

# **GREATER TRIANGLE REGIONAL COUNCIL**

## **Air Quality in the Research Triangle Region**

### **Executive Summary**

In March 2002, the GTRC identified that the Triangle was in violation of the federal 8-hour standard for ground-level ozone and would be designated nonattainment of this standard by the USEPA on April 15, 2004. In June 2003, GTRC formed an air quality task force to promote and coordinate strategies to improve air quality in the Triangle region of North Carolina. The GTRC asked the North Carolina Division of Air Quality (NCDAQ) to provide a report that would inform GTRC and Triangle community members about the current and projected status of air quality and air pollution control in the greater Triangle region. The full report is available at [triangleregion.org](http://triangleregion.org).

Cleaning up the air is a complex and costly challenge. The region's failure to meet national air quality standards affects its physical, environmental and economic health. Dirty air increases health care costs, causes deaths, harms the environment, impedes transportation projects, and makes it difficult to attract and retain businesses and residents, drives up the costs of doing business and the cost of living through increased regulations.

The report focuses on ozone because it is the pollutant of greatest concern, from both a health and regulatory perspective, at this time. However, NCDAQ is also concerned about fine particle levels in the Triangle, which are currently meeting the federal standard but are close to the level of the standard. Fine particles pose a potentially serious health risk to some members of the public, and are addressed in the report.

The report discusses: (1) the levels, health risks, and sources of ground-level ozone and fine particles; (2) current and proposed state and federal controls on emissions contributing to these pollutants; (3) current and projected future levels of ozone precursor emissions; and (4) actions needed to sustain good air quality in future years.

The emissions data presented in this report are for the 8 county nonattainment designated region comprising Chatham, Durham, Franklin, Granville, Johnston, Orange, Person, Wake counties.

The North Carolina Division of Air Quality is a division of the North Carolina Department of Environment and Natural Resources (NCDENR). NCDAQ is responsible for protecting and improving outdoor air quality in North Carolina. To carry out this mission, NCDAQ has programs for monitoring air quality, permitting and inspecting air emissions sources, and educating and informing the public about air quality issues. NCDAQ also enforces state and federal air pollution regulations. For more information on NCDAQ programs, please visit the NCDAQ website at [www.ncair.org](http://www.ncair.org).

## **Overview of Air Quality in the Triangle:**

Outdoor air quality in the United States is regulated by the U.S. Environmental Protection Agency (EPA) under the authority of the federal Clean Air Act. The EPA sets National Ambient Air Quality Standards (NAAQS) for six “criteria pollutants” that are considered harmful to human health and the environment: carbon monoxide, lead, ozone, nitrogen dioxide, particulate matter and sulfur dioxide. Particulate matter is further classified into two categories: PM 10, or airborne particles with diameters of 10 micrometers or less, and PM 2.5, airborne particles with diameters of 2.5 micrometers or less. Levels of a pollutant above the health-based standard pose a risk to human health.

The North Carolina Division of Air Quality monitors levels of all six criteria pollutants in the Triangle region and reports these levels to the EPA. According to the most recent data, the Triangle region is meeting national ambient standards for five of the pollutants, but is not meeting the federal 8-hour standard for ground-level ozone. Therefore ozone is the pollutant of greatest concern in the Triangle at this time.

Ozone-forming pollutants are volatile organic compounds (VOC) and nitrogen oxides (NOx). In the Triangle a large portion of VOCs is produced by natural sources, primarily trees. Major sources of man-made VOCs include unburned gasoline fumes evaporating from gas stations and cars, industrial emissions and consumer/industrial products such as paints and solvents. Nitrogen oxides are produced when fuels are burned, and result from the reaction of atmospheric nitrogen at the high temperatures produced by burning fuels. Major sources of NOx are highway motor vehicles, coal-fired power plants, and off-road vehicles such as construction equipment, lawn care equipment, trains, airplanes and motorboats.

North Carolina and the Triangle are considered to be Nox-limited, meaning that reducing NOx emissions is believed to be the most effective way to reduce ozone levels. Therefore, current ozone strategies focus on reducing NOx.

## **Ozone Health Effects:**

When we breathe ozone, it irritates our lungs and respiratory passages. Long-term and repeated exposure to ozone concentrations above the NAAQS can result in reduction of lung function as the cells lining the lungs are damaged. Short-term, infrequent exposure to ozone can result in throat and eye irritation, difficulty drawing a deep breath, and coughing. Long-term and repeated exposure to ozone concentrations above the NAAQS can result in reduction of lung function as the cells lining the lungs are damaged. Repeated cycles of damage and healing may result in scarring of lung tissue and permanently reduced lung function. Health studies have indicated that high ambient ozone concentrations may impair lung function growth in children, resulting in reduced lung function in adulthood. In adults, ozone exposure may accelerate the natural decline in lung function that occurs as part of the normal aging process. Ozone

may also aggravate chronic lung diseases such as emphysema and bronchitis and reduce the immune system's ability to fight off bacterial infections in the respiratory system.

