

APPENDIX G
AIR QUALITY DOCUMENTATION



Air Quality Monitoring Status Report 2008

*By Jeff Francis, Air Monitoring Manager
Mecklenburg County Air Quality*

The air quality in Mecklenburg County affects every citizen and visitor, regardless of age, sex, race, or occupation.

There have been many changes in Mecklenburg County since this statement was made in the 1987 State of the Environment Report (SOER), but the truth of this statement has not changed. Air quality is important to the health and welfare of our community. Here's a look at where we were in 1987 regarding air quality monitoring, and where we are today.

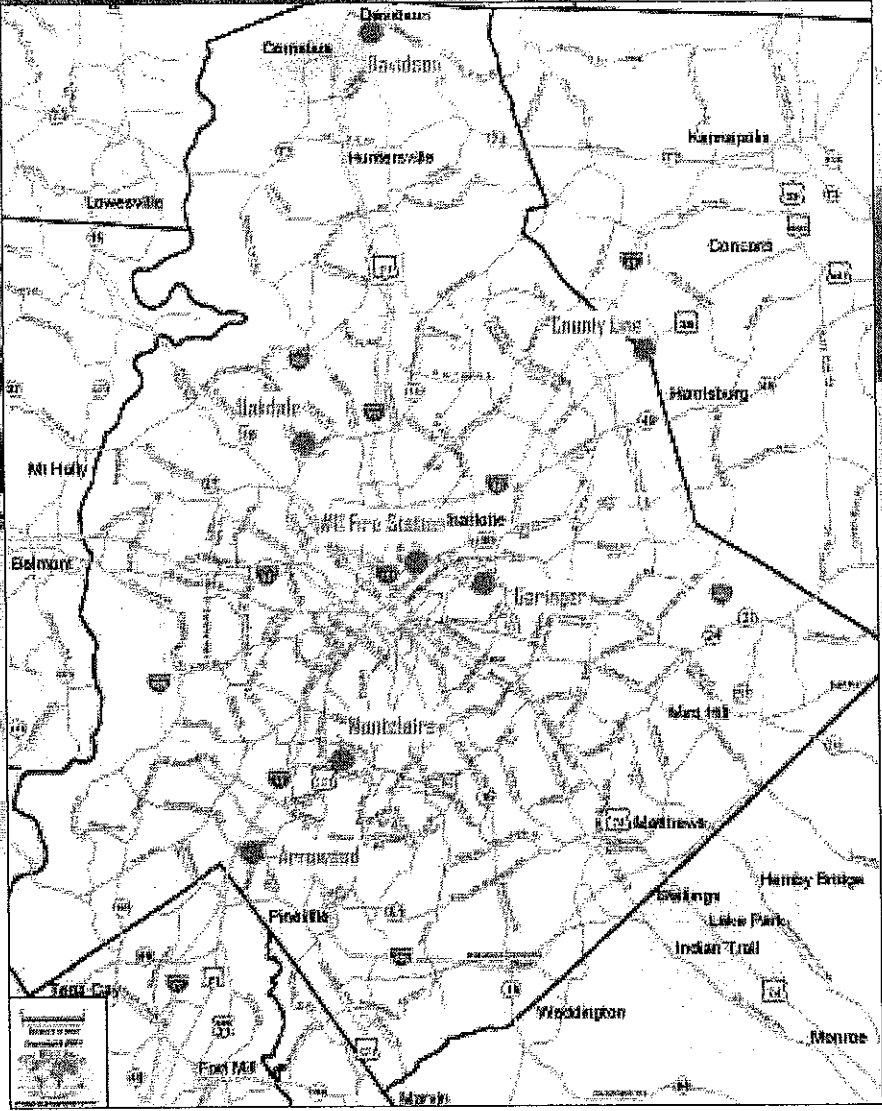
The Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for six air pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), ozone (O₃), lead (Pb), and sulfur dioxide (SO₂). These air pollutants are known collectively as the "criteria" air pollutants.

Historically, the County has measured concentrations well below the levels of the NAAQS for nitrogen dioxide, particulate matter-PM₁₀, lead, and sulfur dioxide.

Over the past 20 years, the pollutants that have been of greatest concern in Mecklenburg County have been carbon monoxide, ozone, and PM_{2.5}. This report will address these three air pollutants.

Carbon Monoxide

Carbon Monoxide is a colorless, odorless gas resulting from incomplete fuel combustion. The primary source of CO in Mecklenburg County is motor vehicle emissions. Mecklenburg County was designated a non-attainment area for carbon monoxide in March 1978. During the period from 1974 - 1984 the carbon monoxide NAAQS was often exceeded more than 10 times per year. The number of exceedances per year fell dramatically beginning in the early to mid 1980s. At the time of publication of the 1987 SOER, Mecklenburg County had just experienced two consecutive years (1986-1987) in which the carbon monoxide standard was not exceeded. The last recorded exceedances of the carbon monoxide standard in the Mecklenburg County network (see map on page 21) were measured in 1990. Automotive emission controls found on newer vehicles are the main factor accounting for the reduction in carbon monoxide concentrations. Mecklenburg County was designated by EPA as an attainment area for carbon monoxide in 1995. Carbon monoxide concentration measurements made since 1990 have remained below the NAAQS (Figure 1 on page 22).



