MEMORANDUM

Subject: Comments on the May, 2007 EPA Science Advisory Board's Hypoxia Advisory Panel Draft Report

To: Holly Stallworth, Ph.D., Designated Federal Officer
Hypoxia Advisory Panel
EPA Science Advisory Board

From: Darrell Brown, Chief /s/
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Date: June 29, 2007

We appreciate the opportunity to comment on the draft report. We commend the SAB's Hypoxia Advisory Panel and the SAB staff for their excellent work. The draft report is very detailed and comprehensive and reflects both the extensive expertise of the Panel and your commitment to meeting our difficult deadlines.

In general, we accept most of the findings in the draft report with no comment. There are several points for which we request your additional consideration. The following comments from the EPA Office of Water (OW) include comments from the Office of Wetlands, Oceans and Watersheds, the Office of Wastewater Management, and the Region 6 Office and are organized by OW Office.

Office of Wetlands, Oceans, and Watersheds (OWOW)
Comments on EPA SAB Hypoxia Advisory Panel Draft Report

1. We appreciate the scientific basis of the conclusion that the optimal choices to reduce nutrient loss from agricultural sources will likely include a mix of practices including: drainage water management, conservation tillage, manure management, changing fertilizer application rates and timing, crop rotation, cover crops, conservation buffers, and wetlands enhancement. While the SAB notes that agricultural voluntary reduction agreements "are not likely to be adequate on their own to achieve significant reductions in nutrient runoff" (p. 127) from farms, additional recommendations regarding how to target specific practices to watersheds throughout the basin would assist our policy debate. If the SAB Panel requires assistance in determining additional research sources regarding the effectiveness of these practices, we can provide assistance.

2. We acknowledge the recommendation that economic incentives are needed to change behavior and that nutrient-reducing practices are less likely to result in actual N and P reductions without some change in the present structure of economic incentives. We also recognize the importance of the statement that current economic incentives favoring corn-based ethanol production could nullify other efforts to reduce hypoxia and enhance water quality. Can the panel cite additional evidence of the effectiveness of different incentives, especially in light of the recommendations for a mix of actions and the broad geographic and political scope of the Basin?

3. On page 94 of the document, P transport by tile drains in agricultural regions is discussed. In this section it says that the P desorbs from sediments if concentration in the water is less than in the sediments. With the conclusion that P loads need to be reduced and agricultural wetlands are not necessarily known for effective retention of P, what is the SAB recommendation for controlling this potential source of P? Is the recommendation for more monitoring, better management of controls, or altering the design of some of the BMPs to better address the future contributions from agricultural lands?

4. The draft report does not adequately recommend how to best coordinate the seasonal variability in nutrient flows (e.g., the springtime flush) with the recommended management options. OWOW requests further clarification on whether the Panel's management recommendations could be designed to capture the spring flow and whether they would be both sufficient and available at the appropriate time to minimize the size of the hypoxic zone in the Gulf of Mexico?

Office of Wastewater Management
Comments on EPA SAB Hypoxia Advisory Panel Draft Report

The report contains some broad statements concerning recommendations for what should be done to reduce loads from point sources. Many of these statements lack data or other

support. An expanded discussion on the reasoning behind the reports recommendations in regards to management of point sources considering their relative contribution to the hypoxia problem would be useful. The following are examples of areas in the report that include these broad statements, lack of data and focus without explanation.

1) The report contains data indicating potential ranges for the contributions of N and P from point sources. Page 88 includes data indicating point sources may contribute 22% of the N and 34% of the P. Pages 165 and 166 include discussion of the need to invest heavily in reducing the N and P loadings from point sources.

2) Page 113-114 also includes discussion of the need to invest in point source reductions, specifically, "A start should be to address point sources of P in the basin." The section indicates there could be "about a 21% reduction in total P loads." The section does not provide any data or cite to any studies to support this. Also the report does not provide any discussion of the cost for this versus cost to address nonpoint sources.

3) Page 114 includes a recommended goal for reducing nonpoint source P, but provides no suggestion for how this will be achieved. Page 115 includes discussion of reductions achieved in the Great Lakes but no discussion of how it was achieved. For example, was it through BMPs controlling runoff or through product bans?

