

Main Points of the Public Input with Recommended Actions and Suggestions for Additional Research

The Region 4 white paper “Evaluation of the Role of Nitrogen and Phosphorus in Causing or Contributing to Hypoxia in the Northern Gulf, August, 2004,” underwent external peer review. The public was solicited for scientific views and information concurrent with the external peer review. The main points of the public scientific views and EPA responses are below. The majority of the comments below will be submitted to the Task Force for consideration in the Gulf of Mexico Action Plan Reassessment (hereafter referred to as *Action Plan*). Some of the comments below have specific responses relating to the scientific merit of the comments in light of the now completed external peer review. The Agency would like to thank those members of the public that provided public scientific views.

Based on the outcome of the independent peer review, EPA will not prepare a final report, “Evaluation of the Role of Nitrogen and Phosphorus in Causing or Contributing to Hypoxia in the Northern Gulf, August, 2004”. EPA, instead, will submit the draft report and peer review and public comments to the Task Force for consideration during the reassessment of the goals of the *Action Plan* scheduled to be completed in 2007.

EPA regrets the confusion caused by the unauthorized release of early drafts of the report with its premature scientific conclusions. The Agency is committed to sound science and, hence, does not typically release reports of this scientific nature without appropriate scientific peer review. Because of the wide circulation of the unofficial drafts of the report and the stakeholder concern generated, EPA released the revised version of the report. This was done prior to scientific peer review in order to provide input to the Task Force about the questions being posed by the report on the role of phosphorus in Gulf hypoxia and to provide stakeholders with a better understanding of the reasons for posing those questions.

EPA appreciates the efforts of the stakeholders in reviewing the Region 4 reports, and carefully considered all comments provided. We summarize the main points of the public views below, and will provide a summary of the comments to the Task Force to be considered as the Task Force moves forward to conduct the reassessment of the goals of the *Action Plan*.

Public Scientific Views Summary and EPA Responses

Mississippi Riverwise Partnership

Several groups provided input to these comments, they included:

Cynthia Pansing
Executive Director
Mississippi River Basin Alliance
Minneapolis, MN

George Boody
Executive Director
Land Stewardship Project
White Bear Lake, MN

Cynthia Sarthou
Executive Director
Gulf Restoration Network
New Orleans, LA

Nancy Stoner
Director, Clean Water Project
Natural Resources Defense Council
Washington, DC

Susan Heathcote
Research Director
Iowa Environmental Council
Des Moines, IA

- The reviewed version of the Region 4 white paper (August 2004) contends that “the available Gulf hypoxia data and related scientific literature support a modification of the original hypothesis that, for waters subjected to nitrogen and phosphorus loads significantly above historic background levels, there may be considerable benefit to reducing both nutrients in order to restore water quality,” joined with a request that the *Action Plan* Reassessment “consider the merits of reducing phosphorus loads as well.” It is not clear that reduction of both nutrients has been absent from the formation of hypoxia policy to this point.
- Several recent articles not cited by the paper conclude that total nitrogen and total phosphorus, rather than dissolved forms, should be used to estimate the limiting nutrient.
- Expressed concern about how this paper has been handled and that the Agency has opened the door to politicizing a scientific process (by not requiring adequate internal and external review prior to official release).

EPA will strive to maintain a process of scientific rigor regarding release of scientific information from the Agency. We regret the controversy the external leaks of the early drafts caused and will seek to prevent such problems in the future.

The Fertilizer Institute

- Utilize multiple regression techniques to determine strength of relationship between known contributing variables and hypoxia.
- Fill in the gaps in regard to monitoring data in certain regions within the Gulf as well as data that is current up to the 2005 time frame.
- Better quantify phosphorus inputs to the Gulf system.

- Integrate the most recent data surrounding nutrient use efficiency for both nitrogen and phosphorus.
- Account for increases in nutrient use efficiency in modeling fertilizer inputs.

These points will be submitted for consideration by the Task Force in the Action Plan Reassessment.

The Farm Bureau

- The Farm Bureau believes resolving the conflict with regard to Redfield ratio balance and the biological bioavailability and uptake of nutrients, and consequently, determining the limiting nutrient is the most important issue to be resolved with regards to Gulf Hypoxia.

The external peer review did not provide support for the contention that the Redfield ratio was misused in Rabalais et al. 1999, and highlighted the complexities involved in nutrient cycling in the Mississippi River/Gulf of Mexico system. Identifying “the” limiting nutrient would be an oversimplification of the problem, and would be meaningless without appropriate context in space and time. Rather the complexities of nutrient cycling and limitation, and algal bloom development as highlighted by the external peer reviewers will be submitted to the Task Force as issues for consideration in the Action Plan Reassessment.

