

**Minutes of the
U.S. Environmental Protection Agency
Hypoxia Advisory Panel
Public Meeting
December 6-8, 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. Walter Boynton
Dr. Andrew Sharpley
Dr. Don Wright
Dr. James Opaluch
Dr. Kyle Mankin
Dr. Tom Simpson
Dr. Alan Blumberg
Dr. Bob Howarth
Dr. James Sanders
Dr. Cathy Kling

Date and Time: December 6-8, 2006

Purpose: The Hypoxia Advisory Panel will listen to invited speakers on topics of interest to fill in gaps in information on Gulf of Mexico hypoxia and discuss how to respond to the Agency's charge.

SAB Staff: Dr. Holly Stallworth, Designated Federal Officer
Dr. Thomas Armitage, Designated Federal Officer
Mr. David Wangsness, Designated Federal Officer
Dr. Anthony Maciorowski, Associate Director for Science
Dr. Vanessa Vu, Director
Dr. Mary Belefski

Other EPA Staff: Rick Greene, Katie Flahive, Darrell Brown, John Wilson, Darrell Brown, Kavya Kasturi, Ben Blaney, Kathleen White, Amy Parker, Dan Kaiser

Other: Mark Peters, U.S. Department of Agriculture
Dan Jaynes, U.S. Department of Agriculture
Sheryl Kunickis, U.S. Department of Agriculture
Tom Purcell, API
Doug Daigle, Lower Mississippi River Sub-basin Committee
Janice Ward, U.S. Geological Survey
Richard Alexander, U.S. Geological Survey
Tim Miller, U.S. Geological Survey
Steve DiMarco, Texas A & M University
Jim Baker, Iowa State University
James Ammerman, Rutgers University
Don Scavia, University of Michigan
Bob Dean, University of Florida
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
Rob Magnien, National Oceanic and Atmospheric Administration
Libby Jewett, National Oceanic and Atmospheric Administration
Cary Lopez, National Oceanic and Atmospheric Administration
Don Parrish, American Farm Bureau Federation
Jim Porterfield, American Farm Bureau Federation

Attachments: Attachment A: Agenda

Presentations: Posted at http://www.epa.gov/sab/panels/hypoxia_adv_panel.htm

Meeting Summary

The presentations and discussion followed the topics 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) operates under the Federal Advisory Committee Act. She also mentioned that there were two requests from the public to speak.

Dr. Anthony Maciorowski, Deputy Director of Science for the SAB Staff Office welcomed members and thanked all the speakers for coming. He noted there were seven teleconferences since the September meeting that resulted with the expert speakers for this meeting.

Dr. Virginia Dale welcomed everyone and reviewed the agenda. She summarized the progress made since September and stated that the full panel would hear from the subgroup chairs with progress on charge questions. The goal after the meeting is to have a more formalized outline of the report and get a report drafted by the next meeting.

Subgroup 1 - Characterization of Hypoxia

Dr. Jim Sanders gave a presentation on the status of the subgroup with respect to their charge on evaluating the information on the Gulf of Mexico and hypoxia including what is known and what is needed. The issues covered included the physical context, the circulation systems, the carbon loads, nutrient inputs and cycling, historical evidence for hypoxia, roles of nitrogen, phosphorus and silica, and reductions of nitrogen and/or phosphorus. Panelists discussed the relative importance of each of their points and concluded at this stage it was too early to attempt to do any prioritization. The panel members discussed issues about carbon and oxygen; availability of bioassay data on nitrogen and phosphorus; lack of measurements on sediments or water column rates; wetlands significance on loadings; atmospheric deposition contributions; and possibility of separating Gulf into physical “regions” east and west of the Atchafalaya River.

