



U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF INSPECTOR GENERAL

*Catalyst for Improving the Environment*

## Evaluation Report

# EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards

Report No. 09-P-0223

August 26, 2009



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**Abbreviations**

CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
OIG	Office of Inspector General
PAMs	Program Activity Measures
WATA	Water Quality Standards Action Tracking Application

**Cover map:** Water from approximately 41 percent of the contiguous United States drains into the Mississippi River Watershed, as shown. The watershed comprises all or part of 31 States. The hypoxic zone in the Gulf of Mexico is thought to be a result of excess nutrients from the Mississippi River and seasonal stratification (layering) of waters in the Gulf. (EPA map).



# At a Glance

*Catalyst for Improving the Environment*

## Why We Did This Review

For the past 11 years, EPA has been promoting State adoption of numeric nutrient water quality standards. In 2007, EPA recognized that State progress needs to be accelerated. We evaluated the effectiveness of EPA's strategy to determine what improvements EPA can make to accelerate progress.

## Background

The 1972 Clean Water Act established a goal of maintaining the chemical, physical, and biological integrity of the Nation's waters. Decades later, States have reported more than 14,000 nutrient-related impairments. Excess nutrients create dead zones in waters. In 1998, EPA issued a strategy recommending that States adopt numeric nutrient water quality standards. Such standards are cost effective and help develop improved wastewater treatment facility permits and limits of nutrient loadings.

**For further information, contact our Office of Congressional, Public Affairs and Management at (202) 566-2391.**

**To view the full report, click on the following link:**  
[www.epa.gov/oig/reports/2009/20090826-09-P-0223.pdf](http://www.epa.gov/oig/reports/2009/20090826-09-P-0223.pdf)

## ***EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards***

### **What We Found**

EPA's 1998 National Strategy and Plan to promote State adoption of nutrient water quality standards (which better protect aquatic life and human health) has been ineffective. In 1998, EPA stated that a critical need existed for improved water quality standards, given the number of waters that were impaired from nutrients. In the 11 years since EPA issued its strategy, half the States still had no numeric nutrient standards. States have not been motivated to create these standards because implementing them is costly and often unpopular with various constituencies. EPA has not held the States accountable to committed milestones. The current approach does not assure that States will develop standards that provide adequate protection for downstream waters. Until recently, EPA has not used its Clean Water Act authority to promulgate water quality standards for States.

EPA cannot rely on the States alone to ensure that numeric nutrient standards are established. EPA should prioritize States/waters significantly impacted by excess nutrients and determine if it should set the standards. EPA also needs to establish effective monitoring and measures so that accurate program progress is reported. This will assist EPA management in program decision-making.

### **What We Recommend**

We recommend that the Assistant Administrator for Water:

- Select significant waters of national value which need numeric nutrient water quality standards to meet the requirements of the Clean Water Act.
- Set numeric nutrient water quality standards for the waters identified in the first recommendation to meet the requirements of the Clean Water Act.
- Establish EPA and State accountability for adopting numeric nutrient standards for the rest of the Nation's waters.
- Establish metrics to gauge the actual progress made by the States.

We discussed our findings and recommendations with Agency officials. The Agency agreed with some but not all of the recommendations.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
INSPECTOR GENERAL

August 26, 2009

**MEMORANDUM**

**SUBJECT:** EPA Needs to Accelerate Adoption of Numeric Nutrient  
Water Quality Standards  
Report No. 09-P-0223

**FROM:** Wade T. Najjum  
Assistant Inspector General, Office of Program Evaluation

**TO:** Peter S. Silva  
Assistant Administrator, Office of Water

This is our report on the subject evaluation conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established resolution procedures.

The estimated cost of this report – calculated by multiplying the project's staff days by the applicable daily full cost billing rates in effect at the time – is \$505,399.

**Action Required**

In accordance with EPA Manual 2750, you are required to provide a written response to this report within 90 calendar days. You should include a corrective actions plan for agreed upon actions, including milestone dates. We have no objections to the further release of this report to the public. This report will be available at <http://www.epa.gov/oig>.

If you or your staff have any questions regarding this report, please contact me at 202-566-0827 or [najjum.wade@epa.gov](mailto:najjum.wade@epa.gov); Dan Engelberg, Director, at 202-566-0830 or [engelberg.dan@epa.gov](mailto:engelberg.dan@epa.gov); or Julie Hamann, Project Manager, at 913-551-7693 or [hamann.julie@epa.gov](mailto:hamann.julie@epa.gov).

