

# BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

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Mr. David Hance  
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**RE: Notice of Variance Application and Hearing  
DENR/DWQ  
Cleanup at the City of Raleigh Public Utilities Department  
Neuse River Wastewater Treatment Plant - Permit Number WQ0001730**

**TO:**

Ms. Kathy Stecker, Hearing Officer  
Mr. Andrew Pitner, Hearing Officer  
Kevin Martin, EMC Groundwater Committee Chair  
Marion Deerhake  
Tom Ellis  
David Moreau  
Donnie Brewer  
Thomas Cecich  
Freddie Harrill  
Darryl Moss  
Steven Weber  
Forrest Westhall

We wish to thank the DENR/DWQ for granting our request for an extension of public comments concerning the City of Raleigh's request for a variance from groundwater protection regulations concerning the nitrate contamination that has occurred at the Neuse River Wastewater Treatment Plant.

It is important that the public has ample opportunity to comment on the subsequent contamination of the groundwater, the Neuse River, private drinking water wells, and surrounding land from years of over-application of sewage sludge by the City of Raleigh Public Utilities Department.

On behalf of the Blue Ridge Environmental Defense League, I wish to submit to you the following comments and recommendations concerning the City of Raleigh's request for a variance to allow the city to pursue a natural attenuation corrective action plan for nitrogen contamination in groundwater that is migrating offsite from the Neuse River Wastewater Treatment Plant into the Neuse River and surrounding properties.

## **Variance request**

We oppose the City of Raleigh's request for a variance and strongly urge the DENR/DWQ to deny this variance request. Permit conditions and state groundwater rules in 15A NCAC 2L prohibit natural attenuation as a clean-up method on permitted wastewater treatment land disposal sites. We strongly object to the city's "do-nothing" approach as it fails to conform to state regulations designed to protect groundwater and surface water. Moreover, the state's approval of this variance would set a dangerous precedent for clean up of similar contamination at other permitted facilities. Natural attenuation is an available clean-up option for use on sites contaminated by unpermitted discharges, such as leaking underground storage tanks. The Neuse River Wastewater Treatment Plant is a permitted facility; thus, using natural attenuation as a cleanup method for nitrate contamination is not applicable to this facility.

## **Recommendations**

Reports from the media, public officials, state regulators and private citizens describe the City of Raleigh's options for cleanup of the nitrate contamination as a "damned if you do, damned if you don't" extreme. These are: 1) remediate the nitrate contamination by drilling over 425 extraction wells and conducting active remediation involving a pump and treat method. This reportedly will cost the city an estimated \$80 million dollars; 2) remediate the nitrate contamination using the "do-nothing" method. In other words, allowing Mother Nature to take care of the mess. Unfortunately, both of these options represent the extremes of what might be a safer and better approach, along with being more cost effective for the applicant.

Because of the severity and range of contamination, we recommend a multi-faceted approach to offset the impacts of the contamination such as on-site clean up of the primary source of nitrate contamination, restoration of wetlands further downstream, and remediation of the 16 drinking water wells belonging to private residents of communities impacted by this contamination. We also recommend the DENR/DWQ and the City of Raleigh continue to engage in a transparent dialogue with the Neuse River Foundation and members of the public in identifying an *acceptable and effective solution with swift implementation of a plan to offset the impacts of contamination caused by over-application of sewage sludge.*

## **Human health risks from nitrates**

Under North Carolina Administrative Code Subchapter 2L – Groundwater Classification and Standards, section 15A NCAC 02L.0113 (4) states that the applicant that submits a request for a variance must demonstrate that the variance "will not endanger the public health and safety, including the health and environmental effects from exposure to groundwater contaminants." The "do-nothing" alternative for nitrate clean up proposed by the applicant does not come close to fulfilling the stipulations under this section.

Short-term exposure to drinking water with a nitrate level at or just above the health standard of 10 mg/l nitrate-N is a potential health problem primarily for infants. Babies consume large quantities of water relative to their body weight, especially if water is used to mix powdered or concentrated formulas. The digestive systems of babies are more likely than adult digestive tracts to allow the reduction of nitrates to nitrites. In particular, the presence of nitrites in the digestive tract of newborns can lead to a disease called methemoglobinemia (*Nitrate: Health Effects in Drinking Water*, M. McCasland, N. Trautmann, and K. Porter, Natural Resources Cornell Cooperative Extension: <http://pmep.cce.cornell.edu/facts-slides-self/facts/nit-heef-grw85.html>).

## **Effects on ecosystems**

In addition to being toxic to human babies, nitrates affect young animals and are a problem for ruminant animals of all ages. Some livestock have been known to abort fetuses due to drinking water containing high levels of nitrates (*Animal Waste and Water Quality*, Alabama Cooperative Extension System, p.5: <http://www.aces.edu/crd/publications/wtrqlty/wq-animalwaste.pdf>).