4) Page 115 explains "the initial goal for P reduction suggested here – approximately a 40% reduction with half coming from point source reductions and half from non-point sources". No explanation is given for why this makes sense given the fact that point sources contribute less than half the total load. Additional information on the relative contributions of non point sources and point sources to phosphorus loads as well as citations might help with the clarification (See Region 6 comment 2c for additional information). Also, there is no discussion of approaches to implement the proposed effluent limits without supporting water quality criteria.

5) Page 165 states, "Permitted point source dischargers are not the dominant source of N or P in the MARB, representing about 22% and 34% of the average annual total N and total P flux to the Gulf, but they are an important source that is growing, and they appear to be cost effective to reduce." The section provides no explanation for why "they appear" to be cost effective. Page 165 also states, "in the Chesapeake watershed, nutrient reductions from sewage treatment plant upgrades have proven to be as cost effective and more certain than estimated reductions from agricultural best management practices." There is no data provided to support this statement.

6) We would request clarification on the discussion surrounding the calculation of point source inputs of N and P, with a clear statement of what conclusions the evidence supports. It appears that the recalculation of seven (7) data points (listed in Table 17, p. 259) was used as the basis for adjustments to 6,560 values, and as a basis for the entire discussion of the point source loads to the MARB. Also, the "% Diff" label in Table 17 is misleading, the figure in that column is the "% of the Measured Value",

and the "% difference" is lower. These are *critical points* as they form the basis for much of the discussion on point sources, as stated on page 259.

7) We would also request further elaboration and clarification on section 4.5.8 "Most Effective Actions for Industrial and Municipal Point Sources." Although it is listed under the "Cost Effective Approaches to Implementation," relative costs are not adequately considered. We provide the following information for your review:

   a) Upgrading municipal wastewater treatment plants to achieve total nitrogen concentrations of 3 mg/l and total Phosphorus concentrations of 0.3 mg/l is currently achievable in most cases. The current limit of technology is considered 3 mg/l total nitrogen (TN) and 0.1 mg/l total phosphorus (TP). The capital and operation and maintenance (O&M) costs to achieve such low levels are high as demonstrated in some limited case studies, including a study of enhanced nitrogen removal costs for plants in the State of Maryland (see *Refinement of Nitrogen Removal from Municipal Wastewater Treatment Plants* 2004, comment 7c, below). Generally speaking, unit costs (per pound of N or P, or per gallon of influent) increase significantly when very high removal efficiencies (e.g. over 90% P removal efficiency) are required to meet very low discharge limits. Costs are also significantly higher for plants that do not already meet some partial limit of removal. As such, requiring very low discharge limits for POTWs is often not the most cost effective method of achieving nutrient loading reductions.

   b) Unit Costs for Municipal Nitrogen and Phosphorus removal

      The EPA's Office of Wastewater Management is currently developing a reference document which will provide technical information to regulators on municipal nutrient removal technologies effectiveness and reliability. The document will also include a limited number of case studies focusing on performance and cost associated with the unit processes selected. The final peer reviewed document is scheduled for completion in early Spring 2008. In an initial literature review performed for this project, we found very limited published information of capital and O&M costs. The cost information was limited in scope and included costs for only some of the categories needed to allow an appropriate comparison among the plants. Capital costs were limited and varied widely, depending upon the target limit, site conditions, and the existing facility that needed to be upgraded. O&M costs were also limited and varied, due to many differences in the original process that had been retrofitted or upgraded, and the variation in costs of power, chemicals, sludge handling, and staffing level.

      A limited number of papers have been presented at various WEFTEC and other conferences which include some cost information for particular plant upgrades. However, we are not aware of comprehensive up-to-date published studies of costs incurred by plants for meeting alternative discharge limits which take into consideration a wide range of design features and operating conditions as they would apply to various unit processes for nutrient removal. Such a comprehensive study will require a significant investment and some time to implement. However,

the document below can provide a reasonable picture of potential capital costs for nitrogen removal.

c) *Refinement of Nitrogen Removal from Municipal Wastewater Treatment Plants* – December 2004, Prepared for Maryland Department of the Environment by George Miles & Buhr & Gannett Fleming

This study evaluated wastewater treatment plants in the State of Maryland to determine the feasibility and estimated cost for achieving nitrogen reductions, down to a lowest enhanced nitrogen removal (ENR) limit of 3 mg/l TN. Maryland already had a biological nutrient removal (BNR) program to reduce nitrogen discharged from its 66 plants (with a treatment capacity of 0.5 MGD or higher) to a goal of 8 mg/l TN. Of the 66 plants assessed, twenty plants were identified for this detailed study and the estimated cost results were extrapolated for ENR implementation at the 66 facilities.

