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

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OFFICE OF
WATER

MEMORANDUM

SUBJECT: Nutrient Pollution and Numeric Water Quality Standards

FROM: Benjamin H. Grumbles
Assistant Administrator

TO: Directors, State Water Programs
Directors, Great Water Body Programs
Directors, Authorized Tribal Water Quality Standards Programs
State and Interstate Water Pollution Control Administrators

This memo provides a national update on the development of numeric nutrient water quality standards and describes EPA's commitment to accelerating the pace for progress. EPA published its June 1998 national nutrient criteria strategy and some States and Territories have made notable progress in establishing numeric nutrient standards - most recently in connection with the Chesapeake Bay and Tennessee streams. However, overall progress has been uneven over the past nine years. Now is the time for EPA and its partners to take bold steps, relying on a combination of science, innovation and collaboration.

Why Action is Needed

High nitrogen and phosphorus loadings, or nutrient pollution, result in harmful algal blooms, reduced spawning grounds and nursery habitats, fish kills, oxygen-starved hypoxic or "dead" zones, and public health concerns related to impaired drinking water sources and increased exposure to toxic microbes such as cyanobacteria. Nutrient problems can exhibit themselves locally or much further downstream leading to degraded estuaries, lakes and reservoirs, and to hypoxic zones where fish and aquatic life can no longer survive.

Nutrient pollution is widespread. The most widely known examples of significant nutrient impacts include the Gulf of Mexico and the Chesapeake Bay. For these two areas alone, there are 35 States that contribute the nutrient loadings. There are also known impacts in over 80 estuaries/bays, and thousands of rivers, streams, and lakes. The significance of this impact has led EPA, States, and the public to come together to place an unprecedented priority on public partnerships, collaboration, better science, and improved tools to reduce nutrient pollution.

Virtually every State and Territory is impacted by nutrient-related degradation of our waterways. All but one State and two Territories have Clean Water Act Section 303(d) listed

impairments for nutrient pollution. States have listed over 10,000 nutrient and nutrient-related impairments. Fifteen States have more than 200 nutrient-related listings each. For these reasons, Regions have identified nutrient pollution reduction as a priority for EPA.

Why Numeric Criteria are Important

Numeric nutrient water quality standards will drive water quality assessments and watershed protection management. They will support improved development of nutrient Total Maximum Daily Loads (TMDLs). Perhaps most importantly, they will create state- and community-developed environmental baselines that allow us to manage more effectively, measure progress, and support broader partnerships based on nutrient trading, Best Management Practices (BMPs), land stewardship, wetlands protection, voluntary collaboration, and urban storm water runoff control strategies. The progress of States and Territories in setting numeric nutrient water quality standards is extremely important to help address nutrient pollution.

Numeric nutrient standards will facilitate more effective and efficient program implementation. Notable progress has been made relying on site-specific application of narrative standards to develop nutrient TMDLs. But this can often be difficult, resource-intensive and time-consuming. Adopting numeric standards, however, has a number of key advantages:

- easier and faster development of TMDLs;
- quantitative targets to support trading programs;
- easier to write protective NPDES permits;
- increased effectiveness in evaluating success of nutrient runoff minimization programs; and
- measurable, objective water quality baselines against which to measure environmental progress.

What Action is Needed

Today, EPA is encouraging all States, Territories and authorized Tribes to accelerate their efforts and give priority to adopting numeric nutrient standards or numeric translators for narrative standards for all waters in States and Territories that contribute nutrient loadings to our waterways. Incremental progress can be an effective way to accelerate progress. If a State needs to implement numeric nutrient criteria incrementally, EPA strongly recommends that States adopt numeric nutrient standards for their priority waters – i.e., waters at greatest risk of nutrient pollution (such as those identified through the EPA-USGS SPARROW modeling effort) or of greatest consequence (such as drinking water sources) – first. States may also choose to prioritize their actions for waters where sufficient information is available to move quickly to adopt numeric criteria in the near-term. The State's nutrient criteria plan should reflect the State's approach to setting standards for its waters, and include schedules for adopting those standards.

