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August 16, 2010

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

RE: Proposed Falls Water Supply Nutrient Management Strategy

Dear Mr. Huisman:

The City of Durham Department of Water Management appreciates the opportunity to comment on the proposed Falls Water Supply Nutrient Strategy (please see attachments). We have actively participated in the stakeholder process and in the public hearing process and will closely follow the final recommendations scheduled to be presented to the Environmental Management Commission (EMC) in November 2010.

The City of Durham and the staff of our water reclamation facilities are committed to optimizing plant practices and adopting treatment strategies and regimens to produce the highest quality effluent possible while providing cost effective services to our customers. Durham however remains concerned that the rules as currently proposed will have a long term adverse economic impact on both our taxpayers and rate payers. We have always been committed to protecting the environment and the waters of the state by providing the highest level of treatment possible by current technology and will continue to embrace responsible strategies for improving our state's water quality.

Regards,

Donald F. Greeley, P.E., PLS  
Director

c: Karen Sindelar, Senior Assistant City Attorney, Durham  
Theodore L. Voorhees, Deputy City Manager, Durham  
Vicki Westbrook, Department of Water Management, Deputy Director  
John Dodson, Superintendent, NDWRF  
Robert Dodson, Superintendent, SDWRF  
Reginald Hicks, Superintendent, Regulatory Compliance, Durham

**City of Durham**  
**Department of Water Management**  
**Comments on Proposed Falls Water Supply Nutrient Strategy**

**I. Wastewater Discharge Requirements 15A NCAC 2B .0279**

The following comments on the Falls Lake Rules and further discussion of the fiscal analysis are submitted by the City of Durham Department of Water Management. Durham supports the Consensus Principles as adopted by most of the governments impacted by the Falls Rules. However, that support is conditioned on a full reexamination of the Rules by 2018 not just to correct and address modeling errors but also to address issues related to economic impact, attainability, cost, and alternative standards. Given the harsh impact of the Rules as proposed, Durham is hopeful that the reexamination will lead to a more realistic approach to wastewater treatment plant requirements in the Falls Basin after the first decade of implementation of the Rules. The comments below address a variety of issues, including how the Falls Rules compare with wastewater treatment requirements elsewhere; the impact of the cost of the Rules, in particular, Stage 1 and Stage 2 as flow increases due to growth; the problems with the modeling and standard-setting that form a basis for the Rules; and some of the misinformation that appears to exist regarding what benefits might be achieved from the Rules. The comments also address the necessity of reexamination. Finally, they address one of the agriculture rules which in fact will present huge problems for wastewater treatment plants that apply sludge, and which should be changed as a result.

**A. Stringent Permit Standards.**

Currently, North Carolina recognizes the limits of technology for wastewater treatment as 3.0 mg/L nitrogen (TN) and 0.3 Mg/L phosphorus (TP). However, DWQ has proposed much stricter limits than the limits of technology in both Stages 1 and 2 in the Falls Rules. If implemented, these limits may exceed any requirements elsewhere in North Carolina, and in the country, with the possible exception of Florida. If not modified through the process of reexamination, they will ultimately require the construction of new technologies for wastewater treatment – microfiltration and reverse osmosis - at huge expense.

Stage 1 mass limits are not unreasonable when applied to current flows of the various plants in the Falls basin, or the flows that might be anticipated in the next several years. They are equivalent to approximately 3.05 mg/L TN and 0.33 mg/L TP at 110% of current flows and are very close to what DENR considers to be the limits of current technology – 3 mg/L TN and 0.3 mg/L TP.

Although the proposed Falls limits are achievable in the short term, as flow increases to serve new development and redevelopment, the Stage 1 limits will become unattainable without the addition of, at the least, microfiltration. If Durham utilized its entire permitted flow, the Stage 1 limits would require achieving a concentration limit of 1.7 mg/L TN and 0.16 TP. Stage 2 limits are much lower, at 1.1 mg/L TN and 0.06 mg/L TP at full permitted flows. By comparison, mass nitrogen limits for Neuse River basin dischargers **allow three to five times as much nitrogen concentration to be discharged to the lower Neuse.** They are equivalent to 3.7 - 5.5 mg/L TN at permitted flows. Those for the Jordan Lake dischargers are equivalent to 3.0 – 5.3 mg/L TN and 0.23 – 0.55 mg/L TP. (Source: Page 92, Chapter 4: Wastewater Discharge Requirements, *Fiscal Analysis For Proposed Nutrient Strategy For Falls of Neuse Reservoir*).