The study included an evaluation of pertinent plant factors such as the existing treatment processes, site restrictions, and current performance. It provided an independent engineering evaluation based on existing operating data, modeling, and cost effective alternative evaluations. Input from POTW owners was subsequently obtained prior to preparing the final report findings and recommendations. In terms of the ability to achieve the low 3 mg/l discharge limit, the study found that while the limit is achievable, it may be difficult for plants receiving an influent organic nitrogen concentration exceeding 1 mg/l to achieve the TN ENR goal of 3 mg/l even with the advanced technologies.

Estimated capital costs per pound of TN removed for ENR improvements ranged from $0.55 to $30.29, with an average of $5.90. These were in September 2004 dollars and calculated by amortizing the estimated capital costs over 20 years at 3% and dividing by the reduction in annual TN discharge. The capital cost per gallon per day treated for ENR improvements ranged from $0.21 to $4.18, with an average of $1.32. Based on a total rated capacity of all plants targeted for ENR of 603.5 MGD (excluding Blue Plains), and the average ENR cost per MGD, the estimated statewide capital cost for ENR improvements (from an existing BNR level) was $800 million. The annual O&M cost implications of this nitrogen removal infrastructure will be an additional burden on State payers. Please note that the entire wastewater collection and treatment needs for the State of Maryland documented in the latest 2000 Clean Watersheds Needs Survey (categories I through IV) totaled $4.08 billion (in January 2000 dollars).

A copy of the full report is available upon request.

8) The SAB panel should provide additional analysis on the effects of the implementation of the CAFO rule on water quality in the MARB. Many states in the Basin have low percentages of CAFOs that are permitted, 6% in Iowa for example. We believe that complete implementation of this rule would significantly reduce

nutrients in this Basin. In general, the position of the Panel is unclear and the report should be more specific in terms of the Panel's recommendations on this topic.

The report does mention animal livestock as a source of nutrients to impaired waters, but only briefly. The concentrated animal feeding operations (CAFO) regulation published in 2003 estimated that based on full implementation of that regulation on the 15,500 CAFOs that existed at the time, 166 million pounds of nutrients would be reduced (56 million in phosphorus, and 110 million in nitrogen), as well as 2.1 billion pounds of sediment. Implementation would occur through EPA's NPDES program. Please see attached chart for more information on the percent of CAFOs permitted by state.

Additionally, while in 2003, approximately 15,500 CAFOs existed, it was estimated that an additional 238,000 smaller animal feeding operations (AFOs) existed in the US as well. While CAFOs present the majority of the nutrient and sediment related runoff from the animal livestock industry the SAB should provide further discussion on the benefits that would be gained from ensuring that all AFOs get nutrient management plans and implement them properly. USDA offers several cost share programs to assist farmers in developing these nutrient management plans and this report could assist in promoting these programs.

The report does discuss in some detail the fact that many states are still applying manure or artificial fertilizer according to the nitrogen content of the soil and goes on to describe how it has been discovered that these nutrients should rather be applied according to the amount of phosphorus in the soil. While this issue is presented in the report, it doesn't go as far as to include in its findings that Basin states should convert to applying based on phosphorus where appropriate and overseen by the agricultural agencies in the states. Listed below are additional references on the subject:

> CAFO Final Rule. 2003. 40 CFR 9, 122, 123, 412.
> Docket number: EPA-HQ-OW-2002-0025
> Addition information – Docket number: EPA-HQ-OW-2005-0037

We recommend that the panel analyze a recycle program which turns manure into biofuels. Last year, EPA's Innovative Action Council focused on what actions could make the most difference in the agricultural arena to reduce nutrient runoff. Of all the possible scenarios, the consensus was to focus on energy production from biomass, including, of course, manure. Taking manure off the land and using it for energy production is a win-win solution. NY City, for example, has declared that 30% of its energy consumption will come from biofuels. The technology is here and this report could go a long way to promoting it.