A growing number of studies suggest that nitrates have the potential to be an endocrine disrupting contaminant and pose a direct threat to the conservation and restoration of vertebrate populations and the ecosystems they depend on for survival (*Is Nitrate an Ecologically Relevant Endocrine Disruptor in Vertebrates?* L.Guillette, Jr. and T.M. Edwards, Society for Integrative and Comparative Biology, 2005, 45(1):19-27: <http://icb.oxfordjournals.org/cgi/content/full/45/1/19>).

It is well documented that increased amounts of nutrients can kill fish due to a lack of oxygen as a result of excessive algal growth (What are the Usual Causes of Fish Kills? USGS: <http://water.usgs.gov/owq/FAQ.htm#Q10>). However, in addition to fish kills, research conducted by Pieter Johnson of the University of Colorado has found that increased levels of nitrogen cause deformities in amphibians. Snail populations that host microscopic parasites known as trematodes reproduce dramatically in nitrogen rich environments infecting frogs with the parasites which then cause cysts in the limbs of developing tadpoles (*Aquatic Eutrophication Promotes Pathogenic Infection in Amphibians*, Johnson et al, 2007: <http://www.colorado.edu/eeb/facultysites/pieter/documents/Johnson%20et%20al.%202007.pdf>). It is not known whether the Neuse River ecosystem will be affected by this phenomenon due to excessive levels of nitrate contamination.

## **Additional organic wastewater contaminants found in sludge**

The Notice of Variance Application and Hearing states that “no other substance monitored at this facility is under consideration.” Additional impacts from contaminants contained in sludge may not be so apparent, and thousands of potentially toxic compounds continue to remain unregulated and untested due to the federal government’s inability to take effective action to provide protection of human health and the environment from emerging contaminants. Untested chemicals at wastewater treatment plants include heavy metals, pharmaceuticals and personal care products (PPCPs), hormones, pathogens, and industrial chemicals that end up in effluent released into surface waters. Many of these compounds are classified as organic wastewater contaminants (OWCs).

These compounds have been found to concentrate in sludge, collectively referred to as biosolids by academics, state and federal regulators and industry pundits. A survey conducted by Eastern Washington University and the USGS examined nine different biosolids products destined for land application produced by municipal wastewater treatment in seven different states. Fifty-five OWCs from a total of 87 OWCs were detected in one biosolids product with a minimum of 30 and a maximum of 45 OWCs detected in any one sample. Among the most commonly detected compounds were pharmaceuticals (prescription and non-prescription), hormones, detergent metabolites, steroids, fragrances, plasticizers, pesticides, fire retardants, and disinfectants in the biosolids. The compounds detected in greater concentrations were nonlyphenol and octyylphenol detergent metabolites.

The Eastern Washington University/USGS study concluded that a range of compounds are “incompletely removed during wastewater treatment and sequestered in biosolids that are subsequently land applied.” Since an estimated fifty percent of biosolids are land applied they are a potentially ubiquitous nonpoint source of OWCs into the environment. The potential concerns surrounding the presence of these compounds in the environment include adverse psychological effects, increased cancer, reproductive impairment in humans and other animals, and antibiotic resistance among pathogenic bacteria (*Survey of Organic Wastewater Contaminants in Biosolids Destined for Land Application*, Kinney et al, Environmental Science Technology, Vol. 40, 2006, p. 7207-7215).

Studies conducted by the USGS have found hormones, antibiotics, and prescription drugs in urban streams receiving effluent from wastewater treatment plants across the nation. Some of these chemicals such as the detergent degradation product nonylphenol and the fragrances AHTN and HHCB have been shown to disrupt reproduction and growth in fish by affecting the endocrine systems (*Assessing the biological potency of binary mixtures of environmental estrogens using vitellogenin induction in juvenile rainbow trout*, Thorpe et al, Environmental Science and Technology, v. 35, no. 12, 201).

Other chemicals such as triclosan found in popular liquid anti-bacterial soaps may increase the antibiotic resistance of bacteria in the environment (*Resistance to triclosan in laboratory and clinical strains of Escherichia coli*, McMurphy et al, FEMS Microbiology Letters, v. 166, no. 2, 1998) and reducing algae diversity in streams (*Effects of three pharmaceutical and personal care products on natural freshwater algal assemblages*, Wilson et al, Environmental Science and Technology, v. 37, no. 9, 2003).

The human health and environmental effects of these and other compounds are not well understood, and standards to protect human health and aquatic life have not been established for these chemicals (Wastewater Chemicals in Colorado’s Streams and Groundwater, USGS: <http://www.coboulder.com/health/enviro/water/ows/pdf/FactSheet%20Wastewater%20Chemicals.pdf>

Numerous research studies have shown that endocrine-disrupting compounds and pharmaceuticals that have the ability to alter the sex of fish and create antibiotic resistance. In Boulder Creek and the South Platte River, Colorado, researchers found more feminized fish downstream of sewage effluent sites than upstream. At least two estrogen compounds, a natural estrogen and a type of synthetic estrogen found in birth control pills, contributed to the feminization. The Colorado study found that each compound was potent enough to cause changes in fish on its own, but together had an even greater impact (“Wading in Hormones: Estrogen Invades Colorado’s South Platte River,” ScienceLine, Aug, 1, 2007: [http://scienceline.org/2007/08/01/environment-anderson-water\\_hormones/](http://scienceline.org/2007/08/01/environment-anderson-water_hormones/)).