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# Chapter 1

## Introduction

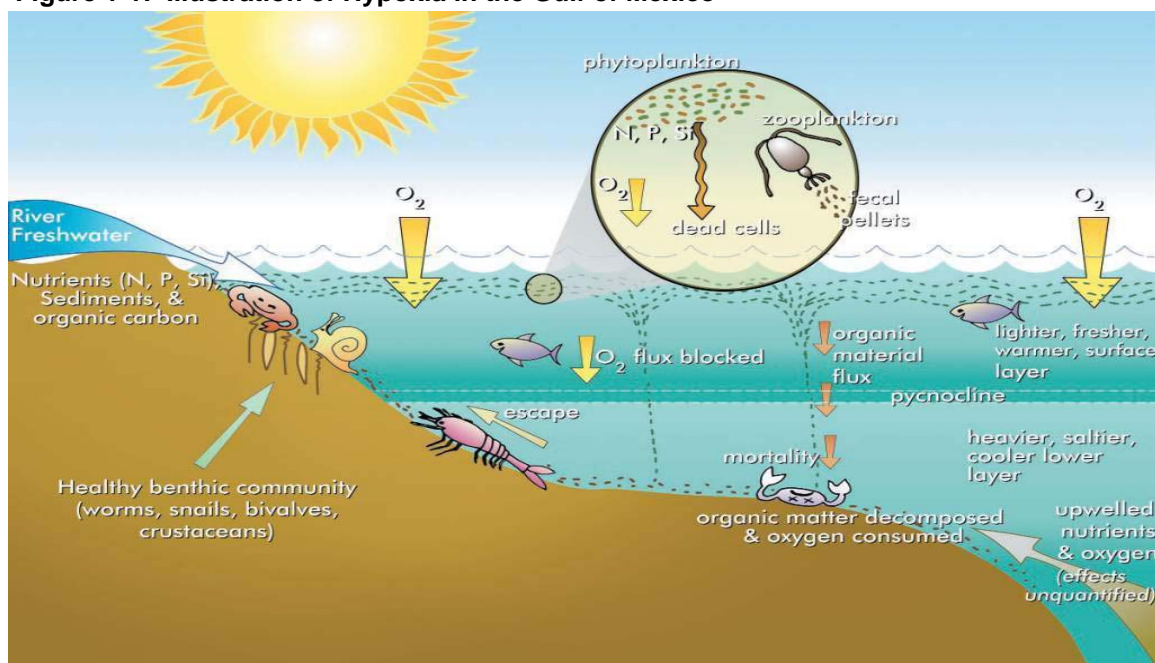
### Purpose

The purpose of our review was to evaluate the effectiveness of EPA's actions to establish nutrient water quality standards in waters covered by the Clean Water Act (CWA).

### Background

Since at least the 1990s, excess nutrients have been reported as one of the major sources of impaired waters nationally. Water bodies need nutrients (nitrogen and phosphorus) to be healthy. But an excess of nutrients can be harmful. Excess levels of nutrients in waters can produce harmful algal blooms. These blooms contribute to the creation of hypoxia or "dead zones" in water bodies (where dissolved oxygen levels are so low that most aquatic life cannot survive). Sources of excessive nutrients include overuse of fertilizer, sewage treatment plants, septic systems, animal manure, urban runoff, and atmospheric deposition. Figure 1-1 illustrates how hypoxia forms in the Gulf of Mexico.

**Figure 1-1: Illustration of Hypoxia in the Gulf of Mexico**



Source: EPA

Since at least 1998, EPA has realized that better standards were needed to restore nutrient-impaired waters and to protect waters from becoming impaired. Water quality standards are important because they help to protect and restore the water quality of the Nation's surface waters, consistent with the requirements of the CWA. The Act, passed in 1972, gives EPA the authority to review and approve State water quality standards as well as establish new standards necessary to meet the requirements of the Act.

Water quality standards provide the foundation for accomplishing the goals and objectives of the CWA. Water quality standards are typically laws adopted by the State which define the goals for a water body by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants.

According to EPA, narrative standards for nutrients can be useful in protecting water quality. But numeric standards applicable to all waters are more effective in achieving nutrient controls. According to EPA, if the Nation is to finish the job of restoring and protecting water quality in accordance with the CWA, water quality criteria and standards need to be improved and enhanced.

In 1998, EPA issued *National Strategy for the Development of Regional Nutrient Criteria and Water Quality Criteria and Standards Plan – Priorities for the Future*. In these documents, EPA described the approach it was taking in working with the States to adopt nutrient criteria as part of the State water quality standards. EPA stated that given the fact that not all the Nation's waters had achieved the CWA goal of being "fishable and swimmable" and that significant water pollution problems still existed, improved water quality standards were critically needed as well as a set of tools to implement those standards.