Office of Science and Technology
Comments on EPA SAB Hypoxia Advisory Panel Draft Report

1. We support the need for identifying the sources of nutrient pollution in the Mississippi Atchafalaya River Basin (MARB) and their contribution water quality problems and to the development of the hypoxic zone in the Northern Gulf of Mexico. We request that the Panel also address water quality problems within the MARB and discuss those water quality issues that can be addressed on local, state and regional scales that will benefit both local water quality and reduce nutrient loadings to the Northern Gulf of Mexico. We can contribute information on water quality problems such as waters impaired by nutrients, excess nitrate in drinking water, harmful algal blooms in freshwaters, and information on how nutrient reductions can benefit local water quality at the request of the Panel. We refer the Panel to the information on the Nutrient Scientific Technical Exchange Partnership and Support (N-STEPS) at: http://n-steps.tetratech-ffx.com/

2. We appreciate the considerable time and effort that the Panel has devoted to defining the importance and timing of delivery of nitrogen and phosphorus to the formation of the hypoxic zone in the Northern Gulf of Mexico, and the discussion of N and P limitation and co-limitation. We request that a discussion of the roles of N and P limitation, alternating limitation and co-limitation be included in the discussion of MARB local, state and regional water quality problems. Again we refer you to the recent webcast by Dr. Walter Dodds posted on the N-STEPS website for initial information. We will provide references from the published literature upon request.

3. EPA supports the use of multiple voluntary and regulatory approaches to reduce nutrient loadings to the MARB. We request the Panel to include discussion of the role of numeric nutrient criteria and water quality standards (WQS) to support the regulatory incentives such as TMDLs (total maximum daily loads) and NPDES (national pollutant discharge elimination system) permit limits for N and P. We also request that the Panel consider the benefits that numeric nutrient criteria and standards can play in reducing nutrient concentrations in local, state and regional waters, as well as in reducing nutrient loading to the Gulf.

   We have excerpted here the regulations, rules, and definitions that define the role of WQS in support of NPDES permit limits and TMDL targets and underlined the pertinent language.

   NPDES: 40 CFR 122.44(d)(1)

   (d) Water quality standards and State requirements: any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318 and 405 of CWA necessary to:

(1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.

(i) Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.

(iii) When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.

(vi) Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options:

(A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use. Such a criterion may be derived using a proposed State criterion, or an explicit State policy or regulation interpreting its narrative water quality criterion, supplemented with other relevant information which may include: EPA's Water Quality Standards Handbook, October 1983, risk assessment data, exposure data, information about the pollutant from the Food and Drug Administration, and current EPA criteria documents; or

(B) Establish effluent limits on a case-by-case basis, using EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where necessary by other relevant information; or

(C) Establish effluent limitations on an indicator parameter for the pollutant of concern.

(vii) When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that:

(A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from, and complies with all applicable water quality standards; and

(B) Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.

TMDL: 40 CFR 130.2 definitions

(g) Load allocation (LA). The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.

(h) Wasteload allocation (WLA). The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

(i) Total maximum daily load (TMDL). The sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

(j) Water quality limited segment. Any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Act.

TMDL: 40 CFR 130.7 requirements

(b) Identification and priority setting for water quality-limited segments still requiring TMDLs.

(1) Each State shall identify those water quality-limited segments still requiring TMDLs within its boundaries for which:

(i) Technology-based effluent limitations required by sections 301(b), 306, 307, or other sections of the Act;

(ii) More stringent effluent limitations (including prohibitions) required by either State or local authority preserved by section 510 of the Act, or Federal authority (law, regulation, or treaty); and

(iii) Other pollution control requirements (e.g., best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards (WQS) applicable to such waters.

(c) Development of TMDLs and individual water quality based effluent limitations.

(1) Each State shall establish TMDLs for the water quality limited segments identified in paragraph (b)(1) of this section, and in accordance with the priority ranking. For pollutants other than heat, TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters.

(i) TMDLs may be established using a pollutant-by-pollutant or biomonitoring approach. In many cases both techniques may be needed. Site-specific information should be used wherever possible.

