

## ENVIRONMENT

**Title:** Monitoring Ambient Atmospheric Chemistry Along a Gradient of Ammonia Emission Density in Eastern North Carolina – **NPB #06-121**

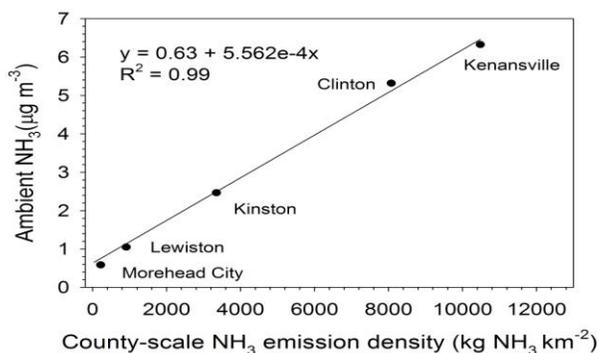
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### SCIENTIFIC ABSTRACT

Based on several years of observations of ambient NH<sub>3</sub> concentrations in eastern NC, we have developed a tentative relationship between mean annual NH<sub>3</sub> concentration and county-scale NH<sub>3</sub> emission density (see figure). In an attempt to further validate the proposed relationship, we measured NH<sub>3</sub> concentrations in localized areas of high NH<sub>3</sub> emission densities as a function of distance from nearby strong point sources using ALPHA passive samplers (weekly samples; April 2007 to June 2008). Distance and orientation with respect to the nearest animal operation (swine or turkey) were chosen to provide a range of observations (total 24



sampling sites).

Consistent with our previous observations at a single swine operation, we observed a rapid drop in integrated weekly NH<sub>3</sub> concentrations beyond 1 km distance from the nearest source (typically < 10 µg NH<sub>3</sub> m<sup>-3</sup> during summer). This data was then combined with previous efforts via a model to generate a visual measure (Environment Systems Research Inc., ArcDesktop and ArcInfo Workstation ver. 9.2; Div. of Water Quality, NC Dept. Environ. Natural Resources registry of animal waste lagoons) of the spatial representation of weekly mean NH<sub>3</sub> concentrations as a function of distance from animal facilities (mainly swine). In general, our analysis supports the proposed relationship developed from previous single point observations of NH<sub>3</sub> concentrations in areas with high NH<sub>3</sub> emission densities, although the exact relationship displayed may be somewhat fortuitous. However, the actual average NH<sub>3</sub> concentration experienced by a given location in an area with relatively high emission density is predominantly influenced by distance to the nearest facility. As such, areas with relatively high emission densities also represent areas where the probability of being within the local dispersion footprint of an emission source is greater than in areas with relatively low emission density, or where the predominant emission source is more uniform across the landscape (such as emissions from soil and vegetation).

*These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed*

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