Subgroup 2: Characterization of Nutrient Fate, Transport and Sources

Dr. Judy Meyer presented the changes in nitrogen and phosphorus flux calculations and methodologies since the last assessment. She noted that although subgroup 1 highlighted carbon in the Gulf, her subgroup had not given a lot of consideration to carbon loads. She also mentioned that one of the major changes in the calculations is that the USGS changed the calibration period for regressions from a 10 year period to a 5 year moving window, and throughout the presentation identified any data gap needs. Changes of note included: changes in methods and some changes in source overall loadings; decreases in the number of monitoring stations and point source loadings; increases of total phosphorus, especially in the Spring; and decreases of flow and nitrogen loads annually. Dr. Meyer also mentioned the overlaps with subgroup 3 on tile drainage impacts and fertilizer application and cropping systems. The panel members discussed various issues including: carbon data and getting more on what is available; identifying need to define gaps and their importance; adequacy of the new loadings estimates and methodology versus the previous; need for evaluating uncertainties and confidence intervals; methodology to evaluate point sources not improved since last assessment; data gaps on sources of phosphorus; availability of sub-basin information; and changes in monitoring stations and what would be needed.

Subgroup 3: Scientific Basis for Goals and Management Options

Dr. Cathy Kling’s presentation included a review of Subgroup 3’s charge questions along with a discussion of a broad outline for responding to the questions, and a review of the old and new information available. She noted that for answering the question III.B. (level of reduction in

causal agents needed to achieve the current reduction goal for the size of the hypoxic zone) that input would be needed from Subgroup 1. Dr. Kling also noted that future considerations for ethanol use might change decisions on cropping systems within the Cornbelt areas. The panel members discussed estimates of phosphorus from plant nutrient use and animal waste, the locations and amounts used for application of nutrients, research on agricultural practices needed, and a discussion with the panel and audience on what other information or studies might be available.

Invited Speaker Presentations

The afternoon session began with a presentation by Dr. Don Scavia on the “Science and Policy Context” for the hypoxia assessment. Dr. Scavia mentioned that in addition to his leadership on the integrated assessment, he also had represented the Department of Commerce on the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. He emphasized that the non-government organization (NGO) petition to EPA and the signing of the Harmful Algal Bloom and Hypoxia Research and Control Act (HABRCA) bill started the policy actions on Gulf hypoxia. Dr. Scavia noted that the prior science reports were peer reviewed and underwent a public comment period that resulted in no changes to the report conclusions. He presented and reviewed the conclusions from the reports and also mentioned that for one issue – organic carbon – a separate consensus meeting was conducted which concluded that organic carbon was deemed not to be a significant source. In addition to what was presented by Subgroup 1, Dr. Scavia highlighted the following points from the previous assessment: hypoxia increased since the 1950’s; nitrogen is the main driver; phosphorus was a factor; reduced nitrogen loads showed effects on water quality exceedances within the hydrologic unit code (HUC) (a code consisting of two to eight digits based on the four levels of classification in the hydrologic unit system); Dr. Bierman’s model (the only one used for the Action Plan showed the effects of reduced nitrogen loads on increasing oxygen levels; Mitsch’s report (Report 5) provided options for reducing nitrogen loads; and for the Doering report (Report 6), the decision was made to not do a cost benefit analysis, but do cost effectiveness. Dr. Scavia then explained that the Action Plan was based on the Integrated Assessment, public meetings and comments, and lots of interaction with groups. To address one of the questions from the September meeting on the goal of 5000 square kilometers for the hypoxia zone, Dr. Scavia said that the decision was a negotiated public policy debate with some science underpinnings done publicly at the Task Force meeting. Dr. Scavia also reviewed the 11 actions set forth in the action plan and noted that the 11th action was not to reassess the science, but to assess the nutrient loading reductions.

The Panel members discussed the differences between the annual and seasonal fluxes of nitrogen and the increased interest in and publications on organic carbon in the rivers. When Dr. Scavia was asked what could have been done differently, he responded that there was not enough discussion in the reports on the dual relationship between nitrogen and phosphorus.