To be effective, nutrient criteria should address *causal* (both nitrogen and phosphorus) and *response* (chlorophyll-a and transparency) variables for all waters that contribute nutrient loadings to our waterways. EPA encourages the adoption of standards for all four parameters because of the interrelationships between these parameters and its experience showing that

controlling *both* nitrogen and phosphorus is important to successfully combating nutrient pollution in all waters. As always, States, Territories and authorized Tribes have the flexibility to address nutrient pollution using a subset of or alternatives to these parameters if they are shown to be scientifically defensible and protective of designated uses. Where a State, Territory or authorized Tribe shows that one causal variable (nitrogen or phosphorus) is the limiting nutrient, it should develop criteria for at least that nutrient. However, if the non-limiting nutrient is likely contributing to a downstream impairment, numeric criteria for that nutrient should be considered as well.

By accelerating the establishment of numeric nutrient standards, state governments and local communities can set goals, establish controls, agree on risk management approaches, measure performance, demonstrate progress, and learn from each other. In a time of scarce resources and competing priorities, we cannot afford delayed or ineffective responses to this major source of environmental degradation. As any environmental professional understands, we can't effectively manage what we can't measure. Numeric environmental baselines help us to measure success, gauge effectiveness, and evaluate alternative approaches.

Current Status

Over the last nine years, EPA has taken a number of steps to provide leadership and articulate its goal of working in partnership with States, Territories and authorized Tribes to establish quantitative endpoints to minimize excess nutrient loadings in our Nation's waters. EPA issued a National Strategy for Development of Regional Nutrient Criteria in June 1998, and followed with a November 2001 national action plan for the development and establishment of numeric nutrient criteria. EPA published technical guidance for developing criteria for lakes and reservoirs in May 2000, rivers and streams in June 2000, and estuaries and coastal waters in October 2001. EPA also published recommended nutrient criteria for most streams and lakes in 2001. This combined strategy of EPA, State, Territorial, and Tribal partnership supported by technical assistance was intended to jump-start progress on a difficult and challenging problem.

We have made progress, but we need to move more quickly and more comprehensively in order to meet the growing challenges from increasing population, expanding and more intensive agricultural activities, and spreading urbanization. A number of States and Territories have already moved ahead to establish numeric standards for priority waterbodies. Others are in the process of collecting data and preparing to develop them. Still others are in the earlier stages of planning and deciding which standards development approach will work best for them. A summary of the current status is attached.

Next Steps

EPA remains committed to supporting States' and authorized Tribes' efforts to adopt numeric water quality standards for nutrient pollution that are protective of designated uses. As outlined in more detail in the attached numeric nutrient standards strategy, EPA will:

- Provide direct assistance to States close to adopting numeric criteria. For these States, EPA will provide implementation guidance addressing technical and policy issues that States raise, and technical information to support States' rulemaking for standards.

- Build capacity for States that are not as close to adopting numeric criteria. For these States, EPA will provide sampling/monitoring, training, data/statistical analysis, and modeling assistance for developing criteria numbers.

- Build a science-based foundation for developing new criteria in estuaries, wetlands, and large rivers. EPA will complete its suite of nutrient criteria manuals for nutrient criteria, and continues to work to meet the goals of the federal and state Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

- Clearly and effectively communicate data and information on nutrient pollution. EPA will integrate nutrient messages in water quality standards communications products and outreach.

Conclusion

We can take steps now that will make a difference in addressing the challenges of growing nutrient pollution. The first step is to have numeric nutrient criteria in place to enable action. EPA is committing itself to support development of numeric nutrient criteria, and to use EPA's tools and metrics to help States, Territories, and authorized Tribes adopt numeric nutrient standards more quickly. EPA will also continue to do research, develop new tools, and collaborate to strengthen partnerships for consensus solutions.

EPA will work with States and Territories to review their nutrient criteria plans developed over five years ago to ensure they reflect current expectations, realistic goals, and clear interim milestones. Working together, we should ask ourselves what is needed to meet these milestones and then take appropriate action.

We should also continue to advance performance measurement and public accountability. EPA recognizes the importance of keeping the public informed of our joint progress. EPA will periodically publish a report of the status of our joint efforts, including the actions EPA has completed and the progress that States have made in adopting numeric nutrient water quality standards. EPA will also continue to track progress regarding nutrient pollution reduction, such as quarterly reporting of the number of TMDLs completed in nutrient impaired waters in the Mississippi River Basin.

