B: Rick Greene presentation
Attachment C: Diane Regas presentation
Attachment D: Subgroup memberships

Meeting Summary

The discussion followed the issues and general timing as presented in the meeting agenda shown in Attachment A. Dr. Stallworth convened the meeting and explained the Hypoxia Advisory Panel (HAP) will operate under the Federal Advisory Committee Act. Dr. Dale reviewed the agenda. Each member of the Panel introduced himself and mentioned his scientific expertise in relation to hypoxia.

Members were welcomed and thanked by Ben Grumbles, Assistant Administrator for the Office of Water at EPA. Following Mr. Grumbles remarks, Diane Regas, Director of EPA's Office of Wetlands, Oceans and Watersheds thanked and welcomed the Panel. Ms. Regas' remarks followed the slides shown in Attachment C. Mr. Darrell Brown, Chief of EPA's Coastal Management Branch also thanked and welcomed the Panel. HAP members asked several questions of Ms. Regas and Mr. Brown to learn more about the context of this advisory request.

Dr. Dale then led the HAP in a discussion of the charge questions and the three subgroups designed to answer the charge questions. The subgroups were created to direct each panelist's expertise to one or more of the following three categories: (1) characterization

of hypoxia, (2) characterization of nutrient fate, transport and sources, and (3) scientific basis for goals and management options. [Hereinafter these three subgroups will be referred to as subgroups 1, 2 and 3.] Charge questions are posted at http://www.epa.gov/sab/panels/hypoxia_adv_panel.htm.) The charge was generally accepted with the exception of charge question 3B which panelists felt belonged to the second subgroup. Panelists also had questions of Mr. Brown and Ms. Regas about the Panel's charge. The discussion covered uncertainty, nutrients, sediments, carbon and institutional designs. Panelists also discussed and questioned the origin of the previous goal [set by the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, hereinafter Task Force] for reducing the size of the hypoxic zone to 5,000 square kilometers. Panelists discussed the need for interaction among the 3 subgroups.

The public comment period did not involve any official public commenters, however Dr. Dale asked members of the audience to introduce themselves. Dr. Rick Greene of EPA's Gulf Ecology Division gave a presentation that followed the slides shown in Attachment B. Members asked questions of Dr. Greene as well as audience members. Topics discussed include the relative roles of nitrogen and phosphorus and their ratios, tile drainage, mass balance, nutrient balance, geographic differences, the effects of hurricanes on hypoxia, fertilizer rates, best management practices, monitoring and monitoring stations, flows from the Mississippi and Atchafalaya Rivers, temporal differences in water and nutrient flows, the relative merits of various watershed models and the relative merits of using hypoxic volume (versus size) as an endpoint. Questions were raised about the effects of hypoxia on living resources and members discussed the need to identify the benefits of reduction in the size of the hypoxic zone. Members also discussed the co-benefits in the entire Mississippi River watershed basin of reducing nutrient flows. The Chair suggested that cross-cutting issues could be pooled and discussed collectively. Members were asked to write a short paragraph that articulated their perspectives on the cross-cutting issues they had proposed for consideration. Key cross-cutting issues discussed include:

- broad-scale affect of local management
- tradeoffs
- unintended consequences
- changes in large systems (e.g., climate, hurricanes regimes, or agricultural practices)
- local benefits and co-benefits
- language issues (e.g., using different terms for same topic)
- quantitative estimates of uncertainty
- short-term versus long-term changes
- social and technological changes
- adequacy of monitoring data.

Discussion of these substantive issues spilled over into the late afternoon sessions that had previously been designated for discussion of a workplan. Toward the end of the day, Dr. Dale led a discussion of the workplan, emphasizing the need to complete a draft report

within 1 year.

The morning of September 7 began with the subgroup sessions described below. Attachment C lists the particular members of each subgroup.