The next session provided information on each of the Action Plan Reassessment Symposia sessions conducted during 2005 and 2006. Mr. Dean Lemke and Dr. James Baker presented information from the *Upper Mississippi River Symposium* that took place in September of 2005

in Ames, Iowa. Highlights from their presentation included looking at the importance of hydrology and land uses; nutrient adsorption and transport mechanisms; understanding the differences between tile drainage and rolling landscapes; evaluation of nitrogen management potentials; considering manure as well as fertilizer; and that improvements should be incremental.

On the *Gulf symposium*, Drs. Rick Greene and Allen Lewitus mentioned that four of the manuscripts from the symposia are still in review. They emphasized most of the symposium discussions were already discussed at the September HAP meeting. Highlights of their discussion included: the annual nitrate fluxes are poorly related to area of hypoxia; the statistical models suggest that spring/early summer nutrient fluxes are good predictors of mid summer size hypoxia; that for the biogeochemistry in the Gulf, the effects vary spatially; few models are available for understanding hypoxia and all of them have limitations; and one of the known models provided the basis for the goal with a 30-45% reduction.

For the *Lower Mississippi symposium*, Mr. Doug Daigle's presentation identified two overarching goals for the Lower Mississippi: 1) to identify nutrient loading and removal; and 2) to identify opportunities for management actions to reduce loadings. He highlighted the following: the symposium did not succeed on the first goal since the papers/studies are not complete yet, EMAP won't be done until 2009, and CEAP information is not ready yet. Mr. Daigle also stressed that the Lower Mississippi is different from the Upper and is flatter with different characteristics; monitoring capacity is very limited. For the symposium's second goal on management actions and opportunities, the focus was on wetlands because of the "sinks" in the Lower Mississippi. Papers were presented on the efforts in forestation; the role of the Atchafalaya River; and the role of funding.

Janice Ward gave a presentation on the *Fate and Transport symposium* just completed in December. Her highlights included the following: that there are still gaps and research needs for Gulf hypoxia; for nutrient nonpoint sources for nitrogen and phosphorus, crops varied by 8% but fertilizer use increased 100% ; different sources need different controls; the National Resource Inventory lost ability since 1997 to find sub-surface drainage; for point sources regular monitoring is not done within States for nitrogen and phosphorus, and wet weather sampling uncertainties; Ohio sub-basin showed slight increases in loadings, although not great; there is a need for frequent long term monitoring data from multiple years; and there is some controversy on phosphorus and phosphate. For gaps and research needs on phosphorus she mentioned evaluating flows and fluxes on a decadal or five year time scale; setting the goal based on spring instead of annual loadings; incorporating the role of P lag times into models; adding tile drainage in models; and evaluating effects of high nutrients on chlorophyll, fish and other factors.

The panel then discussed several issues with the speakers concerning the loadings from the Atchafalaya, the limitations for nitrate reductions in the Farm Bill, use of annual versus monthly loadings in the use of models, and the need for information on fertilizer and its applications.

The next session allowed time for public comments. Mr. Don Parrish speaking on behalf of the American Farm Bureau made a presentation with charts depicting little historical variation in nutrient use. Mr. Parrish also discussed nitrogen removed versus nitrogen applied in different States, emphasizing differences among the states in this ratio. He concluded by questioning where the excess loadings of nutrients are coming from, and questioned whether further fertilizer reductions would keep the same crop productivity levels.

Michelle Perez with the Environmental Working Group (EWG) summarized highlights from a report done by EWG. Three findings in the report were that: 1) 80% of problem appears in a small number of states in Midwest -- Illinois, Iowa and Indiana; 2) commodity spending far outweighs conservation spending; and 3) targeting is not happening. She noted that targeting can be used to address problems, however, 11,000 farmers were turned away from the Environmental Quality Incentives Program (EQIP) funding in IL, IA, and IN. Management actions should consider nutrient management planning in the highest loading areas as a prerequisite for receiving taxpayer subsidies.