Attachments:
1. OW Numeric Nutrient Standards Strategy
2. Current Status of States & Territories: Numeric Nutrient Criteria for Class of Waters

cc: Marcus Peacock
Regional Administrators

OW Numeric Nutrient Standards Strategy

What is the Environmental Problem?

- Excessive nutrients (nitrogen and phosphorus) can cause negative ecological impacts to waterbodies on a national scale by stimulating harmful algal blooms.
    - Algal blooms block sunlight and result in the destruction of submerged aquatic vegetation (SAV). SAV serves as critically important habitat and food for many organisms.
    - Algal blooms eventually die off and consume dissolved oxygen (DO) from the water column. Low DO concentrations lead to die off of aquatic organisms.
    - One result of algal blooms is decreased biological diversity and populations, including smaller populations of game and commercial fish.
- Excessive nutrients also pose public health risks.
    - Algal blooms can cause taste and odor problems in drinking water.
    - Hazardous algal blooms can cause respiratory distress and neurological problems in swimmers.
    - Excessive nitrates can cause blue baby syndrome.
- Nutrient pollution is occurring at a national scale and has not been completely addressed.
    - 49 states and 4 territories have 303(d) listings due to nutrients, and about 50% of the states have greater than 100 water quality impairments due to nutrients.
    - Over 10,000 impairments are a result of nutrient pollution.

What is OW's Role in Reversing Nutrient Pollution?

- The Office of Water, through its Office of Science and Technology (OST), applies science and technology to build a comprehensive framework of state water quality standards, drinking water goals, public health programs, and technology-based solutions to implement the national clean and safe water program in collaboration with national, state, and public partners. As part of this mission, OST develops nutrient water quality criteria recommendations, ensures state adoption of protective nutrient water quality standards, develops tools to aid states in implementing their nutrient standards, and publishes regulations that reduce the discharge of nutrients by industries.
- Over the last 10 years, OST has implemented a strong technical approach to address the negative impacts of nutrient pollution, which includes:
    - Creating a National Nutrient Team and Regional Technical Assistance Groups (RTAGs) with 10 Regional Nutrient Coordinators to support states in the management and evaluation of nutrient pollution.
    - Publishing 26 Ecoregional Nutrient Criteria documents for 13 lakes/reservoirs, 12 rivers/streams, and 1 wetland (Florida Everglades).
    - Publishing technical guidance documents for lakes/reservoirs (2000), rivers/streams (2000), coastal marine waters (2001), and wetlands (released for comment in 2006), and 14 wetland method modules to assist states in assessing wetland conditions.
    - Providing policy recommendations to states to develop nutrient plans which outline parameters they will set, the approach they will use, and the schedule they will follow.
    - Developing tools designed to aid states in developing numeric criteria (e.g., nutrient database for selecting reference conditions, N-Steps to provide scientific assistance on sampling and data analysis, a periphyton sampling methodology for rivers).

What is the OW National Nutrient Strategy?

- Water quality standards (WQS) are the backbone of water quality improvements. Once established, numeric standards reduce States' time and effort to establish TMDLs and permits to control nutrient levels.

- Thus, our goal is to accelerate the progress of state adoption of numeric WQS while building the scientific and technical infrastructure for developing new nutrient criteria. To accomplish this goal, we have four general themes:
  1. Provide direct assistance to states close to adopting numeric criteria.
  2. Build capacity of states that are further from adopting numeric criteria.
  3. Build a science-based foundation for developing new section 304(a) criteria for estuaries, wetlands, and large rivers.
  4. Clearly and effectively communicate the dangers of nutrient pollution and the merits of numeric nutrient criteria to states, nutrient sources, and the general public.
- Work conducted under these themes should reflect a collaborative effort/partnership between EPA Offices/Regions, and States that builds on work to date and coordination/relationships between EPA and States.
- We've developed specific projects under each of these themes based on input from states at the All States meeting in February 2006, subsequent discussions with regions, and the discussion with selected state managers at the WQSMA meeting in August 2006.

Theme 1: Direct Assistance to States Close to Adopting Numeric Criteria.