In a 2001 Federal Register Notice, EPA published recommended criteria for nutrient water quality standards under Section 304(a) of the CWA. This section of the Act requires EPA to develop and publish criteria guidance to assist States in developing water quality standards that protect designated uses. EPA recommended that States adopt numeric nutrient water quality standards for nitrogen, phosphorus, chlorophyll-a; and clarity for lakes/reservoirs, rivers/streams, wetlands, and estuaries as appropriate. EPA also recommended that the States should create their plans by the end of 2001 outlining the process they would take to develop and adopt numeric nutrient standards.

To assist the States in developing nutrient criteria, EPA issued Ambient Water Quality Criteria Recommendations for most rivers, streams, lakes and reservoirs in the United States on an ecoregional basis. The criteria represented surface water conditions that were minimally impacted by human activities and protected aquatic life and recreational uses. EPA also issued technical guidance by water body type.

EPA expected the States to consider the following elements in developing a nutrient criterion:

- Historical data and other information (published literature),
- Current reference conditions,
- Models to simulate physical and ecological processes to determine relationships among nutrients' biological or physical conditions,
- Evaluation of downstream effects, and
- Expert judgment.

EPA recommended the States use the following approaches, in order of preference:

- Developing nutrient criteria that fully reflect localized conditions,
- Adopting EPA's recommended section 304(a) criteria for nutrients, or
- Using other scientifically defensible methods.

The States would follow a general process of identifying available data and data gaps; collecting and analyzing the data; developing a proposed standard; involving public and stakeholder participation; obtaining approval from State legislatures; and obtaining EPA approval of the new/revised standard.

Due to the limited progress made by States, the Office of Water Assistant Administrator issued a memorandum in 2007 stating that progress needed to be accelerated. In 2008, 10 years after EPA issued its national strategy, the hypoxic zone in the Gulf of Mexico had become the second largest on record and the second largest dead zone in the world.

Nutrient pollution is widespread and impacts virtually every State. As required by the Section 303(d) of the CWA, States continue to report over 14,000 impairments for nutrient and nutrient-related pollution on their impaired waters lists.

## **Noteworthy Achievements**

EPA Headquarters and regions have helped States develop numeric nutrient criteria in their water quality standards, including:

- publishing technical guidance for developing criteria for lakes and reservoirs, rivers and streams, estuaries and coastal waters, and wetlands. EPA also published recommended nutrient criteria for most rivers, streams, lakes and reservoirs in the United States.
- developing several tools including N-STEPS, a portal that provides Web-based technical assistance to State and regional scientists and managers who are developing numeric nutrient criteria, and provides information regarding nutrient pollution and EPA's activities to the public.



- determining, in January 2009, that new or revised numeric water quality standards for nutrients are necessary for Florida to meet CWA requirements. EPA will work collaboratively with Florida experts to generate data and analyses.
- approving nutrient criteria for estuarine and tidal waters in the Chesapeake Bay watershed. This is an example of where downstream criteria have been put in place to drive upstream nutrient control actions.

## **Scope and Methodology**

We conducted this evaluation from October 2008 through June 2009 in accordance with generally accepted government audit standards, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We focused on States contributing nutrients to the Gulf of Mexico because excess nutrients have resulted in its having one of the largest dead zones in the world. Additionally, water from approximately 41 percent of the contiguous United States drains into the Mississippi River Watershed. We conducted interviews with EPA's Office of Water and Regions 4, 5, and 7 officials, and with State officials from Florida, Illinois, Iowa, Kansas, Minnesota, and Missouri. We reviewed information from EPA's Water Quality Standards Action Tracking Application and EPA's Program Activity Measures. We reviewed State nutrient criteria development plans and EPA/State mutual agreements to evaluate how States are progressing in adopting numeric nutrient criteria into water quality standards. Appendix A contains detailed information on the scope and methodology of our evaluation.

## Chapter 2

### EPA's Strategy to Promote State Adoption of Numeric Criteria Has Been Ineffective

We found EPA's nutrient criteria strategy lacked management control and an adequate system of accountability for either itself or the States. EPA did not seek State commitment to specific actions or milestones that would provide accountability. As a result, few States have made progress adopting numeric nutrient water quality standards. Until recently, EPA had not used its CWA authority to promulgate standards for waters of national value that have been significantly impacted by nutrients. EPA has not been effective in coordinating standard development for waters involving multiple States. While setting standards does not of itself improve water quality, it generally marks the beginning of serious efforts to identify impaired waters and make improvements where needed. Ineffective management control and accountability over the approach to promoting State adoption of nutrient water quality standards has resulted in an unnecessary delay to the start of the clean-up process.