Dr. Dale then asked if there were any other public comments and there were none. The Panel members then asked for some clarifications on Mr. Parrish's presentation.

The Roundtable Session on hypoxia related activities began with a presentation by Dr. Bob Kellogg with USDA who focused on the Conservation Effectiveness Assessment Program (CEAP) program report. He mentioned that CEAP was a national assessment that included 37 watershed studies with a focus on cropland and field level treatment needs. The interim report will be completed by the end of January 2007 and will be based on two years of data. The final study will have a focus on risk assessment and be completed in December of 2008. Dr. Kellogg's presentation may be found on the SAB website.

Katie Flahive of EPA provided an update on the Management Action Reassessment Team (MART) report. The report focuses on the Action Plan items 9 and 10 and other program indicators. The report provides information on the Conservation Reserve Program (CRP) for all enrollees in the United States. She then discussed the 2006 point source reassessment report which summarizes 2004 data. She mentioned the following differences in study results: Biological Oxygen Demand (BOD) was not included in 1998 and now was included; of the facilities, the majority of the loads came from sewage treatment plants; graphics with loadings broken out by sub-basins for nitrogen, phosphorus, and BOD; facilities almost tripled from 1998 to 2004; there are few permit requirements for nutrient parameters; and state requirements for nitrogen and phosphorus monitoring vary. Ms. Flahive's presentation may be found on the SAB website.

In the next presentation, Mr. Tim Miller of USGS pointed out that: 1) USGS monitoring is done for multiple purposes; 2) USGS monitoring choices are based on trade-offs of special, temporal and other coverage; and 3) USGS constantly changes protocols for sampling and analysis. He then discussed the New Mississippi Monitoring Network and emphasized that different monitoring sites have different protocols. At the lower end of the Mississippi are a number of

continuous monitoring sites. Others are sampled every several times each year or two. Regarding his slide on “Flux to Gulf of Mexico: Streamflow,” Mr. Miller cautioned that a shift in one year’s data can create a large shift in what the data looks like. He referred the Panel to the website <http://toxics.usgs.gov/hypoxia>. Mr. Miller’s presentation may be found on the SAB website.

Panel members then asked clarification questions for the roundtable speakers. Panel members noted that additional monitoring on the lower Mississippi is sorely needed because existing monitoring could lead to incorrect estimates of up to 40%. They also noted the lack of accuracy in state assessments. Models can be refined as more field data becomes available. Panel members noted that the CEAP draft report would be out for review in February and final in June and asked Dr. Kellogg if the report would contain information helpful to the Panel’s deliberation. Dr. Kellogg wasn’t sure it would be since his group is looking to the watershed studies to validate the national model. If the directions and general magnitudes are similar, it will give them more confidence in the results of the national model. Ms. Flahive mentioned she can provide information on concentrations by basin from the Permit Compliance System (PCS) database. She is preparing a huge spreadsheet for the Panel with individual calculations for every facility in the basin. That spreadsheet will include the estimated total concentration of phosphorus (TCP). Discussions followed on some limitations for expenditures on conservation programs, trying to get accurate costs for practices like terraces in place for a long time, and considering maintenance and operation costs. The Panelists asked Mr. Miller whether the Panel would be given information on the earlier monitoring sites as well as the current ones. Miller hadn’t planned on it, but if the Panel poses a question USGS will try to provide the information. When questioned on the selection of monitoring sites, Mr. Miller observed that a 2003 or 2004 GAO report on monitoring programs addresses the issues of site location pretty well. Mr. Miller’s presentation may be found on the SAB website.

Dr. Dale asked people to send websites to Dr. Stallworth when new information becomes available. She then opened the floor to any questions for any of the speakers, not just the last roundtable. There was a discussion on the importance of the silica-phosphorus ratio and diatoms.