The proposed limits surpass the limits imposed on the hundreds of wastewater treatment plants in the watershed of the Chesapeake Bay. The most aggressive limits being imposed in the Chesapeake region on existing plants simply require achieving the limits of technology, at 3 mg/L N and 0.3 mg/L P

The fiscal impact statement notes that the wastewater plant stakeholders preferred the “mass limit” approach rather than a technology based approach. In fact, that was not the case. The wastewater plant stakeholders would have preferred an approach requiring the limits of current technology to be achieved, but DWQ staff determined that such an approach could not achieve reductions as flow increased. The problem faced by DWQ in setting limits was that the modeling, and the decisions it chose to make from that modeling, required massive nutrient reductions. Those could not be made within the limits of current technology.

### ***B. Cost of Achieving Ultimate Compliance with Stages 1 and 2.***

Durham invested approximately \$45 million to upgrade its North Durham plant to biological nutrient removal in the mid-1990's. As a result, it can meet the Stage 1 limits for the short term, over the next decade, if development activity continues to stall and if it spends approximately \$14 million to add state of the art “enhanced nutrient removal.” Durham anticipates that its enhanced processes at North Durham will allow its plant to perform better than the limits of technology of 3 N and 0.3 P. In fact, it will need to perform better than those limits as flow into the facility increases due to growth. . However, the plant **will not** be able to achieve the Stage 1 limits when its flow increases to approximately 16 MGD nor will it be capable of achieving the nutrient loadings proposed under Stage 2, even using the most advanced nutrient removal processes available. Durham’s consultants Hazen and Sawyer have estimated that once flow increases by about 50% over current flow, an investment of 80 million dollars will be needed for the construction and installation of microfiltration or membrane bioreactor technology, even under Stage 1 standards. To meet Stage 2 standards, and possibly Stage 1 standards as flow nears the permit limits of the plant, the use of nanofiltration or reverse osmosis will be required at a cost of at least \$240 million dollars. These costs are in 2009 dollars. It is important to recognize that reverse osmosis presents additional environmental issues as it is energy intensive and produces brine for which there are very limited disposal options. DWQ staff also stated that water reclamation and reuse could significantly curtail the discharge from the North Durham plant. While the City continues to evaluate expansion of its Bulk Reclaimed Water System at ND, few large usage customers exist of the type needed to establish the economies of scale necessary for a more robust reuse program.

Even though compliance with the Stage 2 reductions has been pushed to 2036, it will be impossible for Durham to finance required improvements to treatment facilities other than through raising sewer rates substantially, possibly to levels that would be double the rates of other large cities in the state. In a review of necessary rate increases to finance such expensive Capital projects, our consultant projected that average monthly **sewer-only bills** to residential/small commercial customers would escalate to \$100.02 from a current cost of \$27.27. This causes the **sewer-only portion** of a customer’s bill to approach 1.5% of the Median Household Income (MHI) (see attached chart prepared by Raftelis Financial Consultants). The MHI percentage for Durham may be deceiving as the large salaries associated with the research and medical professions may mask the large percentage of disadvantaged citizens in the city. To avoid placing such financially burdensome costs on our customers, Durham would be ultimately forced to adopt a no-growth policy. Even beneficial infill development or redevelopment of the downtown core would have to cease as such development increases sewer demand, just as new development does.

The costs estimated in the fiscal analysis are substantially underestimated. They use inappropriate discount rates to reduce the wastewater treatment dischargers' actual costs of constructing and operating the expensive and novel technologies required. As noted above, Durham's costs, which do not include operational costs, which are huge, have been estimated at \$320 million. The costs for Durham and other Upper Falls watershed communities mandate that the reexamination in the Consensus Principles agreed to by local governments occur in a timely fashion, by 2018, so that the goals and nutrient loads can be adjusted to avoid these unwarranted costs. The Department of Water Management supports the alternative language as set forth in the letter from the attorneys representing most of the governments that agreed to the Consensus Principles (the "Attorneys' Joint Submission").

In addition to such reexamination Durham also supports the new language to the Point Source Rules in the Attorneys' Joint Submission. That language is found in Rule .0279(6)(b) and inserts a new provision that load limits after Stage 1 be determined accordance with what is "the maximum extent technologically and economically feasible." This provision may, independently of the reexamination, give some relief to wastewater treatment dischargers from the impacts of Stage 2. However, for reasons relating to its current flow versus its permit limits, Hillsborough's nitrogen (though not phosphorus) limits in Stage 1 are actually more stringent than for Stage 2. Durham would therefore also support language in the Rules that would allow any wastewater treatment plant provider to use either its Stage 1 or Stage 2 permit limit.

