Beverly Eaves Perdue, Governor

Dee Freeman, Secretary
North Carolina Department of Environment and Natural Resources

Coleen H. Sullins, Director
Division of Water Quality

January 27, 2009

Ms. Joanne Benante
Ms. Annie Godfrey
Water Quality Planning Branch
United States Environmental Protection Agency
Region 4 - Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303-8960

Subject: 2008 Status Report of NC's Nutrient Criteria Implementation Plan and Supporting Documentation

Dear Ms. Benante and Ms. Godfrey:

In accordance with requirements of the EPA FY 09 106 plan and the US EPA/State Nutrient Criteria Implementation Plan (NCIP) mutual agreement letter (dated June 27, 2006), the State of North Carolina is providing a status report on nutrient implementation activities to date. The following is a summary of our nutrient activities through December 31, 2008, related to the NCIP and to Task #1 under North Carolina Water Quality Standards, EPA FY 09 Section 106 Work Plan (9/02/08):

Current Nutrient Management Efforts:
The State of North Carolina's Environmental Management Commission (EMC) has a long, dedicated history of commitment to the control of nutrient over-enrichment. Recognizing the difficulty in capturing the multitude and strength of these resource-consumptive programs, a summary of existing North Carolina nutrient control programs is provided as Attachment I. The document, "Existing North Carolina Nutrient Management Programs 2008" encapsulates established nutrient response criteria, specialized classification system, use support methodology, nutrient TMDLs, nitrogen and phosphorus permitting strategies for both point and non-point sources, stormwater control programs, control of animal waste and other additional protective measures for the state's waters. Attachment I provides a complete and accurate portrayal of the hard work that we are involved in to prevent and protect the waters of the State from nutrient enrichment and impairments.

Progress Towards Revised Criteria Development:
In accordance with the mutually agreed upon NCIP, the final nutrient related data analysis and evaluation was completed by the Division's Environmental Sciences Section in December 2008. These two evaluation reports, entitled "An Exploration of Nutrients and Chlorophyll in North Carolina's Estuaries" and "An Exploration of Nutrient and Chlorophyll

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a Relationships in North Carolina Lakes and Reservoirs" are included as Attachment II and Attachment III, respectively. These extensive reports are briefly summarized below:

- North Carolina is home to estuarine waters from Albemarle Sound in the North, to Lockwood's Folly in the South. In order to investigate possible linkages between nutrient concentrations and chlorophyll a concentrations in estuarine waters, data from monitoring stations throughout North Carolina's coastal area were examined. Stations chosen for analysis were identified as estuarine, had analytical data for chlorophyll a and nutrient parameters and the samples were collected from January 1, 2002 through December 31, 2006. The data were statistically evaluated in a multitude of ways to explore potential relationships. For example, the data were divided by basin location (north, central, and south), location within the estuary (upper, middle, and lower), and season. Because the tidal movements of each area vary significantly from mostly wind driven in the north to strong lunar tides in the south, location is a useful distinction. Location within an estuary is also an important factor to examine as upper estuarine locations get heavier loading of sediment due to drops in stream velocity, and the lower estuary locations have greater tidal action (though this varies greatly from north to south). After a thorough examination of the available data for North Carolina estuarine waters, linear regression analysis indicated that the nutrient parameters of Total Nitrogen (TN), Total Organic Nitrogen (TON) and Total Phosphorus (TP) provide poor correlations with chlorophyll a. The water quality standard for chlorophyll a in North Carolina is 40 ug/L, positive correlations were observed at levels above 50 ug/L chlorophyll a. Exploration of North Carolina's estuarine water quality observations of nutrients and chlorophyll a failed to produce a scientifically defensible direct link between chlorophyll a and nutrient concentrations. It is likely that estuarine nutrient and chlorophyll a relationships can only be evaluated with a site specific analysis of loading and response criteria.

- Lake monitoring station data throughout North Carolina were examined with the objective to find defensible science associating nutrient concentrations with chlorophyll a concentrations. This rigorous analysis indicated that there appears to be weak relationships between Chlorophyll *a* and Total Phosphorus, Total Nitrogen and Total Organic Nitrogen in NC lakes and reservoirs. In general, there does *not* appear to be a significant relationship between Total Inorganic Nitrogen (TIN) concentrations and Chlorophyll *a*. TIN concentrations were generally low, often below detection levels, likely because this form of nitrogen is rapidly consumed by algae during the growing season. The weak relationships between chlorophyll a and nutrient concentrations indicate that there are variables other than nutrient concentrations that affect chlorophyll a response. Site specific variables such as retention time, lake morphology, station location within the lake, watershed area and land use, all play a role in the severity of chlorophyll a response to nutrient inputs.

- The inability to define a clear relationship of chlorophyll a to nutrients was also mirrored in the report contracted through The North Carolina Water Resources Research Institute (WRRI)/Duke University entitled "Evaluating Eutrophication-Related Water Quality Parameters in North Carolina Lakes and Reservoirs." (January 18, 2007). The WRRI/Duke report provided the State with a single suggestion of a statewide Total Phosphorus criterion but cited an inability to recommend any specific nutrient criterion concentration. WRRI/Duke was unable to identify other nutrient thresholds (including frequency and duration for any given threshold) and did not provide any discussion of application of specific numeric concentrations based on regional, temporal or spatial values.