Dr. Dale outlined the process the Panel will use. The plan is that, at the end of this meeting, the Panel will have an outline of what the report will look like. This will be distributed to the Panel about a week later to guide the writing. Writing assignments should be submitted by February 5. A draft will be posted at the SAB website and there may be a Panel conference call between then and the next face-to-face meeting, February 28-March 2. The Panel will work on the draft further at that meeting and may need additional speakers to provide information to help them with report completion. The process would be summarized again before the end of the meeting. It was noted that it will be increasingly difficult to add new or overlooked information after February 5. Dr. Stallworth noted that the first draft is really an opportunity for the panelists to read each other’s writing and offer feedback.

December 7 Presentations and Discussion

The first session on December 7 was a roundtable discussion on modeling. Dr. Howarth introduced the roundtable presenters. Mr. Alexander provided an overview of the Spatially Referenced Regression on Watershed Attributes (SPARROW) model which is a hybrid of mechanistic and statistical structure. In his presentation he noted that the model is data driven; that it is important to characterize movement through the system. SPARROW reflects long term steady states and predicts long term removal processes; predictions are at the reach and watershed scales. He also mentioned that for management implications some areas are more cost effective for removal than others. The recent advances to the model include more complexity but more accuracy. USGS is applying it to the 25,000 basins in the Mississippi and Atchafalaya Rivers with steps to expand the model nationwide. He is hoping they will complete work by 2008. Mr. Alexander's presentation may be found on the SAB website.

Mr. Jeff Arnold made a presentation on the Soil and Water Assessment Tool (SWAT) modeling application. Mr. Arnold described SWAT as a continuous time model overlaying slope and land use. A lot of work was done on tiles with Dr. Jaynes. SWAT's design drawdown time component is now being modified to include spacing for better representation of the water table. The model is looking at monthly flows and total loads of nutrients and sediment. Future plans include trying to divide or subdivide watersheds into landscaping to get a more realistic picture of what is happening, and looking at other parameters, such as pathogens. Mr. Arnold's presentation may be found on the SAB website.

Dr. Scavia gave a presentation on his model, which he contrasted to the "big scary" models like SWAT and SPARROW. Rather his model looks at the "sweet spot" or the simplest explanation for hypoxia in the Gulf. The model applies classical engineering to evaluate whether the Mississippi River nitrogen load can be used as a surrogate for BOD. Highlights of his presentation include: recognition of the role of the Atchafalaya River; the possibility of treating the hypoxic "zone" as a "river" with a length, width and depth; use of the point source Streeter-Phelps model for BOD and DO; comparison of the Mississippi/Atchafalaya DO loads with the hypoxia area. Dr. Scavia's presentation may be found on the SAB website.

The Panel members asked questions of the speakers on the models.

In the afternoon session, Dr. Ammerman gave a presentation on "Nutrient Dynamics." Highlights from his presentation included: nitrogen loading has stabilized or declined since 1980s, and the Corps river flow data and loadings are highest in the Spring. Dr. Ammerman also discussed the use of nutrient bioassays; use of fast rate fluorometry as a way to assay the health of the phytoplankton quickly; rate measurements of alkaline phosphatase and whether or not it can be an indicator of phosphorus stress; high activity of plankton shown at only low level of phosphorus; temporal patterns of the ratio between nitrogen and phosphorus; and a host of other scientific issues. Dr. Ammerman stressed that any phosphorus limitation was the result of excess nitrogen.

Panel members engaged Dr. Ammerman on a range of issues.

Dr. Steven DiMarco then gave a presentation on the *Physical Oceanography in the Gulf*. He explained the various physical factors and their seasonality in the Gulf of Mexico such as wind, flows sediment deposition. Dr. DiMarco also highlighted how the factors affect the development of hypoxia, the role of stratification and loadings, the potential for different zones within the Gulf of Mexico, and the data collected on the physical parameters before and after hurricane events. Dr. DiMarco's presentation may be found on the SAB website.

Panel members asked several questions about the physical zone concept and the data collected.