These compounds end up in wastewater effluent that is eventually released into the Neuse. However, since these compounds also concentrate in sludge, instead of being applied to land, they have been “re-released” into the Neuse, the volumes of which are unknown.

### **Environmental justice**

Since the 1980s the city has over-applied sewage sludge to 1,000-acres at its Neuse River Wastewater Treatment Plant’s sludge farm. As a result of the over-application of sewage sludge over 30 families (16 wells total) have had their drinking water wells contaminated with nitrates from the Neuse River Wastewater Treatment Plant.

After the contamination was discovered, the wells were abandoned and families were placed on city water. It is unclear as to if and when the wells will be safe to use again. Additional concerns include a community well system planned for a subdivision in Wake County just west of the Neuse River Wastewater Treatment Plant (Public Hearing, Raleigh Request for Variance, Testimony of Russell Briggs, B&F Consulting).

If the city's request for a variance is granted, an estimated 120,000-150,000 lbs. of nitrates will be released into the Neuse River over the next 30-40 years. It is reportedly the largest source of groundwater contamination in the state. In order to ensure protection of future generations and residents who may be living in subdivisions on lands in close proximity to the Neuse River Wastewater Treatment Plant, the applicant should be required by the state to provide continuous remediation of the 16 contaminated wells until they are restored to their original condition.

The water quality standards applicable to groundwater rules established under section 15A NCAC 02L.0103 Policy (a) specifically provide for the preservation of the "quality of the groundwaters, prevent and abate pollution and contamination of the waters of the state, protect public health, and permit management of the groundwaters for their best usage by the citizens of North Carolina.

Furthermore, 15A NCAC 02L.0103 states, "It is the policy of the Commission that the best usage of the groundwaters of the state is as a source of drinking water...***and to enhance and restore the quality of degraded groundwaters where feasible and necessary to protect human health and the environment, or to ensure their suitability as a future source of drinking water.***" [emphasis added]

The city's request to apply 15A NCAC 2L .0106(k) which allows the contaminant to migrate onto adjacent properties if (A) "such properties are served by an existing public water supply system dependent on surface waters ..." is a rule that applies to non-permitted sites only. Furthermore, it is a sham that the city wishes to use this rule to allow the migration of nitrates into the Neuse River and avoid clean up of nitrate contamination while allowing it to further contaminate land where it now provides public water to those whose wells it was responsible for contaminating.

Since they are very soluble and do not bind to soils, nitrates have a high potential to migrate to groundwater. And because they do not evaporate, nitrates/nitrites are likely to remain in water until consumed by plants or other organisms (USEPA Consumer Fact Sheet on Nitrates/Nitrites: [http://www.epa.gov/safewater/contaminants/dw\\_contamfs/nitrates.html](http://www.epa.gov/safewater/contaminants/dw_contamfs/nitrates.html)).

### **Principles of Enforcement**

The city has stated the over-application was due to a mathematical error which resulted in application rates double or triple what they should have been. This resulted in the migration of nitrates from groundwater into the Neuse River. Land application was stopped in 2002 after several wells were found to be contaminated with nitrates from the over-application of sewage sludge (Notes from EMC Meeting Summary, Erin Kimrey, NCCN, Sept. 12-13, 2007, p.10).

Research conducted by the Neuse River Foundation, however, states the opposite. Their research shows a history of illegal dumping, raw sewage and chemical spills, worker safety issues, illegal and excessive sludge spraying, and repeated violations despite penalties and warnings from the state (Profile of a Polluter: The History of Problems at Raleigh's Neuse River Wastewater Treatment Plant and the E.M. Johnson Water Treatment Plant, Neuse River Foundation:

[www.neuseriver.org](http://www.neuseriver.org)). This history of negligence demonstrates a clear disregard for state and federal laws, human health and the environment.

As the capital of the State of North Carolina, the City of Raleigh should take a leadership role in being a steward – instead of a polluter - of our state’s environment. The city needs to own up to its failure to protect the environment and health of its people. The NCDENR has a vested responsibility to uphold and embrace its mission to protect human health and the environment by upholding the state standards for groundwater and surface waters.

We encourage the DENR/DWQ to defer to its “Principles of Enforcement” in the matter of the City of Raleigh’s variance request:

- 1) *Compliance is the first step toward the ultimate goal of stewardship;*
- 2) *Enforcement will be an effective deterrent against future violations;*
- 3) *Enforcement actions will increase in severity for regulated entities with poor compliance histories;*
- 4) *The cost of non-compliance should be greater than the cost of compliance.*

Thank you for your consideration.

Respectfully submitted,

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