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Asthmatics and other individuals with respiratory disease are especially at risk from elevated ozone concentrations. Asthmatics are more severely affected by the reduced lung function and irritation that ozone causes in the respiratory system. Ozone may also contribute to the development of asthma.

All children are at risk from ozone exposure because they often spend a large part of the summer playing outdoors, their lungs are still developing, they breathe more air per pound of body weight, and they are less likely to notice symptoms. Children and adults who frequently exercise outdoors are particularly vulnerable to ozone's negative health effects, because they may be repeatedly exposed to elevated ozone concentrations while breathing at an increased respiratory rate.

Numerous studies have found correlation between elevated ground-level ozone concentrations and increased hospital admissions and emergency room visits for respiratory symptoms. These health effects are associated with increased monetary and societal costs. Ozone's adverse health effects also result in missed school days and lost productivity, as parents take time from work to care for children with respiratory problems.

### **Nonattainment Designation and Regulatory Schedule**

When an area in North Carolina is designated nonattainment, the NCDAQ must submit a State Implementation Plan (SIP) to the EPA, describing how pollution will be reduced to levels meeting the standard. The SIP must include specific control measures for pollutant sources, and DAQ must demonstrate, through computer modeling results, the reductions expected from each control measure. The SIP is usually due to EPA three years after the date of nonattainment designation.

For 8-hour ozone nonattainment, EPA requires that three regulatory measures be implemented in addition to those control measures included in the SIP: **transportation conformity**, **general conformity**, and **new source review**. Under transportation conformity, transportation planning agencies must demonstrate that planned road infrastructure expansion (new roads, road widening, etc.) will not result in vehicle NOx emissions over the level allowed by the SIP. If this cannot be shown, the area loses federal highway construction funds. The general purpose of transportation conformity is to ensure that federal funds do not contribute to degraded air quality in a nonattainment area. Under general conformity, other emission sources using federal funds or requiring a

federal action such as approval of a permit, e.g. airports, must demonstrate that modifications will not result in emissions exceeding the SIP budget.

Under new source review, any new emitting industry wishing to locate within the nonattainment area, or any existing industry wishing to expand its operation, faces stringent permit requirements. Because new point sources and major expansion projects at existing sources cannot increase emissions in the nonattainment area, new or expanding industry will need to purchase emissions credits from other industry in the area. The practical implication of this measure is that many industries will not locate within a nonattainment area because the new source review requirements increase the cost of doing business when compared to an attainment area.

NCDAQ anticipates that the 8-hour ozone SIP will be due to EPA in 2007, and the year ozone concentrations in the Triangle must meet the standard will be 2010.

### **Future Needs and Long-Term Goals**

Although technological improvements such as power plant controls and cleaner vehicles will improve air quality a great deal, action is needed to maximize the benefits from these controls, make sure air quality is improved sooner rather than later, and ensure that the benefits of controls are retained into the future.

The Triangle's most urgent immediate need is for an organization that serves as the region's coordinating body on air quality issues. The organization would work in three areas: education, advocacy and coordination. Its mission would be to serve as the umbrella organization that helps the region understand the implications of air pollution on the Triangle's quality of life and economy. It would work directly with regional, state and federal regulators to reduce air pollution and to deal with related fundamental issues such as land use and transportation. It would bring regional stakeholders together to share resources and garner support to reach air quality compliance to meet EPA requirements, and to make clean air a priority for the future.

Vehicle miles traveled (VMT) will continue to increase. The current rate of North Carolina VMT increase, as well as EPA national projections, suggests that VMT will continue to increase at a rate of 2 to 3 percent annually. Given a 2% annual increase, VMT in Wake County will more than double between 2004 and 2031. This growing VMT will decrease the air quality benefits from vehicle emission controls, add to transportation infrastructure expense, and increase the conversion of open space to streets and highways. There will also be a significant impact on quality of life, as people spend more time in their cars, drive longer distances, and experience greater traffic congestion.

The most pressing future need is reduction of VMT through local and regional growth planning. “Smart Growth” or sustainable development principles such as mixed-use development, brownfields redevelopment, neighborhood schools, higher density (where appropriate), and transit-oriented development will reduce VMT and may significantly improve quality of life in our communities. Better public transit infrastructure is needed and should be tied to growth planning to co-locate greater residential densities, businesses, and transit. Businesses should be encouraged to locate near residential centers and transit infrastructure. In other words, we will continue to grow, but our challenge is to grow efficiently.

Green building techniques also hold much promise for increasing energy efficiency, decreasing pollution from electricity generation, and reducing energy costs for building owners and tenants. Governments and private industry are encouraged to use green building techniques and energy efficiency measures whenever possible.

Many of these decisions must occur at the local level, and jurisdictions within a region must cooperate to maximize the benefits of sustainable development practices. Cleaning up the air will require regional cooperation and action by the local governments, the state, the USEPA, businesses, community-based organizations and individual citizens. There won't be a one-time solution. Cleaning the air also requires commitment from all of us to change our behaviors, even without a formal government program requiring us to do so. Each of us who live and work in the Triangle region must ultimately realize that we contribute to the problem, frequently for the sake of personal convenience, and that we can improve the quality of the air through our personal actions.