Subgroup 1: Characterization of Hypoxia

Subgroup 1 discussed a number of issues that should be dealt with in their draft report, among them:

- Oxygen dynamics. The report should address what is known about how oxygen is delivered to water through vertical mixing and horizontal advection processes. The importance of sediment oxygen demand should also be addressed (e.g., processes such as highly reducing sediments on the shelf).
- The importance of various processes in different zones moving westward from the Mississippi River plume. These processes should include: the role of nutrients (e.g., nutrients are not as important in the plume as in other zones due to light limitation), physical processes driving hypoxia (e.g., stratification, mixing, the internal structure of currents, river discharge, wind stress, shelf waves or meanders), and interaction between physics and biology. A paper by Dr. Piers Chapman (Louisiana State University) describes stratification in different zones and should be reviewed.
- Sediment and carbon dynamics and the role of mobile muds associated with the Mississippi River and fluid muds associated with the Atchafalaya.

The following *action items* were agreed upon in Subgroup 1:

(1) Drs. Gilbert and Wright will develop a section on the state of knowledge of the physical processes controlling hypoxia (and the role of physics vs. non physics in control of hypoxia). This will include, but is not limited to, those physical processes identified in the following parts of the charge: 1(A)(i) - the importance of increased volume or funneling of fresh water discharge from the Mississippi River, 1(A)(ii) - changes in hydrologic or geomorphic processes in the Gulf of Mexico and Mississippi Basin, and 1(A)(iv) - increased stratification, and seasonal changes in the magnitude and spatial distribution of stratification and nutrient concentrations in the Gulf.

(2) Dr. Bianchi will develop a section on knowledge of the importance of biogeochemical processes in formation and maintenance of hypoxia in the Gulf. This section will address sediment and carbon dynamics (including particulate and dissolved organic carbon coming out of the watershed and the role of marsh erosion), and the role of mobile and fluid muds. Dr. Bianchi's section will address relevant parts of the charge: 1(A)(iii) - increased nutrient loads due to coastal wetlands losses, upwelling, or increased loadings from the Mississippi River Basin.

(3) Dr. Paerl will develop a section on knowledge of nutrient dynamics including nutrient

limitation in various parts of the Gulf, temporal and spatial shifts between phosphorus and nitrogen limitation, and perhaps silicon, and the linkage between the period of maximum production and hypoxia. Dr. Pearl's section will address relevant parts of the charge: 1(A)(iii) - increased nutrient loads due to coastal wetlands losses, upwelling, or increased loads from the Mississippi River Basin, and 1(A)(v) - temporal and spatial changes in nutrient limitation or co-limitation, for nitrogen or phosphorus, as significant factors in the development of the hypoxic zone

(4) Dr. Howarth will also develop the section on nutrient dynamics. Dr. Howarth will focus on the role of redox reactions.

(5) Dr. Conley will contribute to the section on redox reactions and will also develop a section on knowledge of historical changes in productivity and hypoxia in the Gulf.

(6) Dr. Sanders will develop a section focusing on part 1 (A)(vi) of the charge – the implications of reduction of phosphorus or nitrogen without concomitant reduction of the other.

Subgroup 2: Characterization of Nutrient Fate, Transport and Sources

Dr. Meyer led the members of Subgroup 2 in a discussion of the charge concerning the characterization of nutrient fate, transport and sources. Subgroup members volunteered to focus on particular issues listed within their charge. Subgroup 2 identified some “cross-group” issues and proposed the formation of small working groups to differentiate which part of the charge should be addressed by which Subgroup so as to avoid duplication of effort. On the issue of the “effectiveness of management practices” the group pointed out the overlap between charges 2.A.iii and 3.B.&C.

The following action items were agreed upon in Subgroup 2:

(1) Dr. Meyer asked Subgroup members to email additional citations to Wangness within the next couple of weeks, focusing on those most relevant to this review. Wangness will update a supplemental bibliography, and the Subgroup will prioritize those most relevant to their assignments.