Neither of the above provisions will offer significant relief from the very stringent and unprecedented limits that will ultimately be faced by the upper Falls communities as they grow, and their wastewater flow also grows. Only a reexamination and modification of the Rules following the reexamination can do that. Until such reexamination is conducted, the allocation system utilized in the Rules is the most equitable manner in the short term of complying with Stage 1 over the next ten years. It is consistent with prior practice by DWQ in the Jordan basin, which applied the percentage load reduction needed to a mass allocation and then divided it up in an equal proportion. It is also supported by all of the local governments that agreed to the Consensus Principles.

Finally, Durham would propose that language be added to the point source rules to address the difficulty of consistently meeting the proposed stringent standards – especially as flow increases. The limits proposed allow no latitude for the occasional wastewater treatment plant exceedance that can occurs when taking a basin out of service or as a result of an occasional plant upset. Formation of an Association which can combine loads may assist in avoiding penalties for such exceedances, but may not be sufficient. It is punitive to not allow any latitude for exceedances by treatment plants that are required to operate below the limits of technology. Language that would require that penalties be substantially reduced in these circumstances would be a fair and reasonable way of recognizing the unprecedented demands that are being placed on the wastewater treatment plant dischargers in the upper Falls Basin.

### **C. Understanding the water quality goals of this rule-making.**

There appears to be considerable misunderstanding regarding the water quality goals being addressed by the Falls Lake Rules. The fiscal analysis discusses and gives large values to supposed benefits that in fact are not related to achieving the arbitrary chlorophyll-a nutrient standard. Three areas, in particular, are noted briefly below: a) drinking water supply; b) bacterial contamination; and c) park use.

**Drinking water Supply.** Compliance with chlorophyll-a has already been achieved at the intake for the City of Raleigh's drinking water supply. The sampling point next to Raleigh's intake and the sampling point directly above the intake have always been in compliance with the State's chlorophyll-a standards. In addition, the modeling conducted by DWQ showed a very weak relationship, if any, between reductions in the upper Falls and chlorophyll-a readings near Raleigh's intake, a fact that was verified by Tetra Tech in its critique for NCDOT. **The lower portion of the lower Falls is already in compliance and should stay in compliance as long as new development controls and agricultural controls are implemented in the lower Falls near Raleigh's intake.** There has been an assumption that the Total Organic Carbon (TOC) levels Raleigh is dealing with at its water plant are related in some way to chlorophyll-a. This has not been scientifically established by the state and is not addressed in any scientific manner in the materials the state has produced. Raleigh has produced information showing a clear relationship between its TOC levels and rainfall, as high levels of organic materials from nearby trees and plants are released into the water. Other water providers in this region are all facing the elevated TOC levels in a variety of reservoirs of other sizes and shapes. This is not a result of nitrogen or phosphorus emissions from point sources or developed land, or of chlorophyll-a. It is a result of rainfall and the many forested areas that surround the Falls Lake reservoir. These forested areas are on state lands and in buffers and other protected areas, and they will remain a source of TOC despite the levels of chlorophyll-a in the lake. The state has included Raleigh's potentially increased costs for drinking water treatment to address TOC in its evaluation of the costs and benefits of these rules. However, it has not taken into consideration that other water providers in the area are incurring these same costs for enhanced water treatment processes. In fact, Durham's water treatment Capital Improvement Program is more than \$40 million to address these same issues.

**Bacterial contamination.** There is no science showing that nitrogen and phosphorus or algae produced by those nutrients causes bacterial contamination. However, there are references to bacterial contamination in the fiscal analysis and other documentation. Reducing nitrogen and phosphorus from point and nonpoint sources will not reduce bacterial contamination. It is conceivable that failing septic tanks near the reservoir could be contributing to such bacterial contamination but at this point that is only speculative. Since the proposed rules do not directly require any reduction in septic, any supposed benefit in reduced bacterial contamination that might flow from septic cannot be assumed.

**Increased value of park use.** Falls Lake is an incredibly popular park with steady and use. It is a destination for fishers, and the mainly lower lake beaches are very popular. Without a sophisticated survey instrument, it is difficult to determine whether visitors are actually deterred from using the park, and, if so, what actual benefits would be gained from increased park use.