### States Have Been Slow to Adopt Numeric Nutrient Standards

In the 11 years since EPA issued its strategy, half the States still had no numeric nutrient standards at the end of 2008.<sup>1</sup> Most States take a piecemeal approach by adopting selected parameters for selected waters. States set their own milestones and priorities. EPA did not work with the States to identify priority waters or coordinate efforts to focus on waters which needed the most protection. In some cases, the States developed standards based on availability of data rather than the severity of the impairment. In its 2008 report, *State Adoption of Numeric Nutrient Standards (1998 – 2008)*, EPA reported that after 10 years, no State has met EPA's goal (see Table 1 below).

**Table 2-1: State Progress in Adopting Numeric Nutrient Standards, 1998-2008**

Numeric Nutrient Standards by Year	4 Parameters <sup>a</sup> 4 Water Body <sup>b</sup> Types	1+ Parameters 1+ Entire Water Body Type	1+ Parameters Selected Waters	No Numeric Criteria
1998	0	6	7	37
2008	0	7	18	25

<sup>a</sup> The four parameters are nitrogen, phosphorus, chlorophyll-a, and clarity.

<sup>b</sup> The four water body types are lakes/reservoirs, rivers/stream, wetlands, and estuaries.

Source: Developed by OIG based on EPA's report, *State Adoption of Numeric Nutrient Standards (1998 – 2008)*.

<sup>1</sup> Hawaii is the only State to have adopted all the parameters for all its water bodies and did it prior to 1998.

EPA's current approach holds little promise that States will achieve the goal of numeric nutrient standards (including the parameters of nitrogen, phosphorus, chlorophyll-a, and clarity) for all water bodies. EPA needs to improve its strategy if it hopes to finish the job of restoring and protecting water quality in accordance with the CWA as it stated in its 1998 strategy. EPA must identify priority States and waters so that limited resources can be targeted to these waters. EPA should identify States or specific waters which are seriously impaired so it can make a determination under section 303(c)(4)(B) to issue a water quality standard itself.

In January 2009, EPA made such a determination for the State of Florida. Six months prior to EPA's determination, five environmental groups filed suit against EPA to compel EPA to use its CWA authority under section 303(c)(4)(B) to promulgate nutrient water quality standards for Florida. Since 1998, this has been the only time EPA issued a determination for nutrients. EPA's Ecological and Health Protection Branch Chief said the Florida determination was State-specific and no other determinations were planned for the near future. He said it would make development of maximum pollutant loads to a water body and regulatory action more efficient and effective.

Cost is a significant obstacle to making headway toward developing water quality standards for nutrients. It is relatively expensive for States to develop individualized nutrient criteria that reflect localized conditions. While EPA has provided much technical assistance to the States, it cannot cover the full cost of State development of standards. EPA estimates it provided approximately \$11 million to all the States from 1998 to 2008 for numeric nutrient standard development. State officials at Illinois, Iowa, Minnesota, and Missouri, estimated it would cost from \$1.8 to \$8.2 million to develop numeric standards. Florida has already expended approximately \$20 million and has not completed the task.

Alternatively, States could adopt EPA's recommended criteria which would reduce State development costs. However, many States viewed EPA's criteria as overly protective. States believe standards developed from EPA's criteria would be financially costly to implement. Therefore, many States choose to continue developing their own criteria since time is not a constraint.

Adoption of standards alone will not ensure improved water quality. States need to ensure that the standard is implemented. According to EPA's Office of Science and Technology Director, some States believe they do not have strong tools to implement the standards. Therefore, the States may be reluctant to adopt standards they cannot implement. Such tools may include regulatory authority over nonpoint sources or the ability to raise funds to support implementation. Although developing these tools may often be politically unpopular, it can be possible.

For many States, agricultural operations are the primary source of excess nutrients. EPA has only limited regulatory control over agriculture. Some States

indicated that they do not have the regulations or resources to influence agricultural producers to change their practices to improve water quality. Generally, the selection and adoption of best management practices is at the discretion of agricultural producers. While States could establish their own regulations, it could be politically unpopular to do so.