Drawing Coastal Louisiana's New Map was the topic for a presentation by Dr. Robert Dean who chaired the committee developing the report for the National Academies on the degradation of the Louisiana coastal ecosystem. He explained how the focus of the review changed in terms of funding, time, and leadership responsibility. Dr. Dean then commented on the preliminary questions posed by the Panel concerning the Army Corps of Engineers coastal restoration plans in Louisiana and the likelihood of implementing diversions in the lower Mississippi River, and how the report findings might impact hypoxia in the Gulf. Dr. Dean's presentation may be found on the SAB website.

Dr. Dan Jaynes gave a presentation on *Agricultural Nitrogen and Phosphorus Management Practices* with a focus on the Midwest soybean and Cornbelt areas. He discussed the trends: increasing row crop production, precipitation, and overall drainage and flow, followed by a detailed discussion on the potential nutrient management solutions. Of the solutions presented Dr. Dean focused on fine-tuning nitrogen fertilizer rates, modifying tile design and management, and using cover crops and new crop rotations. Also, he emphasized the need for incentive programs. Dr. Jaynes' presentation may be found on the SAB website.

The Panel had a question and answer discussion among members and with Dr. Dean on the management practices and their economic implications.

Cost and Benefits of Methods to Reduce Nutrient Loads was the topic of the final afternoon presentation given by Dr. Marc Ribaud. Dr. Ribaud reviewed recommendations and goals presented in the hypoxia science assessment reports 5 (effort led by Dr. Bill Mitsch) and 6 (effort led by Dr. Otto Doering). He presented background information on the U.S. Map Programming (UMAP) model, explained how it was used to evaluate costs inside and impacts outside the Mississippi River Basin, along with some in-stream benefits, and discussed conclusions reached. Dr. Ribaud's presentation may be found on the SAB website.

The Panel had a discussion about model developments and farming production changes since the science assessment reports were produced .

Dr. Dale reviewed the room assignments and goals for the December 8 Subgroup meetings.

December 8 – Subgroup Discussions

Subgroup 1 - Characterization of Hypoxia

Dr. Sanders conducted the session with group members. The purpose of the breakout session was to discuss any changes needed in the outline of the Panel report (the outline had previously been distributed to members) and to discuss technical issues with the invited experts (Drs. Don Scavia, Steve DiMarco, and Jim Ammerman).

Dr. Sanders reviewed the report outline with the group members and stated that a draft of the subgroup's report was to be completed in early February. He indicated that he would develop a first draft of the report based on material that had been prepared by the members. He stated that he would organize the material according to various subheadings of the outline and send a draft to members for comment. The draft would then be revised based on subgroup member comments and discussed on a subgroup teleconference. Members agreed to hold the subgroup teleconference on Friday, January 26 from 9:00 a.m. – 12:00 noon eastern time.

Subgroup members posed a number of questions to the invited experts to focus attention on the group's charge. Several topics were discussed including the Scavia model characteristics, destratification issues, and limitations and strengths of the three models presented (Bierman's, Turner's, and Scavia's).

Dr. Sanders stated that, in addition to answering questions about the state of the science, the group had been asked to comment on the level of reduction needed to meet hypoxic zone targets. He noted that managers needed this information and observed that the Scavia and Bierman models were available and might be used to develop targets. He asked the group to discuss how these and other models could be used to evaluate levels of nutrient reduction needed. The group discussed factors that could be manipulated in the models to evaluate the effects of nutrient load reductions.

The group discussed new information that has become available since the last assessment. Members noted that nitrogen is still thought to be a major driver of hypoxia. It was noted that a model was not available to evaluate phosphorus. However phosphorus has been identified as a driver of hypoxia because of the increase in nitrogen. It was also noted that more information is needed on organic carbon.

