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Catherine B. Templeton, Director
Promoting and protecting the health of the public and the environment

March 14, 2014

Mr. Jim Giattina, Director
Water Quality Protection Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

Re: Revision of EPA/South Carolina Mutually Agreed Upon Nutrient Criteria Plan

Dear Mr. Giattina,

The South Carolina Department of Health and Environmental Control (Department) has revised South Carolina's Numeric Nutrient Criteria Plan and provides this hardcopy for your approval. Due to the complexity of the issues involved in developing nutrient criteria for these vastly differing waterbody types and in recognition of current reductions in State resources, we are amending the previous plan to adjust the timeframes for submittal of numeric criteria for estuaries, rivers and streams. The Department has hired additional staff dedicated to the development of numeric nutrient limits for our estuarine systems. We commend you and your staff for your assistance. If you have any questions regarding the plan, please contact Jason Gillespie of my staff at (803)-898-4330.

Sincerely,

David E. Wilson, Jr., P.E., Chief
Bureau of Water

Attachment

cc: Heather Preston, SCDHEC
Anne Marie Johnson, SCDHEC
Joel Hansel, USEPA
File

THE STATE OF SOUTH CAROLINA'S ADOPTION PLAN FOR NUMERIC NUTRIENT WATER QUALITY CRITERIA

Overview

The South Carolina Department of Health and Environmental Control (SCDHEC or Department) provides this plan in compliance with United States Environmental Protection Agency (EPA) guidelines regarding the adoption of numeric criteria for nutrients for waters of the United States. This is a brief description of our current status with development for numeric values for nutrients and includes a schedule for our State's promulgation of water quality criteria for nutrients. This plan describes methods SCDHEC will use to set and adopt water quality standards for nutrient parameters that protect against measurable impacts to the aquatic environment caused by nutrient over-enrichment.

The standards development process will ultimately lead to adoption of water quality standards for nutrients for all waters identified by the Department to have the potential for eutrophication from nutrient over enrichment. The date of adoption for all criteria is subject to change depending on the outcome of earlier tasks. SCDHEC staff will review this plan periodically and the EPA will be notified. The two parties will reestablish mutual agreement on any changes at the time of their submittal.

Prioritization and Coverage of Waters

The Department completed the process of promulgating numeric nutrient criteria for its waters with the adoption of numeric nutrient criteria for lakes of forty acres or more in the 2001 triennial review of the water quality standards regulation, South Carolina Regulation 61-68 *Water Classifications and Standards* (R.61-68). Due to both necessity and a legal urgency, the Department prioritized its lakes for numeric nutrient criteria development. The Department adopted an ecoregional approach for classification of these waters and modified EPA's Approach to Criteria Development as outlined in the Technical Guidance Documents that are specific to the waterbody types to reflect attributes specific to South Carolina's lakes.

At the time of development and promulgation of these numeric criteria, the EPA did not specify that any additional language was necessary for the Department to assess its waters using the criteria that was duly promulgated and adopted. This has since changed and the EPA has requested clarification regarding specific issues such as duration, frequency, and values used for determining compliance with the numeric criteria for 303(d) listing purposes and total maximum daily loads (TMDLs). With this issue in mind, in 2009, the Department extensively reviewed its existing criteria and the process by which they were developed. The LOESS regression, SPLINE regression, and logistic regression methods were applied to the data analysis. No adjustment to our existing criteria have been proposed, but methodology evaluation continues as well as chlorophyll *a* values.

It is the intent of the Department to move forward with numeric criteria for all waters and to ensure that they reflect a scientifically defensible and sound approach that will not only provide for the protection and maintenance of our waters from nutrient over-enrichment, but will also improve those waters that are currently impaired due to nutrient loadings. The Department continues to prioritize development of nutrient criteria for estuaries first and then, move onto rivers and streams. A two-year temporary grant position is currently funding a scientist to accomplish these goals.

Parameters to be Analyzed

South Carolina has adopted all four of the USEPA nutrient criteria parameters for use with lakes, but will determine through the development process if all four are necessary for each additional type of waters.

a. Total Phosphorus - Phosphorus has largely been implicated as the cause of over-enrichment in freshwater systems and implicated recently as the limiting factor in marine systems as well, thus it is likely that phosphorus criteria will be developed and adopted for all classes of waters. Criteria will be set based on evaluations of relationships between total phosphorus (TP) and various response variables [e.g., chlorophyll *a*, dissolved oxygen (DO), and biological indices].