### **D. Modeling and Reexamination.**

As we move forward, it is critical that an extensive monitoring program be initiated to gather appropriate data at multiple sites in the lake to both better assess the lake's health and its problems, and to periodically assess the anticipated positive impact of Stage 1 reductions. Additional modeling must be conducted and Stage 2 reductions should not go forward until the

entire premise of the goals for the upper Falls is reexamined. That reexamination needs to assess the design constraints of the reservoir and what can reasonably be achieved in the upper Falls; the historic uses; what chlorophyll-a levels would impair those uses; the cost of the measures taken thus far; the cost of future measures, the benefits to be achieved from taking those measures, and whether alternative water quality standards are appropriate to maintain existing uses.

The City supports and will be an active participant in this monitoring and data gathering program. To that end, we have initiated discussions with our regional partners to support and expand upon the initial monitoring regime developed by DWQ staff.

## **II. Agriculture Rule 15A NCAC 2B .0280**

The proposed changes to 15A NCAC 02B.0280, Falls Reservoir Water Supply Nutrient Strategy: Agriculture will significantly disrupt long-standing relationships between Durham and area farmers and will negatively impact Durham's approved/permitted land application program. 15A NCAC 02B.0280 6 (c) states that, "Persons subject to these permitting requirements shall meet Realistic Expectation Yield based nitrogen application rates and shall apply phosphorus in compliance with guidance established in the most recent version of North Carolina Agricultural research Service's Technical Bulletin 323, North Carolina Phosphorus Loss Assessment. . ." That document will require the use of the PLAT model to determine phosphorus loss from an agricultural site. The model looks at many different factors that will ultimately determine how much phosphorus can be applied on a site.

The majority of the land used for land application for the City of Durham's North and South Durham WRFs is located in northern Orange County in the Neuse Basin. In reviewing the soil sample results and the applying the PLAT model, it appears that the City would lose over 80% of its permitted land for land application, basically eliminating Durham's land application program.

The City does understand the need to control phosphorus on the land to prevent over-application and potential runoff. However, both the Falls and Jordan Rules require additional removal of phosphorus from the City's wastewater discharges by adding metal salts, creating additional biosolids for disposal. Durham is being required to remove more phosphorus but at the same time is losing the primary method for disposal and beneficial reuse/recycling of that phosphorus. It appears, in fact, that this rule is premature and should not be passed without further examination of the impact of chemically bound phosphorus in the biosolids and the bio-availability of this phosphorus. Currently, there is limited research on the availability of phosphorus that is chemically bound to the plant and the ability of that phosphorus to runoff or leach from the soil. The City has conducted testing on cake sludge samples from each of its facilities through the NC Department of Agriculture and Dr. Robert Rubin, NCSU, in an attempt to determine if phosphorus is available at the same rate that the PLAT model estimates. Preliminary data indicates that a significant portion of that phosphorus is not available. If this research is verified then the application of the PLAT model to biosolids applications would not be justified.. There simply is not enough research on the issue to accurately predict the fate of chemically bound phosphorus.

If the provision stays as written, the City of Durham would have to landfill much of its sludge at a potential additional cost of over \$1,000,000 annually. Other biosolids disposal options such as composting would be of similar cost or greater depending on the method of disposal. In

addition, the farming community would respond to the loss of biosolids by paying much more for commercial fertilizers which have a higher potential for runoff of nitrogen and phosphorus than cake biosolids have.

The over-application and accumulation of phosphorus is certainly a concern and we understand and support the need to manage croplands to protect the soil and the water. However, the rules should be based on sound science as they apply to biosolids application not on a model that may be specific to conventional agricultural methods.

The City of Durham is requesting that the provision limiting biosolids application based on phosphorus loadings be removed from the rule until adequate research is completed to determine the movement of chemically precipitated phosphorus in the soils. We would support the requirement to investigate, through testing, the ultimate fate of chemically bound phosphorus. Once such testing is conclusive, the appropriate result would be application through rules that would regulate biosolids applications in all nutrient sensitive waters, not just Falls watershed.

### **III. Nutrient Offsets 15 NCAC 02B.0282 (5)**

Durham's City departments – Public Works/Stormwater Management and Water Management specifically- are committed to working collaboratively within our governmental unit to promote environmental stewardship principles and innovative strategies to achieve overall nutrient reductions. For this reason, the City supports 15 NCAC 02B.0282 (5) which allows offsetting nutrient loads by combining the reduction needs of point sources and existing development.