(ii) TMDLs shall be established for all pollutants preventing or expected to prevent attainment of water quality standards as identified pursuant to paragraph (b)(1) of this section. Calculations to establish TMDLs shall be subject to public review as defined in the State CPP.

Additional Information

NPDES Permit Writers Guide (1996). See chapter 6. Found at http://www.epa.gov/npdes/pubs/owm0243.pdf

TMDL Program Guidance (1991). See chapers 2 and 3. Found at http://www.epa.gov/OWOW/tmdl/decisions/

4. We appreciate the efforts of the Panel to identify both regulatory and voluntary incentives for reducing nutrient loadings to the Northern Gulf of Mexico. We

request that the Panel consider including a discussion on consumers willingness to pay for improvements in water quality. Examples of the public concern for water quality can be found in efforts of the EPA Great Lakes Program Office as identified in the Great Lakes Water Quality Agreement 1978 (http://www.epa.gov/glnpo/glwqa/1978/index.html) and Annex 3 that identifies agreements for controlling phosphorus to protect the Great Lakes (http://www.epa.gov/glnpo/glwqa/1978/annex.html#ANNEX%203); and the Maryland senate Bill 320 (http://www.mde.state.md.us/Water/CBWRF/index.asp, and http://mlis.state.md.us/2004rs/billfile/sb0320.htm) commonly known as the flush tax designed to help fund wastewater treatment plant upgrades for the protection and restoration of Chesapeake Bay.

5. We encourage the Panel to prioritize their recognized need for additional monitoring and modeling to further inform management that will lead to reduction of the size of the hypoxic zone in the Northern Gulf of Mexico. EPA is assisting in USGS SPARROW modeling efforts by providing more detailed nutrient data from EPA Regions 5 and 7 regional nutrient databases.

6. We request that the Panel use terminology to distinguish among biological and ecological changes that are indicative of an ecosystem shift and those changes to the hydrodynamic changes that indicate a shift in the physical circulation (hydrodynamics on the coastal shelf) regime. We also request the Panel to further investigate data supporting a regime shift in the hydrodynamics.

EPA Region 6
Comments on EPA SAB Hypoxia Advisory Panel Draft Report

Several of the Panel's findings and recommendations deserve careful consideration:

1. The Panel recommends that plans for future Mississippi and Atchafalaya River diversions consider the effects of diversions on Gulf hypoxia.
2. The Panel recommends that a P reduction strategy be developed and implemented in conjunction with the current N reduction strategy already in place.
3. Point sources provide 22% of riverine N flux and 34% of P flux delivered to the Gulf.
4. The Panel recommends that N be reduced by at least 45% and P be reduced by at least 40%. Both targets should be re-assessed as nutrient reductions are achieved.
5. The Panel recommends MARB sewage treatment plants upgrades to achieve total N concentrations of 3 mg/L and total P concentrations of 0.3 mg/L;
6. The Panel recommends consideration of nutrient concentrations or loading limits in permit renewals for major sewage treatment plants and selected industrial facilities in the MARB.

What follows is a point-by-point consideration of each of the above:

1. *The Panel recommends that plans for future Mississippi and Atchafalaya River diversions consider the effects of diversions on Gulf hypoxia*

   We would like to emphasize the special significance this has for states in the Lower Mississippi River Basin. It is of special interest to Region 6 since we are actively engaged with the U.S. Army Corps of Engineers, the State of Louisiana, and other Federal agencies and local governments, in coastal restoration in Louisiana, and Mississippi River reintroductions (e.g. diversions) in particular. The EPA Region 6 office is currently the Federal sponsor of two small river reintroduction projects, we are sponsoring a pending proposed medium-sized reintroduction project, we sit on advisory committees for two existing medium size reintroduction projects, and we commonly participate in discussions and reviews of other proposed reintroduction projects of various sizes. In general, we strongly support Mississippi River reintroduction as a coastal wetland restoration tool, and for water quality benefits. Responding to this recommendation will incur significant cost, and will make river reintroduction projects less competitive with other restoration approaches, in the existing cost-competitive wetland restoration planning environment. In addition, the tools to conduct such analyses may not yet be available, and will likely require further development. The Panel should consider and comment on the implications of subjecting individual small and medium-sized reintroductions to this kind of analysis.