- A new assessment is needed to identify and quantify phosphate sources, to determine the bioavailability of different forms of phosphorus, to evaluate methods, costs, feasibility and benefits of phosphorus control, and to evaluate the reductions in phosphorus loads needed to drive the system to phosphorus limitation and to reduce midsummer hypoxia.

The external peer reviews do not support phosphorus as the limiting nutrient for algal bloom development, but indicate the complexities of the issue and the need to reduce loads of both nitrogen and phosphorus to reduce the size of the hypoxic zone; however, this point will be submitted to the Task Force for consideration in the Action Plan Reassessment.

- More scientific research is necessary to determine sources of nutrients and more monitoring stations need to be appropriately placed to qualify nutrient sources.
- EPA needs to qualify the relative contributions of the following:
 - Relative contribution of bio-available forms of nutrients from all sources;
 - Offshore sources of nutrients from upwelled waters of the continental slope;
 - Nutrient contributions associated with the loss of approximately 27 square miles of nutrient rich wetlands and coastal marshes each year;
 - The change in hydrology of coastal Louisiana and the loss of wetland and coastal marshes;
 - The loss of wetland filtering capacity;
 - The impact of an overall increase in rainfall and increase flow patterns within the Mississippi River Basin on nutrient loads and fresh water stratification in the Gulf;
 - The overall impact of flood control measures;
 - The prescribed flow requirements with regard to the Atchafalaya River; and

- The impact of the capture of the Mississippi River by the Atchafalaya River on hypoxia formation in the northern Gulf of Mexico.

EPA will respectfully submit this list for consideration by the Task Force in the Action Plan Reassessment.

Louisiana Chemical Association

- Include the report entitled “Nutrient Releases to the Mississippi River in the Louisiana Industrial Corridor,” prepared by Alfred Knecht in August 2000 in the record for the white paper as it concludes that there is no significant difference between the nutrient concentrations-including phosphorus-in Mississippi River water as it enters Louisiana at the state’s boundaries and the nutrient concentrations in the Mississippi River water at the river’s mouth below New Orleans. The report thus essentially refutes any assertions made in the White Paper that phosphorus discharges in the lower Mississippi River are a major cause of hypoxia.

EPA will submit the Knecht report for consideration by the Task Force in the Action Plan Reassessment.

The Potash and Phosphate Institute

- Regression analyses need to be performed to determine if indeed there is a predictable cause and effect relationship between spring river DIN:DIP ratios and hypoxia. Further, there is a need to include DIN:DIP ratios for the time since 1999 in evaluating cause and effect relationships with the development of hypoxia, its size, and persistence in the northern Gulf.
- The discrepancy between the conclusion of the White Paper that P from the lower Miss. is a major contributor due to its increased use and the data showing that consumption of fertilizer P declined by 23% since 1980 in the 20 major states of the MARB should receive strong consideration in any policy or strategies to reduce P.
- Rigorous multiple regression analyses and nutrient budget evaluations are needed to test multiple nutrient hypotheses and to develop statistical confidence in relationships that ultimately will be helpful in achieving water quality goals.

EPA will respectfully submit these points for consideration by the Task Force in the Action Plan Reassessment.

EPA will submit the following list of references provided by the Potash and Phosphate Institute in their public scientific input to the Task Force for consideration in the Action Plan Reassessment:

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Conley, D. 2000. Biogeochemical nutrient cycles and nutrient management strategies. *Hydrobiologia* 410:87-96.

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Moore, P.A., Jr., K.R. Reddy, and D.A. Graetz. 1991. Phosphorus geochemistry in the sediment-water column of a hypereutrophic lake. *J. Environ., Qual.* 20:869-875.

Osterman, L.E., R.Z. Poore, P.W. Swarzenski, and R.E. Turner. 2005. Reconstructing a 180-yr. record of natural and anthropogenic induced low-oxygen conditions from Louisiana continental shelf sediments. *Geology* 33(4):329-332.

Paerl, H.W., L.M. Valdes, A.R. Joyner, M.F. Piehler, and M.E. Lebo. 2004. Solving problems resulting from solutions: evolution of a dual nutrient management strategy for the eutrophying Neuse River Estuary, North Carolina. *Environ. Sci. Technol.* 38:3068-3073.

PPI. 2002. Plant Nutrient Use in North American Agriculture. PPI/PPIC/FAR Technical Bulletin 2002-1. Potash & Phosphate Institute, Norcross, GA.

Reddy, K.R., M.M. Fisher, and D. Ivanoff. 1996. Resuspension and diffusive flux of nitrogen and phosphorus in a hypereutrophic lake. *J. Environ. Qual.* 25:363-371.

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