(2) Prior to the October 16 conference call, Subgroup members will email an outline of their progress toward addressing their assignments for discussion during the call. Dr. Meyer requested that the material be provided to Wangness in the form of an outline so it can be used to start building the report.

(3) Prior to the November 21 conference call, Subgroup members will email an updated outline of their progress toward addressing their assignments as it relates to the incorporation of information from the Kansas City conference and Minneapolis Symposium.

Subgroup 3: Scientific Basis for Goals and Management Options

Dr. Kling led the members of Subgroup 3 in a discussion of the 5,000 square kilometer goal for the size of the hypoxic zone. Members again discussed a different approach for setting the size goal that would derive from a broad weighing of social benefits and costs. Members agreed that their subgroup could take a dual approach: first, advocating a cost-benefit type approach for setting the goal itself, and second, discussing means of achieving a previously set goal. Members discussed previous research that yields information on the relative efficiency of various best management practices and other institutional arrangements. Members acknowledged the difference between information derived from plot studies versus information derived from watershed studies. Members discussed various schemes for categorizing approaches to nutrient reduction. The Office of Wetlands, Oceans and Watersheds was implored to get information to the members about the U.S. Department of Agriculture's Management Action Reassessment Team (MART) report as well as information on the distribution of combined and sanitary sewer overflows in the Mississippi River Basin. Dr. Kling stressed the need to discuss the level of accuracy needed for Task Force decisions, the role of co-benefits in identifying control measures, possible antagonism or synergism between upstream and downstream measures, and the science needed to support decisions.

The following *action items* were agreed upon in Subgroup 3:

- (1) A Subgroup consisting of Drs. Crumpton, Snyder, Sharpley and Simpson would identify relevant literature (with a preference for synthesis) and develop an outline for the subgroup's approach to their particular charge.
- (2) Dr. Stallworth would investigate the possibility of a presentation of the Conservation Effects Assessment Project (CEAP) results at the next face-to-face meeting.
- (3) EPA's Office of Wetlands, Oceans and Watersheds will ensure that members will receive the Management Action Reassessment Team (MART) report as well as information on the distribution of combined and sanitary sewer overflows in the Mississippi River Basin.

Full panel discussion resumed after the breakout sessions with each subgroup chair reporting back to the Panel on the outcome of their particular discussions in the breakout sessions. Action items from those sessions are given above. In the afternoon, panelists discussed what information they would need in order to approach the charge, which scientists might be useful, and dates for future meetings and teleconferences. Although particular scientists were discussed, it was decided that subgroups would first need to identify precisely what questions were to be asked of any scientists brought into the discussion.

As a result of the afternoon's discussion, the following action items were agreed upon.

- (1) Drs. Howarth and Reckhow will pool their thoughts on useful models for Gulf of Mexico hypoxia and lead a discussion at the next face-to-face meeting on this subject.
- (2) Drs. Gilbert, Reckhow and Crumpton will discuss methods of identifying uncertainty and report back at the next face-to-face meeting on possible approaches the Panel might take.
- (3) The appropriate DFO will contact the U.S. Geological Survey about giving a presentation on the SPARROW model at the next face-to-face meeting.
- (4) Subgroup 1 would identify appropriate questions to ask of consulting scientists, primarily physical oceanographers.
- (5) The Science Advisory Board Staff Office would contact appropriate members regarding travel to the forthcoming workshop [Sources, Transport, and Fate of Nutrients in the Mississippi and Atchafalaya River Basins Conference](#) to be held: November 7-9, 2006 in Minneapolis, MN.
- (6) Drs. Simpson, Lowrance, Sharpley, Crumpton and Snyder would report back on their pooled information on the management of sources and sinks in the Mississippi River Basin.

Topics discussed in the afternoon include issues of scale and uncertainty.

On Behalf of the Panel,
Respectfully Submitted,

Holly Stallworth, Ph.D.
Designated Federal Officer

Certified as True:

Virginia Dale, Ph.D.
Chair, Hypoxia Advisory Panel