2. *The Panel recommends that a P reduction strategy be developed and implemented in conjunction with the current N reduction strategy already in place.*

   We do not disagree with this recommendation. It is consistent with the agency's findings based on the External Peer Review of the Draft Region 4 report, *Evaluation of the Role of Nitrogen and Phosphorus in Causing or Contributing to Hypoxia in the Northern Gulf, August, 2004*. However, the draft report appears not to acknowledge that there was in fact some recognition of the need for phosphorus load reduction in the earlier (pre-1999) scientific literature, the CENR Topic 1 report, the Integrated Assessment, and the Action Plan.

   In addition, we recommend the following be considered:

   a. As acknowledged in places in the draft report, it is still unclear how important the organic matter produced by phytoplankton production in the P-limited zone is, to formation and maintenance of hypoxia overall on the Louisiana Inner Shelf. The implication would seem to be that it is still unclear how important phosphorus load reduction is. Of course, the reverse is therefore, by definition, also true (e.g. importance of organic matter produced in nitrogen-limited zones, importance of N-load reduction).

b. The phosphorus limitation observed in the plume, which is the basis for the recommendation to reduce phosphorus loads, is a direct result of excessive nitrogen loading. The implications of this are unclear, but note that it seems very counterintuitive that the solution to an environmental problem (Gulf hypoxia) caused by excessive loadings of one pollutant (nitrogen), is to reduce the loadings of another pollutant (phosphorus), which coincidentally, may not have increased. We are recommending further clarification of the reasoning behind this recommendation.

c. We would request additional clarity on the discussion of phosphorus loadings in the MARB and the recommendations of section 4.2, with a clear analysis of the scientific evidence and report findings and recommendations. For instance on p. 116 there is reference to the "key points summarized above" yet no key points are presented. It is also unclear what the 40% phosphorus reduction recommendations are based on. On page 115, the paragraph beginning "The initial goal for P reduction" is also unclear, additional information on the relative contributions of non point sources and point sources to phosphorus loads as well as citations might help with the clarification. In general more clarity as to what conclusions the scientific evidence supports would be helpful. Finally, discussion on the implications of the well-documented long-term decline in sediment load in the river on the long-term trend in phosphorus loads is warranted as well. Further review of the CENR Topic 1 report would be helpful in this endeavor.

3. *Point sources provide 22% of riverine N flux and 34% of P flux delivered to the Gulf*

   This is a significant revision of previous findings of Tetra Tech, Inc. (1998), the CENR Topic 2 report (Goolsby et al., 1999), and MART (2006), with important implications for EPA. Screening-level review of the draft report discussion on this suggests that the increase in the relative importance of point sources is due to a decrease in the estimates of the overall nutrient loads in the Mississippi River, without a concomitant reduction in the point source loads. The estimates of the point source loads made by the panel are actually lower than those of Tetra Tech, Inc. (1998), but higher than the recent estimates of MART (2006b).

4. *The Panel recommends that N be reduced by at least 45% and P be reduced by at least 40%. Both targets should be re-assessed as nutrient reductions are achieved.*

   While we don't disagree with the recommendation, we think it is important to note that the recommended P load reduction is based on best professional judgment only. What is also unclear in the report is if this recommendation is based on the assumptions of reductions that would be achieved by the

implementation of BAT or whether this is a reduction target that is based on the scientific data. Further clarification is needed on the basis of this recommendation as well as including management actions such as including modeling to improve the quality of the P load reduction estimate, to achieve the recommendation.

5. *The Panel recommends MARB sewage treatment plants upgrades to achieve total N concentrations of 3 mg/L and total P concentrations of 0.3 mg/L*

   Again, while we don't disagree with this recommendation we want to point out that it has significant implications for EPA, State water quality agencies, and municipal wastewater dischargers. It is our understanding that these recommendations are technologically feasible, but they will be costly. We request that the Panel provide further information on the range costs and expected impact on POTWs and rate payers.

6. *The Panel recommends consideration of nutrient concentrations or loading limits in permit renewals for major sewage treatment plants and selected industrial facilities in the MARB.*

   Similarly, we don't disagree with the recommendation, but we would like to point out that until nutrient criteria are established it may not be possible to comply with this recommendation.