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August 16, 2010

Mr. John Huisman,
NCDENR, Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

RE: Comments on the North Carolina Falls Lake Nutrient Strategy Rules

Dear Mr. Huisman:

The Durham Environmental Affairs Board (EAB) is an independent, volunteer group of citizen-scientists that have been appointed by the Durham City Council and County Commissioners to advise them on environmental issues affecting Durham County. We swim, hike, kayak, fish and picnic at Falls Lake and its tributaries, and strongly support efforts to improve water quality in the reservoir. However, we want to ensure that the efforts undertaken to reach the water quality standards really are the most effective means for improving water quality.

The attached memo summarizes our findings on the Falls Lake Nutrient Strategy Rules, as we have transmitted to Durham City and County officials. In it, we outline specific concerns with the current rules. **We urge DWQ to commit to re-visiting the modeling and analysis prior to implementation of the Stage II reductions, using improved data, better representation of the reservoir and additional sensitivity studies. We recommend that DWQ consider guidance from the EPA and conduct a Use Attainability Analysis.** We support the “Consensus Principles to guide Falls Lake Nutrient Management Strategy.”

Given the huge investment required to reduce nutrient levels in the upper Falls Lake, we find it imperative to target those sources that will most effectively and efficiently improve water quality. We must have confidence that our controls will work to achieve the water quality standards that are appropriate for Falls Lake.

Sincerely,

Deborah Luecken, Chair
Durham Environmental Affairs Board (EAB)



Environmental Affairs Board

Durham City-County Planning Department ▪ 101 City Hall Plaza ▪ Durham, NC 27701

August 4, 2010

TO: Durham City Council and Durham County Board of Commissioners
FROM: Durham Environmental Affairs Board (EAB)
SUBJECT: EAB Comments and Recommendations on the North Carolina Falls Lake Nutrient Strategy Rules

Executive Summary

The Durham EAB strongly supports pollution controls to improve the water quality in Falls Lake. However, we want to ensure that the reductions that we make will indeed have the desired benefits and will most effectively target water quality improvements. To this end, we have reviewed the North Carolina “Falls Water Supply Nutrient Strategy”, 15A NCAC 02B .0275-.0283 (NC Division of Water Quality (DWQ), 2010). We have consulted with independent scientists, city experts and others. Based on this research, we have significant concerns about the rules and recommend that Durham request that the State:

- commit to revising the model for Stage 2 and addressing some of the uncertainties in the current model;
- request a Use Attainability Analysis (UAA) to determine whether the desired goals are attainable in the upper portion of the lake;
- add additional monitoring sites for both compliance and for evaluating model results

The EAB recommends that DWQ re-examine the rules prior to implementing the Stage 2 reductions. This would involve analyzing and reviewing new information, revisiting the modeling studies using additional monitoring and modeling data, and re-examining whether alternative water quality standards would be sufficient to protect existing uses in the upper lake.

The EAB further recommends the Council and Commissioners consider the environmental concerns detailed in this memo that we intend to submit to Mr. John Huisman at DWQ. All comments received by August 16, 2010 will be considered by Department of Environment and Natural Resources (DENR) when promulgating the final rule.

Background

Since the time it was constructed, portions of Falls Lake have experienced high concentrations of chlorophyll-*a*, which is a measure of algal growth due to excess nutrients consisting of phosphorus (P) and nitrogen (N). To protect water quality functions and fulfill its obligations under the federal Clean Water Act, DWQ uses numeric and narrative criteria to assess whether each surface water body is meeting its designated use classification. When the water in Falls Lake has been tested, some parts of the lake have been found to exceed the chlorophyll-*a* standard. These exceedances are more frequent in the northern parts of the lake due to the

shallow conditions and the presence of rivers and creeks feeding high levels of P and N into the lake. In 2005, the General Assembly passed State Law 2005-190(S981) which directed the Environmental Management Commission (EMC) to develop a nutrient management strategy for Falls Lake and establish rules no later than January 15, 2011. The Falls Lake Nutrient Management Strategy designates the Falls Lake watershed as a critical water supply watershed. This allows the EMC to establish more stringent requirements than the minimum watershed class requirements, and requires it to meet the chlorophyll-*a* standard of no more than 10% exceedance of 40 µg/L.