b. Total Nitrogen - The Department will develop appropriate nitrogen criteria for remaining South Carolina waters by evaluating relationships between nitrogen concentrations and response variables (e.g., chlorophyll *a*, and biological indices) which are indicative of eutrophication. The need for nitrogen loading controls to address downstream water quality impacts will also be evaluated.

c. Chlorophyll *a* (can include periphyton and phytoplankton) - The Department will evaluate the utility of chlorophyll *a* criteria by examining relationships between chlorophyll *a* and nutrients in fresh and marine waters. The Department is also exploring the use of mathematical models to predict conditions that may cause impairment.

d. Turbidity - South Carolina has adopted turbidity criteria for all of its waters based on waterbody types and also their classified uses.

e. Other information to be evaluated - The Department will evaluate biological indices and macroinvertebrate data to determine its utility for setting nutrient criteria. The Department is considering the use of dissolved oxygen data and information as it relates to productivity or algal biomass.

Criteria Development Process

As noted above, the Department developed numeric nutrient criteria for lakes greater than 40 acres in 2001. The Department monitors and assesses waters according to these criteria. The Department also monitors waters for nutrients where there are no applicable numeric criteria. Where monitoring data indicate a violation of the numeric standard, these waters are placed on the 303(d) list and prioritized for TMDL development. To date, one nutrient TMDL has been established and three additional nutrient TMDL efforts are underway.

Approach for Developing Remaining Nutrient Criteria and Data Sources and Analysis

South Carolina plans to utilize EPA's technical guidance or modifications thereof to refine and develop criteria for other waters of the State. The actual approaches used will most likely depend on the result of the analysis of available data and future data collections and will use only data specific to South Carolina waters. The approaches will be either effect-based (correlating nutrient levels with measurable water quality or biological effects or impairments utilizing available data and data to be collected, findings in published literature, and historical information) or reference-based (utilizing a percentile of the frequency distribution of all sites for different water body types based on site-specific data and ecoregions).

- Estuaries –

  It is believed that all of South Carolina's estuaries lie within Nutrient Ecoregion XIV. During criteria development, a determination will be made if it is appropriate to have one set of indicators for all estuarine waters or to include several sets. In 2003, SCDHEC expanded its analysis of estuarine eutrophication indicators, as well as spatial coverage for estuarine sampling to gather additional data and information using a grant provided by the EPA. Algal growth potential test (AGPT) data was developed along with nutrients and other specific parameters on ten additional sites believed to represent our estuaries as a whole, but also included two site locations that represent least impacted or reference sites. While the study did not generate a large data collection, results indicated that either nitrogen or phosphorus may limit algal biomass even in the least impacted estuarine waters.

  Several different statistical analyses of nutrient causal and response parameters based on the above classification schemes are being utilized to develop nutrient criteria for estuaries. Calculations using the National Estuarine Research Reserves data have shown promising results. However, the data analyses from most South Carolina datasets results in low correlation and high variability.

  This is likely due to the manner in which most South Carolina coastal nutrient related data was collected, e.g., it was not collected with nutrient criteria development in mind, which has resulted in data gaps across both geographic and temporal scales. Therefore, the Department's subsequent approach involves a statistically validated estuary grouping method. Grouped estuaries will then be assigned numeric nutrient criteria using the EPA approved "data distribution approach" and the assignment of reference conditions.

  The Department intends that numeric nutrient criteria for estuaries be adopted during its triennial review of the water quality standards. The Department will provide progress reports to the USEPA and will submit for early review and concurrence any numeric criteria (including supporting data and analyses) proposed for water quality standards adoption.

- Rivers and Streams –

  South Carolina's rivers and streams lie within Nutrient Ecoregions IX, XI, and XIV. SCDHEC's river and stream monitoring program has traditionally included phosphorus, nitrogen, turbidity and biological community analyses, with excellent spatial coverage across ecoregions and stream classes. All appropriate data and information will be analyzed and used to develop numeric nutrient criteria for South Carolina rivers and streams according to EPA guidance. The dynamic relationships between nutrients, water chemistry, substrate, lentic and lotic conditions within the waterbody and designated uses of these waterbodies will be evaluated. The Department proposes that numeric nutrient criteria for rivers and streams be adopted on a site-specific basis with the Department first establishing a methodology that will provide a measure for the presence of eutrophic conditions instream. This methodology will incorporate a process for identification of nutrient over-enrichment and the severity of the pollution. The individual site-specific numeric water quality standards will be implemented at the time of their development. The Department will provide progress reports to the USEPA and will submit for early review and concurrence any numeric criteria (including supporting data and analyses) proposed for water quality standards adoption.