Costs to implement the standards will primarily be borne by individual citizens and businesses (particularly agribusiness in some States) of the States. For example, if new/revised standards result in stricter discharge limits for wastewater treatment plants, these plants may need to increase their user fees to support the construction of nutrient removal technology, which can run in the millions of dollars. Management of agricultural runoff and restrictions on businesses would likely increase costs. As a practical matter, increasing costs for taxpayers and businesses is generally unpopular. State environmental officials told us that because of the cost issue they believe they need a high level of scientific support for any water quality standard before submitting it for approval before their State legislators.

## **EPA Needs to Ensure that States Consider the Impact of Nutrient Pollution on Downstream Waters in Other States**

Even if individual State numeric water quality standards were set, there is no assurance those standards would adequately protect the waters of downstream States. The States we interviewed said they had not yet considered the impact of their nutrients on downstream waters. Title 40, Code of Federal Regulations, Part 131.10, provides that States must ensure that their water quality standards provide for the “attainment and maintenance of the water quality standards of downstream waters.” EPA has the authority to review and approve a State’s water quality standards. We believe waiting for the States to submit their incremental standards over a number of years is an ineffective way to ensure that downstream waters are protected.

Many States contribute pollutants to waters in other States. The States we interviewed said that their primary obligation is developing standards to protect the waters within their own borders. For example, 31 States are responsible for the excess nutrients found in the Gulf of Mexico. States such as Illinois, Iowa, and Missouri are major contributors of nutrients to the Gulf of Mexico. None of those States had considered their impact on the Gulf in developing their standards (see Appendix B).

EPA’s Chief for Ecological and Health Protection Branch advised us that it would be best for downstream States to develop numeric nutrient standards first. Theoretically, this approach could drive the upstream States to ensure that they develop standards which protect downstream waters. However, EPA has not taken any action to coordinate and prioritize an effort to take this approach. EPA’s Region 4 Nutrient Coordinator said discussions had occurred within EPA and with

the States regarding the impact of upstream State nutrient standards on downstream waters. But no final resolution had been made as of the end of 2008. Florida State officials also indicated that they have conversed with Georgia, Alabama, and EPA but also indicated that no final decisions had been made. The States we reviewed did not appear to be motivated to improve nutrient water quality standards for protection within their own borders let alone for States downstream.

The CWA gives EPA the authority to review and approve State water quality standards. EPA can disapprove State standards which do not meet EPA regulations, such as requiring the attainment and maintenance of water quality standards downstream. Rather than relying on upstream States to set standards that protect downstream waters, EPA could promulgate standards for waters of national value, such as the Gulf of Mexico or the Mississippi River. Section 303(c)(4)(B) of the CWA requires that EPA promulgate standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act. Once EPA establishes a standard for such a water body, it would drive standard development for upstream States.

## **EPA Did Not Adequately Monitor and Measure Program Progress to Support Accountability**

In its 2001 Federal Register Notice, *Nutrient Criteria Development: Notice of Ecoregional Nutrient Criteria*, EPA stated that by the end of 2001, the States should develop plans outlining how the State would develop and adopt numeric nutrient criteria. EPA further stated it would consider promulgating numeric nutrient standards for a State if it had not substantially completed adopting numeric nutrient criteria in accordance with its plan by the end of 2004. Section 303 (c)(4)(B) of the CWA requires that the Administrator shall promulgate standards in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of the Act.

In 2005, about one-third of the States did not have a nutrient criteria development plan or were not in the administrative phase of adopting standards. EPA did not promulgate standards for any State at that time. Generally, we found no sanctions were taken when States did not make progress as planned. For example:

- Region 4 noted missed milestones but simply revised them.
- Region 5, over several years, has expressed concern with the direction of Illinois' nutrient criteria effort and Illinois' apparent belief that it did not need numeric nutrient criteria.
- Region 7 acknowledged that States have missed their milestones. No action was taken.

Regional Nutrient Criteria Coordinators advised us that they discussed with Headquarters the lack of progress made by certain States. But no formal process

existed for making a determination that EPA should promulgate standards. Regional staff also advised us that States knew that EPA would not use its promulgation powers so the States were not pressured to accelerate progress.

In 2007, EPA conducted an overall assessment of the program's progress. EPA had not established measures to hold itself accountable for achieving the goals of its 1998 strategy. Neither did EPA have a national tracking system to monitor State progress in meeting nutrient criteria development plan milestones. EPA Headquarters worked with its regional offices and a contractor to develop the information included in the report, *Status of State Adoption of Numeric Nutrient Standards, December 2008*. EPA did not have a national tracking system of State progress on nutrient criteria development milestones until 2007.