The draft Falls Lake rules are to be implemented in two stages (DWQ, 2010):

- Stage 1 (10 years from inception): Watershed-wide reductions to meet chlorophyll-*a* standard in lower lake
- Stage 2 (20 years from end of Stage 1): Additional reductions in upper watershed (above NC 50) to meet standard in the entire lake, requiring lake-wide reductions of nitrogen and phosphorus loading to surface waters by 40 percent and 77 percent, respectively.

Durham has committed to meeting the Stage 1 rules, and to working towards additional reductions in N and P beyond Stage 1. Under the Consensus Principles developed by Durham along with other local governments and stakeholders (Falls Lake Stakeholder Project, 2010), Durham has recognized that citizens throughout the watershed will benefit from reductions in pollutants to Falls Lake. However, Durham and many other groups have serious concerns about the reliability, applicability, and attainability of the reductions specified in Stage 2.

To examine the issues surrounding this rule and provide an independent assessment of the rules, the EAB:

- Reviewed the proposed rules;
- Reviewed the modeling reports;
- Read and considered the proposed Consensus Principles and related information presented by the Falls Lake Stakeholder Project;
- Attended the June 30, 2010, public hearing held by DENR at Neal Middle School;
- Consulted with Durham City staff;
- Consulted with international experts, Rochelle Araujo and Kenneth Reckhow, on water quality science and policies; and
- Attended stormwater citizens group meetings, Upper Neuse River Basin Authority (UNRBA) and DWQ meetings.

Summary of Environmental Concerns

The EAB wholeheartedly supports efforts to improve the water quality in Falls Lake. But at the same time, we want to ensure that the resources that Durham expends really do result in the desired improvements. The EAB supports the Stage 1 implementation. While Stage 1 will be costly, we believe the benefits to the environment will be significant. However, we question the appropriateness of the full and mandatory implementation of Stage 2 rules as currently written, and believe they can be improved upon as described below:

1. The EAB recommends that DENR commit to revising the model for Stage 2 and addressing some of the uncertainties in the current model. The present model used to develop the required

reductions contains substantial uncertainties and simplifications, which make the results unreliable. Specifically, the watershed loading and lake response models which were used to develop the 30% N and 70% P reductions contain several structural implausibilities, process omissions, and assumptions about input conditions. Independent water quality modelers have cited the following as weaknesses in the model:

- Limitations in amount and quality of input data that are used to drive the model;
- Problems with driving model calibration from one monitoring point (see Point 3);
- Limitations in the monitoring data for evaluating the model outputs;
- Lack of processes that are relevant specifically for reservoirs;
- Assumption of constant tributary algal loading; and
- Lack of sensitivity tests and uncertainty propagation.

Some of the assumptions used in the model, such as no reduction in tributary algal loading when tributary nutrient loads are reduced, were found by an independent modeler to make a significant difference in the percent of time that the standard was exceeded (TetraTech, 2010). This needs to be seriously examined because it could overestimate the amount of reduction needed. In addition, although the model predicted a 70% P/ 30% N reduction to meet the standard, NC DWQ revised reductions upward to 77% P and 40% N reduction in the rule. The basis behind this upward revision is not sufficiently explained or justified. This is a substantial jump in amount and complexity of the reduction requirements that must be thoroughly evaluated.

It is critically important that the mandated percentages of P and N reduction are as accurate as possible, which requires that we use the best tools possible. As part of the Consensus Principles, the City of Durham has proposed that the regulatory model be enhanced by a more rigorous program of sampling, monitoring, and analysis to produce a more robust application of the model. We, the EAB, recommend that DENR commits to revisiting the model application using more complete and location-relevant process descriptions and input data. This additional modeling will more thoroughly characterize how the lake would respond to controls. By better understanding the response, we can better target those reductions which will be the most effective for achieving the standards.