Sources of Data

As of December 2013, a marine nutrient database has been compiled which contains 182,000 water nutrient records and approximately 19 million additional water quality records from 799 sampling stations along the South Carolina coast. Data sources include DHEC's own Ambient Surface Water Quality Monitoring Program, the United States Geological Survey, the National Estuarine Research Reserve's Central Data Management Office and generous contributions by local scientists. Additionally, GIS software has been employed to subdivide the South Carolina coastline into 15 estuary regions. These estuary groups have also been more broadly classified by estuary type. The Department is considering additional monitoring in 2014 to fill gaps within our database and to aid in the development of predictive modeling efforts.

Additional Data Needs

To continue data collection and to help fill in data gaps, the Department will seek to utilize any additional available funds, EPA nutrient criteria development and/or training funds, information available from studies in other states, etc. to provide resources or information to help fill in these data gaps. Additional data and resource needs include, but are not limited to:

a. Further assessments of relationships between nutrient (TP and TN) concentrations and impairment of designated uses in more waters throughout the state.
b. Seasonal effects of nutrients.
c. The importance of flow, turbidity, substrate, and light in moderating the effects of nutrients.
d. Additional resources to collect, compile, and analyze data from future collection efforts.

Other Concerns to be Addressed

The Department has other issues that will need to be addressed as criteria are developed for other waters of the State regarding nutrient criteria implementation. The Department expects to address these issues throughout the development process as additional information is gathered and that data and information is reviewed. These issues include, but are not limited to, the following:

- Criteria protective of designated uses
- Continued application of narrative criteria
- System for evaluating exceedences of nutrient criteria for assessment
- Modeling and assessing effluents
- Consideration of downstream effects

Schedule

The Department is planning to bifurcate the nutrient promulgation schedule to focus initially on criteria for estuaries and then develop criteria for rivers and streams. The Department currently plans to move forward with numeric nutrient criteria for estuaries during 2017 and will address rivers and streams during the subsequent triennial review period. The reason for focusing initially on criteria for estuaries is that we believe we have gathered substantial data to support that effort and this data is currently lacking to support the development of nutrient criteria for rivers and streams.

Adoption Process

The Department must promulgate these criteria through its regulation process as new water quality standards. Our state process is a lengthy one and provides for ample opportunity for public involvement and participation. The first step by the Department is to develop the criteria based upon the process described. The next step is to begin the public process of adoption of these values. This process will require multiple public comment periods and opportunities for the public to provide additional data, information, and comment to the actual development of the water quality standards that are derived from the criteria development process. This often includes application and implementation decisions as well as the criteria themselves. Our process for regulation development is briefly described as follows:

- Notice of Drafting – *State Register* notification. Includes a thirty (30) day comment period.
- Meetings with stakeholders – Usually multiple meetings are convened to provide for interaction between the many different stakeholders and the Department. Federal and State agencies are involved as well as environmental groups and members of the regulated community along with local governmental groups representing cities and towns.
- First Board meeting – The Department requests permission from our Agency Board members for a Notice of Proposed Regulation, a Staff-conducted Informational Forum to be convened, and a Public Hearing to be held.
- Notice of Proposed Regulation – *State Register* notification. Another thirty (30) day comment period. Department prepares final language of the regulation and a responsiveness summary to all comments received during the process.
- Staff Informational Forum – The Department provides an additional opportunity for the public to provide comments regarding the proposed regulation.
- Public Hearing – Conducted before the Agency Board and if the proposed regulation is approved, then the Department may go forward with sending the promulgated regulation to the South Carolina Legislature for approval.
- Submittal to S.C. Legislature – If after 120 days, it is approved or no action taken, the regulation is then published in the next *State Register.* The regulation becomes effective for purposes of state activities.
- Submittal by the Attorney General to the EPA – EPA is now given sixty (60) days to approve the regulation revision or ninety (90) days to disapprove.
- If approved by the EPA – State may use the numeric criteria as South Carolina water quality standards for purposes of the Clean Water Act.

Summary

South Carolina was the first state in Region 4 to promulgate and adopt numeric nutrient criteria for lakes based upon a modification of the EPA guidelines. The development of TMDLs for identified impairments reaches upstream throughout the watershed feeding those lakes encompassing hundreds of miles of tributary streams. We believe this indicates the seriousness with which this Department views the problems of nutrient over-enrichment. The Department plans to continue to develop nutrient criteria and believes that these criteria are essential for our water quality standards program and for our water programs in general. The Department is committed to their continued development. With the full knowledge that the most egregious nutrient eutrophication problems in our State have been addressed by the adoption and implementation of nutrient controls for our lakes and reservoirs, the Department will begin to address estuaries in 2017 and rivers and streams during the subsequent triennial review period.