The State is continuing to pursue a revised chlorophyll a standard as its primary approach to refined nutrient control criteria. As proposed in the NCIP, revised draft regionalized chlorophyll a standards, as well as proposed lower threshold criteria approaches, have been drafted and are included in this report as “Chlorophyll a - Draft Proposed Revisions“, Attachment IV. To meet this goal, fifteen workgroup meetings have occurred throughout the 2008 calendar year to address the State’s data evaluation needs, development of revised standards and ultimately, management of nutrients. These include eleven meetings to address narrative and numerical changes to the existing chlorophyll a standard which involved the Environmental Sciences Section and Planning Section staff. As part of the State required public process, staff presented information to the North Carolina Environmental Management Commission (EMC) on November 12, 2008. This update provided an overview of potential revisions to the chlorophyll a standard, the addition of chlorophyll a threshold values and additional information on the implementation efforts that will accompany these proposed changes to NC water quality standards.

Staff members representing NPDES, Stormwater and Non-point Source Management Units have been more recently involved in determining feasible mechanisms for implementation of both the proposed revised chlorophyll a standards and the preventative lower threshold levels in both the point source and non-point source arenas. The attached “Chlorophyll a - Draft Proposed Revisions” will be used by the staff of the NPDES section and the Non-point Source Management Unit to develop complementary regulations and policies to address nutrient inputs. Where waters are identified as exceeding the proposed chlorophyll a threshold levels or proposed chlorophyll a standards, Division staff are evaluating changes to regulations which may include technology based effluent limits as part of a multi-tiered approach to refine nutrient controls. These requirements and policies will be based upon the size and type of the discharger and the susceptibility of the receiving stream and downstream waters to nutrient impacts. Municipal, industrial, and stormwater discharges will be assessed to create site-specific TN and TP optimization levels to prevent and preclude further enrichment. Regulatory and policy language to address the NPDES, Stormwater and Non-point Source implementation aspects of the proposed chlorophyll a revisions is expected to be drafted over the coming year by these three workgroups.

Additional Complementary Activities:
Water supply reservoir protection is a major focus of the Environmental Management Commission's efforts. North Carolina has completed a TMDL for Jordan Reservoir and is pursuing a suite of rules to control and reduce N and P loading from both point and nonpoint sources that has an estimated implementation cost over thirty years of close to $1 billion dollars. This management has been at least a seven year effort to develop and construct these rules, which will constitute the most stringent nutrient management strategy in the state. Public hearings to seek comments on the rules occurred over the summer of 2008, with EMC and Rules Review Commission consideration in November of 2008. Final state legislative consideration of this suite of regulations is anticipated in early 2009. Additional information with respect to Jordan Lake can be found in Attachment I and at the Division's website: http://h2o.enr.state.nc.us/nps/JordanNutrientStrategy.htm.

Nutrient related North Carolina legislation known as the "2005 Drinking Water Reservoir Protection Act" (also: Senate Bill 981; Session Law 2005-190 and Session Law 2006-259),"the Act" charges the EMC to adopt a nutrient management strategy, based on a calibrated nutrient response model, to address identified impairments in the Act's applicable drinking water supply waters. Under the Act, the Falls of the Neuse Reservoir (Falls Lake) meets the regulations' criteria as an applicable body of water. While the Act calls for the strategy to be adopted by 2009, the Division of Water Quality has been working with the original sponsors of the Senate Bill and has submitted a request to the NC General Assembly to extend the adoption timeline to 2011. This extension is being sought in light of delays caused by the loss of chlorophyll-a data and to allow sufficient time for the modeling process and State required regulatory process, including stakeholder involvement. DWQ continues to work on the modeling, stakeholder process and rule development as it awaits appropriate legislative responses to these inquiries which may ultimately affect proposed timelines and modifications to the water quality standards. (Additional information with respect to the Act can be found in Attachment I)

Animal Feeding Operations and the management of the wastewater from confined animal feeding operations are permitted as non-discharge land application systems. This wastewater, including nitrogen and phosphorus, is not to be discharged directly to any waterway. In response to a petition, the Division has proposed changes to rules governing animal operations that would require water quality monitoring for most permitted piedmont and coastal plain animal operations. Under the proposed rules, a surface water monitoring plan shall be established. It will include up to three representative monitoring sites chosen by the Division, including one location that provides background conditions. Monitoring coalitions may also be allowed with Division approval. Samples will be collected and analyzed for Ammonia Nitrogen, Nitrate Nitrogen, Biological Oxygen Demand, Fecal Coliform and Chloride. The proposed rule also requires surface water monitoring during an unpermitted wastewater discharge to surface waters which includes the above listed parameters and Total Kjeldahl Nitrogen. These proposals have received approval from the NC Environmental Management Commission to go to public notice and comment and pubic hearings are anticipated this coming spring.

In September 2008, the Classifications and Standards Unit staff attended the Region IV Nutrient RTAG meeting held in Atlanta, Georgia. North Carolina anticipates being involved in the proposed national meeting in 2009; however, we are experiencing deep budget cuts and travel opportunities will be limited.

North Carolina remains committed to continued cooperation with the US EPA and to full disclosure in regards to the assessment of water quality in the State. All of the above activities summarize our nutrient related activities this quarter. North Carolina remains actively engaged in further developing the existing Nutrient Criteria Implementation Plan to assist in the prevention and protection from future nutrient impairments. Questions or comments regarding the status of revisions to water quality standards may be sent directly to Connie Brower at 919-807-6416. Please call Alan Clark at 919-807-6441 or Jeff Manning at 919-807-6415 for any questions regarding the North Carolina Nutrient Criteria Implementation Plan.

Sincerely,

Coleen H. Sullins

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Enclosure(s)