2. The EAB recommends that Council and Commissioners request a Use Attainability Analysis (UAA). There are legitimate concerns that the standard set by this rule for Falls Lake may not be attainable, regardless of cost. Therefore, DENR should conduct a UAA for Falls Lake as allowed by US Environmental Protection Agency (EPA). There is reasonable doubt among people who are knowledgeable about the science whether the nutrient reduction standard set in the Falls Lake rules can be attained. Additional, independent modeling studies (TetraTech, 2010) show that even with complete control of all manmade sources of N and P, the 40 µg/L chlorophyll-*a* standard would still be exceeded approximately 5% of the time. The wide and shallow structure of the upper portion of the lake and legacy P in forested lands provide a large “background” level of nutrients that cannot be reduced, which makes it more difficult for actions by Durham citizens to have a significant effect – Durham has to take heroic and extreme actions to have even a minor improvement.

Guidance from the EPA urges states to consider local conditions in setting defined uses for bodies of water, including whether the designated use is applicable and the standards are attainable. Under 40 CFR 131.10(g), States may remove a designated use which is not an existing use, as defined in § 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible. Some of the particular conditions that indicate consideration of a UAA, include when:

- “Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
- Dams diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
- Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.” (EPA, 2010)

These points are directly relevant to the Falls Lake environment. Durham government staff have stated that the standards cannot be achieved in certain parts of the lake. Further, staff has estimated that measures needed to attempt to achieve these standards would cost citizens in excess of one billion dollars, creating an unnecessary hardship on the community. The EAB therefore recommends that DWQ consider guidance from the EPA and conduct a UAA as part of the Falls Lake strategy.

3. The EAB recommends that Durham ask the State to add additional monitoring sites for both compliance and for evaluating model results. The reduction target based on attainment at one monitoring point, versus using a more broadly-defined average, is neither a good representation of the water quality conditions of the lake nor the responsiveness of the lake to nutrient reductions. The standard is based on 10% of the samples violating the standard (in this case, a chlorophyll-*a* standard of 40 µg/L), not necessarily on 10% of the samples at a given point violating the standard. Nutrients disperse throughout a body of water, therefore taking a measurement at a single point, especially one in a transition zone such as NEU013B, does not adequately characterize the water body. This is not the “standard” way that these types of standards are generally assessed under the Federal Clean Water Act.

Additional monitoring will help us more precisely identify the sources and quantify the amount of N and P entering Falls Lake. Increased monitoring data will improve the evaluation of Stage 1 measures and inform the modeling for Stage 2.

Recommendations

The EAB recommends that the State consider revisions to the requirements of Stage 2 requirements based on results of updated modeling and monitoring information, as described in part 5b of the Rule. With the numbers provided from revised modeling and the results of the UAA, the State should provide a formal re-examination prior to full implementation of Stage 2 requirements. As part of this process, the State should consider EPA guidelines under the Clean Water Act.

The EAB recommends that Durham commit resources towards improving both the monitoring and the modeling applications. We recommend that Durham collaborate with the State on model simulations that characterize the response of the upper lake to alternative nutrient reduction scenarios. By doing so, Durham can support model applications to explore those policy alternatives that are most appropriate for Durham and target those scenarios that are the most effective at meeting the standard.

The EAB supports the Consensus Principles which have been developed through a deliberative process involving local governments and citizens in the Falls Lake watershed.

The EAB has submitted these written comments to the Council and Commissioners for review and will forward them to John Huisman at the following address:

NC DWQ
1617 Mail Service Center
Raleigh, NC 27699-1617

Thank you for your concern about this important issue and your support of the EAB. Please contact Kathleen Snyder at (919) 560-4137 x269 or at Kathleen.Snyder@DurhamNC.gov with any questions.

References

Falls Lake Stakeholder Project, 2010. Consensus Principles To Guide Falls Lake Nutrient Management Strategy. February 9, 2010. <ftp://ftp.tjcog.org/pub/fallslake/concensusprinc.pdf> (Accessed July, 2010).

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Schlegel, M. 2010. Falls Lake Stakeholder Project. Triangle J Council of Governments, Research Triangle Park, NC. Accessed February 2010. <http://www.fallslakestakeholder.org/> (Accessed July 2010)

U.S. Environmental Protection Agency, 2010. Water Quality Standards – Use Attainability Analyses (UAAs) <http://www.epa.gov/waterscience/standards/uses/uaa/index.htm>

Attachments: Consensus Principles to Guide Falls Lake Nutrient Management Strategy

cc: Thomas J. Bonfield, Durham City Manager
Mike Ruffin, Durham County Manager
Steve L. Medlin, Durham City-County Planning Director