- We've identified states that are further along in criteria development for some or all of their waters. These states identified implementation and policy support as their primary need. Under this theme, OST is:
  - Developing implementation guidance that addresses technical and policy issues raised by these states.
  - Issuing a policy memorandum that clarifies EPA'srecommendations, thus providing states with a clear statement supporting their work. EPA will foster adoption of standards reflective of States' priorities, and recognizing the importance of incremental progress.
  - Assessing the benefits and costs of reducing nutrients, thus providing states with information to support their rulemaking to adopt nutrient criteria.
  - Compiling information on treatment and BMP effectiveness, thus providing states with information supporting that their criteria can be attained.
  - Developing common principles for EPA review of state nutrient standards submittals, thus providing assurance to states that EPA review will be consistent among regions.
  - Making all tools more accessible to states via the OST website.

Theme 2: Build Capacity of States That Are Further From Adopting Numeric Criteria.

- We've identified states that are further along in criteria development for some or all of their waters. These states identified sampling/monitoring, data/statistical analysis, and assistance in developing criteria numbers as their primary needs. Under this theme, OST is:
  - Providing states with on-demand statistical, sampling and data analysis support through N-STEPS.
  - Providing additional statistical, sampling and data analysis support through a variety of financial vehicles, with funds targeted towards progress with specific states.
  - Holding technical transfer workshops and training in regional offices to provide on-site hands-on training on OST technical tools.
  - Developing modeling tools that allow states to evaluate a causative approach for developing criteria and assessing the likelihood of criteria being attained.
  - Making all tools more accessible to states via the OST website.

Theme 3: Build a science-based foundation for developing new section 304(a) criteria for estuaries, wetlands, and large rivers.

- We've published technical guidance documents for developing criteria for lakes and reservoirs, rivers and streams, and estuaries and coastal waters. We still need to publish criteria or develop targets for other waters. Under this theme, OST is:
    - Completing technical guidance for developing wetland criteria.
    - Developing demonstration projects for estuarine and wetland criteria development.
    - Developing the scientific underpinnings for criteria for large rivers.
    - Supporting data collection to support developing criteria for estuaries and watersheds in the northern Gulf of Mexico.
    - Working to meet the goals of the Hypoxia Task Force.

Theme 4: Clearly and effectively communicate the dangers of nutrient pollution and the merits of numeric nutrient criteria to states, nutrient sources, and the general public.

- To be successful, we must engage the general public in understanding the consequences of nutrient pollution and the benefits of nutrient controls. Under this theme, OST is:
    - Building web-based and printed materials on the dangers of nutrient pollution.
    - Creating training materials for NGOs on the dangers of nutrient pollution.
    - Improving the OST website to attract more students looking for information on nutrient pollution.

Current Status of States & Territories Numeric Nutrient Criteria for Class of Waters Adopted Post-1997: Updated May 14, 2007

Entire Class of Rivers and Streams

Stage	Num	States
Has approved criteria for all parameters	5	TN, HI, AS, GU, CN
Has approved criteria for N, P, or Chlorophyll	4	DC, FL, OK*, NV
Engaged in developing criteria for all parameters and waters	6	MA, ME, VT, KY, MI, WI
Collecting data for all parameters or waters	34	CT, NH, RI, NJ, NY, PR, DE, MD, PA, VA, AL, FL, GA, MS, NC, SC, IL, IN, MN, OH, AR, LA, OK, NM, TX, IA, KS, MO, NE, CO, MT, UT, AZ, CA
Just starting criteria process	8	WV, ND, SD, WY, AK, ID, OR, WA
Notes: OK*: scenic rivers only		

Entire Class of Lakes and Impoundments

Stage	Num	States
Has approved criteria for all parameters	4	HI, AS, GU, CN
Has approved criteria for N, P, or Chlorophyll	3	RI, FL, IL
Engaged in developing criteria for all parameters and waters	15	MA, ME, VT, VA, WV, SC, MI, MN, WI, TX*, OK*, IA, MO, NE, AZ
Collecting data for all parameters or waters	34	CT, NH, RI, NJ, NY, PR, DE, MD, PA, AL, FL, GA, KY, MS, NC, SC, TN, IL, IN, OH, AR, LA, NM, OK, TX, KS, CO, MT, UT, CA, NV, ID, OR, WA
Just starting criteria process	4	ND, SD, WY, AK
Notes: OK*: drinking water lakes; TX*: large lakes; NE & VA packages in regions for review		