The group discussed nitrogen versus phosphorus reduction. (Several members noted that both nitrogen reduction and phosphorus reduction would be the best management approach. A member stated that a target is not currently available for phosphorus reduction but this should not lessen the focus on nitrogen). Among other issues discussed were; the importance of "hidden" processes that may contribute to hypoxia (phytoplankton activity within the Mississippi River; productivity below the pycnocline, and sediment nutrient fluxes); paleontological data on productivity and hypoxia (it was noted that the available data indicate

that hypoxia was not prevalent until the 1950s and also more information is needed to determine whether pigment in the sediment was a result of increased production in the water column or diagenetic processes); and zonation of the hypoxic area (as depicted in the figure from the Rowe and Chapman). A member asked whether the group was charged with recommending changes in the 5,000 square kilometer target established for hypoxia. The subgroup discussed whether different regions (e.g. east and west of the Atchafalaya) in the Gulf of Mexico should be considered. A member stated that the target of a 5,000 square kilometer hypoxic area was not well justified. The group agreed that the report HAP report should identify criteria that might be applied to develop a management target for the size of the hypoxic region.

Dr. Sanders stated that he would be sending them a draft for review before the conference call on January 26.

Subgroup 2: Characterization of Nutrient Fate, Transport and Sources

Dr. Judy Meyer led Subgroup 2 in a discussion of work assignments related to the new report. The subgroup confirmed their assignments related to Section II of the charge (Characterization of Nutrient Sources, Fate, and Transport). Several of the technical experts that made presentations to the Panel participated in the discussions. Jeff Arnold and Rich Alexander addressed additional questions related to modeling and Dan Jaynes addressed questions related to nutrient management approaches. Jeff Arnold provide the subgroup with several recent articles describing SWAT modeling results, including a recent draft report describing its historical use and future needs. Rich Alexander described a current draft report describing SPARROW modeling results that can be made available to the subgroup in January, 2007.

Several action items related to writing assignments and scheduled discussion/deliberation by Subgroup 2 and the Panel were noted:

- Subgroup 2 was asked to provide their first rough drafts to Dave Wangsness by January 19 so that he can compile them into the current outline and redistribute them to the group for discussion during their conference call, which currently is scheduled for January 25, 2007 at 10:00 Eastern.

- Individual sections of the rough draft should be updated based on discussion during the conference call, and resubmitted to Dave Wangsness by February 5 so that the DFOs for the three subgroups can merge their respective rough drafts into a draft report for discussion and deliberation by the entire panel during their conference call, which currently is scheduled for February 12 starting at 9:00 A.M. Eastern.

- Following deliberation by the panel during the February 12 conference call any revisions or updates should be submitted to the respective DFOs so that they can update the draft report and redistribute it for deliberation by the panel during the next meeting, which currently is scheduled for February 28 – March 2, 2007.

Subgroup 3: Scientific Basis for Goals and Management Options

Dr. Cathy Kling led the group in a discussion of work assignments related to the new report

outline during a 2-hour breakout session on Friday, December 8. The subgroup reviewed and confirmed their assignments related to their charge for the Scientific Basis for Goals and Management Options. Several of the technical experts that made presentations to the Panel on December 7 participated in discussions during the breakout session. Dr. Marc Ribaudo provided more details and answered questions on his work related to the cost and benefits of nutrient load reductions. Subgroup members confirmed assignments and agreed to have a teleconference on February 20.

During the final general session on December 8, Dr. Dale led the Panel in a review of highlights or any questions for the overall Panel. The Panel clarified which subgroup was handling the various aspects of the charge related to the goal (Subgroups 1 and 3), reviewed the schedule for developing their report, and confirmed the dates for the Subgroup and Panel teleconferences (Subgroup 1, January 26; Subgroup 2, January 25; Subgroup 3, February 20; Panel, February 12) and for the next face to face meeting (February 28-March 2, 2007).

On Behalf of the Panel,
Respectfully Submitted,

/Signed/

Holly Stallworth, Ph.D.
Designated Federal Officer

Certified as True:

/Signed/

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