In 2007, EPA also developed a component to its Water Quality Standards Action Tracking Application (WATA) to monitor State progress in achieving nutrient criteria development plan milestones. However, this system is not utilized for tracking, reporting, or decision making because the data have not been validated (i.e., ensuring entry of correct significant milestone dates and descriptions). While it is a positive step, too much variation still exists in State reporting. Many activities from our sample had "open, no specific date available." Also, because the nutrient criteria development plans vary by State, WATA data are inconsistent.

As of 2008, 13 States still did not have projected adoption dates in their plans. Realistic measures are needed to effectively monitor progress towards program goals, and make programmatic adjustments. Additionally, EPA's Program Activity Measures (PAMs) for numeric nutrient standards do not provide an accurate picture of program progress either. PAMs are annual program outputs that link back to the Agency's Strategic Plan, which measures program outcomes. EPA's numeric nutrient standard PAMs do not describe the progress being made. The PAM definition for achieving State adoption of numeric nutrient standards has been revised annually, making trend analysis difficult. Some of the changes included types of waters or parameters measured as well as the method for determining if the States were on track for meeting their milestones. Credit is given for partial adoption of criteria, which does not indicate what has or still needs to be accomplished. Regional staff does not consider the measures useful. Headquarters and regions have not been using measures for tracking performance, generating reports, or decision making. The absence of meaningful measures in this program limits the ability of the States, EPA senior leadership, and Congress to make informed decisions about the status of the program.

## Conclusion

EPA's current approach is not working. EPA has relied on the States to develop standards on their own without any meaningful monitoring or control. EPA did not establish priorities, enforceable milestones, or adequate measures to assess

progress. States have made minimal progress in developing standards and have not yet considered the impact of their waters on downstream waters. EPA has neither held the States accountable nor used its CWA authorities to promulgate standards. Consequently, EPA is not assured that the States will set numeric nutrient standards or that the standards would provide adequate protection under the CWA for downstream waters.

Given the lack of progress and the challenges involved, EPA needs to develop a realistic approach to meet the intent of the CWA that includes priorities and milestones for action. We believe that EPA should prioritize its efforts by addressing waters of national value (e.g., the Gulf of Mexico) requiring a coordinated effort with several States. Using its CWA authority, EPA should determine if numeric nutrient water quality standards are necessary for those waters and apply its recommended criteria. That would allow EPA a baseline to work with the upstream states to develop reasonable standards and milestones.

## Recommendations

We recommend that the Assistant Administrator for Water:

- 2-1 Select significant waters of national value which need numeric nutrient water quality standards to meet the requirements of the CWA.
- 2-2 Set numeric nutrient water quality standards for the waters identified in Recommendation 2-1 to meet the requirements of the CWA.
- 2-3 Establish EPA and State accountability for meeting milestones for adopting numeric nutrient water quality standards for those waters in the rest of the Nation that require them. EPA should do this by:
  - a. Requiring States to develop milestones based on resources available.
  - b. Reviewing those milestones and approving them as appropriate.
- 2-4 Establish metrics to gauge the actual progress made by States in adopting numeric nutrient water quality standards.
- 2-5 Ensure that the regions annually validate WATA data.

## Agency Response and OIG Comments

EPA disagreed with Recommendations 2-1 and 2-2. In its response to our draft report EPA argued that “a strategic approach to leverage resources and existing authorities” for “waters of regional, local and multi-State value” is the best way to establish effective standards. OIG concluded EPA's past and current strategy has not been effective, and developing another “strategic approach” would not be

responsive to the recommendations. Historically, EPA has said it would use its authority to set standards as a motivator and then failed to set standards. We believe selecting nationally significant waters and acting to set standards for nutrients in them is a minimal first step if EPA is to meet the requirements of the CWA. Critical national waters such as the Gulf of Mexico and the Mississippi River require standards that, once set, will affect multiple upstream States. These States have not yet set nutrient standards for themselves; consequently, it is EPA's responsibility to act. Those standards set for nationally significant waters will serve as an impetus for States to set their own standards and develop and implement load limits and management practices that will achieve them and the goals of the CWA. These recommendations are unresolved.

The Agency concurred with our third, fourth, and fifth recommendations.

A complete copy of the Agency's response is in Appendix C. All recommendations will remain open until the Agency has completed the agreed-upon actions.



## ***Status of Recommendations and Potential Monetary Benefits***

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status <sup>1</sup>	Action Official	Planned Completion Date	Claimed Amount	Agreed To Amount
2-1	10	Select significant waters of national value which need numeric nutrient water quality standards to meet the requirements of the CWA.	U	Assistant Administrator for Water			
2-2	10	Set numeric nutrient water quality standards for the waters identified in Recommendation 2-1 to meet the requirements of the CWA.	U	Assistant Administrator for Water			
2-3	10	Establish EPA and State accountability for meeting milestones for adopting numeric nutrient water quality standards for those waters in the rest of the Nation that require them. EPA should do this by: a. Requiring States to develop milestones based on resources available. b. Reviewing those milestones and approving them as appropriate.	O	Assistant Administrator for Water			
2-4	10	Establish metrics to gauge the actual progress made by States in adopting numeric nutrient water quality standards.	O	Assistant Administrator for Water			
2-5	10	Ensure that the regions annually validate WATA data.	O	Assistant Administrator for Water			

<sup>1</sup> O = recommendation is open with agreed-to corrective actions pending  
C = recommendation is closed with all agreed-to actions completed  
U = recommendation is undecided with resolution efforts in progress

## Appendix A

### ***Details on Scope and Methodology***

We conducted our review from October 2008 through June 2009. We reviewed EPA activities from 1998 to 2008 to assist States in adopting numeric nutrient criteria.

We obtained information on the progress of State adoption of numeric nutrient criteria nationally, focusing our review on selected States contributing nutrients to the Gulf of Mexico (Florida, Illinois, Iowa, Kansas, and Missouri). The Gulf of Mexico has one of the largest dead zones in the world. Water from approximately 41 percent of the contiguous United States drains into the Mississippi River Watershed. We selected States with high nutrient discharge levels as reported by the U.S. Geological Survey. We also considered a State's progress in developing numeric nutrient standards based on EPA data.

We interviewed officials in EPA's Office of Water, specifically the Offices of Science and Technology; Wastewater Management; and Wetlands, Oceans, and Watersheds. We also interviewed officials in the EPA Office of Counsel. We interviewed officials in EPA Regions 4, 5, and 7 where our selected States are located.

To determine how the States planned to adopt numeric nutrient criteria and their progress in doing so, we interviewed State officials in our selected States. We reviewed nutrient criteria development plans, EPA mutual agreement documents, and associated nutrient criteria milestones dates for our selected States.

To gain an understanding of the regulatory requirements, we reviewed the CWA and Federal Code of Regulations pertaining to water quality standards. To determine how EPA planned to promote State adoption of numeric nutrient criteria, we reviewed the following EPA strategies and guidance documents:

- June 1998: *National Strategy for the Development of Regional Nutrient Criteria*.
- June 1998: *Water Quality Criteria and Standards Plan – Priorities for the Future*.
- January 9, 2001: *Nutrient Criteria Development; Notice of Ecoregional Nutrient Criteria*.
- November 14, 2001: Memorandum from the Office of Science and Technology Director, *Development and Adoption of Nutrient Criteria into Water Quality Standards*.
- May 25, 2007: Memorandum from the Office of Water Assistant Administrator, *Nutrient Pollution and Numeric Water Quality Standards*.

To determine what management controls EPA had in place to monitor and measure State progress in adopting numeric nutrient criteria, we evaluated EPA's WATA and PAMs. We interviewed staff responsible for these systems and applicable guidance documents. We reviewed 2008 WATA reports for our selected States. We analyzed PAM data from Fiscal Years 2005 to 2009. Since our review was confined to evaluating EPA's methods for monitoring and measuring progress, we did not assess the accuracy of the data reported in WATA and PAMs. But we did note and report in Chapter 2 that WATA data have not been validated. We reviewed

EPA's December 2008 report, *State Adoption of Numeric Nutrient Standards*, which documents States' progress in adopting numeric nutrient criteria.

To determine the extent of the hypoxic zone in the Gulf of Mexico and the States' contribution to this problem, we reviewed the following reports:

- *Gulf Hypoxia Action Plan 2008 for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico and Improving Water Quality in the Mississippi River Basin*; Mississippi River/Gulf of Mexico Watershed Nutrient Task Force; 2008; Washington, DC.
- *Differences in Phosphorus and Nitrogen Delivery to the Gulf of Mexico from the Mississippi River Basin*; U.S. Geological Survey; published in *Environmental Science & Technology*, Vol. 42, No. 3, 2008.
- *Mississippi River Quality and the Clean Water Act: Progress, Challenges, and Opportunities*; National Academies; October 2007.
- *EPA and USDA Should Create New Initiative to Better Monitor Nutrients Across the Mississippi River Basin and Northern Gulf of Mexico*; National Academies; December 2008.

To determine EPA funding of State activities related to developing numeric nutrient criteria, we requested EPA's Office of Science and Technology to provide us with figures from 1998 to 2008. To determine an approximate cost of the States developing numeric nutrient criteria, we requested the States to provide cost estimates and describe the approach they were using to develop the criteria. In obtaining estimates from our selected States, we also requested information from Minnesota because that State had adopted standards for lakes/reservoirs. Because we are using this information as background, we did not audit the information provided to us.

## Prior Reports

The OIG has not conducted a prior review of EPA's efforts to promote State adoption of numeric nutrient water quality standards.

The Government Accountability Office assessed EPA and State efforts to improve water quality standards in its report, *Water Quality: Improved EPA Guidance and Support Can Help States Develop Standards that Better Target Cleanup Efforts* (GAO-03-308, January 2003).

## Appendix B

***Top 10 States Contributing Nutrients  
to the Gulf of Mexico  
Progress in Adopting Numeric Standards  
(by percentage of Nitrogen and Phosphorus contributions)***

State	Percentage of Total Nitrogen Contribution	Status of Adopting Nitrogen Water Quality Standards
Illinois	16.8	None
Iowa	11.3	None
Indiana	10.1	None
Missouri	9.6	None
Arkansas	6.9	None
Kentucky	6.1	None
Tennessee	5.5	No standard for nitrogen. Standard for chlorophyll-a for selected lakes/reservoirs
Ohio	5.4	None
Mississippi	3.4	None
Nebraska	3.2	None

State	Percentage of Total Phosphorus Contribution	Status of Adopting Phosphorus Water Quality Standards
Illinois	12.9	Select waters for lakes/reservoirs
Missouri	12.1	None
Iowa	9.8	None
Arkansas	9.6	None
Kentucky	9.0	None
Indiana	8.4	None
Tennessee	5.3	No standard for phosphorus. Standard for chlorophyll-a for select waters for lakes/reservoirs
Mississippi	4.4	None
Ohio	4.1	None
Oklahoma	3.3	Select waters for lakes/reservoirs and for some response parameters

Sources: U.S. Geological Survey's January 2008 report, *Differences in Phosphorus and Nitrogen Delivery to the Gulf of Mexico from the Mississippi River*; and EPA's December 2008 report, *State Adoption of Numeric Nutrient Standards*.

**Appendix C*****Agency Response***

July 15, 2009

**MEMORANDUM**

**SUBJECT:** Draft Evaluation Report: EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards, Project 2008-575.

**FROM:** Michael H. Shapiro  
Acting Assistant Administrator

**TO:** Dan Engelberg  
Director, Water and Enforcement Issues

Thank you for your draft evaluation report of June 18, 2009, EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards. In accordance with EPA Manual 2750, this is our written response to your findings and recommendations.

In general, EPA's Office of Water finds the draft report to be factually accurate. Also, the Office of Water generally concurs with the findings in the report. However, we would like to be clear that our view is that numeric nutrient State water quality standards are needed to protect not only those waters already impaired by nutrient pollution, but also to prevent high quality waters from future impairment.

With regard to recommendations I and 2, overall we agree with the importance of addressing priority waters of regional, local and multi-State value. However, rather than selecting a specific list of significant waters of national value which will entail a substantial amount of process and, to a large degree, be redundant with the assessment and listing provisions of CWA sections 303 and 305, we believe a greater benefit will be derived by developing a strategic approach to leverage resources and existing authorities to get more numeric nutrient water quality standards in place. This strategic approach would consider waters of national value, including waters impaired for nutrients and high quality waters of national significance. When envisioning this approach, we recognize the strategic importance of addressing waters such as the Gulf of Mexico, the Mississippi River Basin and the Chesapeake Bay. We propose that we could develop this strategic approach in 2010.

With regard to recommendations 3 and 4, we are limited in terms of the metrics and tools available to require States to keep on schedule according to their individual mutually agreed upon plans. However, we agree that there is room for improvement in the use of the tools we have available (i.e., notification to the States that EPA is aware that they are not on schedule, more frequent publications of State status reports, revision of internal program clearly and

metrics to more transparently track and document State progress over time, and utilization of existing authorities).

Lastly, with regard to recommendation 5, we agree that WATA data should be validated on an annual basis. We are presently evaluating the approach of tying the WATA information to the PAM reporting to provide the necessary incentive for more accurate reporting.

Thank you for providing us with the opportunity to review and comment on this draft evaluation report. If you have any questions, please contact Dana Thomas at (202) 566-1046.

Attachment

**Appendix D**

***Distribution***

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