Ozone

Ozone is the criteria air pollutant of greatest concern in Mecklenburg County. Ozone is a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground-level is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NO_x and VOC that contribute to the formation of ozone. Ground-level ozone is the primary constituent of smog. Sunlight and hot weather can cause ground-level ozone to form in

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Mecklenburg County Air Monitoring Network

Site	Pollutant Monitored
#11 Fire Station	Particulate Matter - PM ₁₀
Arrowood	Ozone Particulate Matter - PM ₁₀
County Line	Ozone
Davidson	Particulate Matter - PM ₁₀
Garinger	Carbon Monoxide Nitrogen Dioxide Ozone Sulfur Dioxide Particulate Matter - PM _{2.5}
Montclair	Particulate Matter - PM _{2.5}
Oakdale	Particulate Matter - PM _{2.5}

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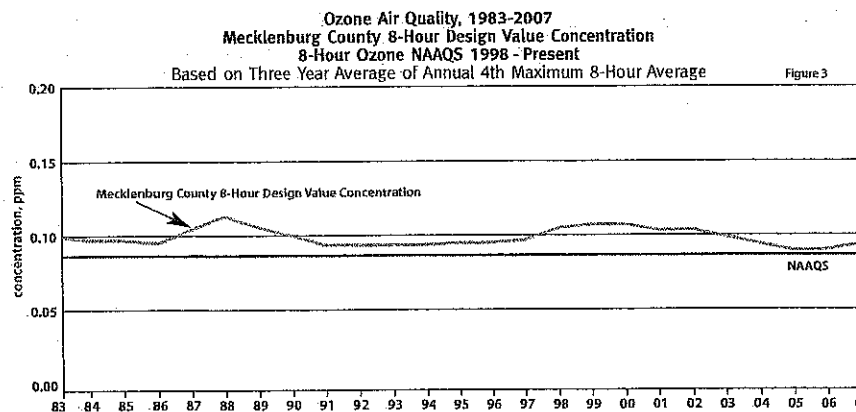
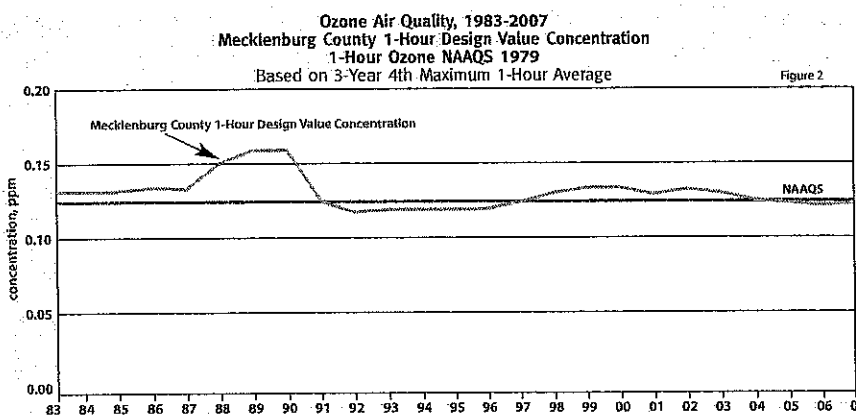
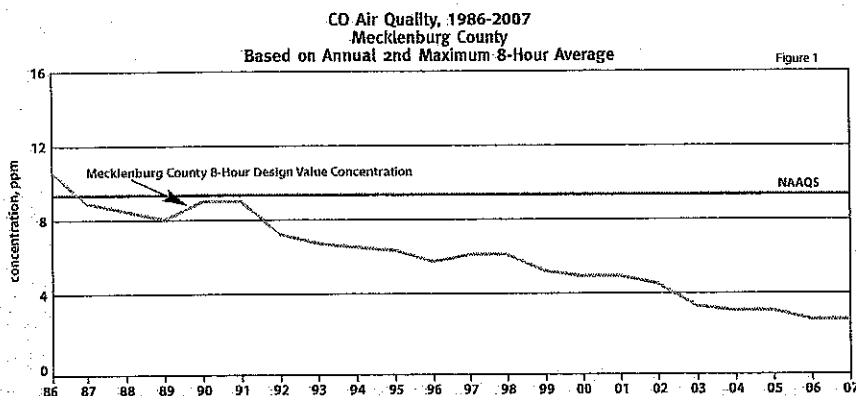
harmful concentrations in the air. As a result, it is known as a summertime air pollutant. For this reason, the months of April through October often are referred to as the "ozone season" in our area.


Mecklenburg County was designated as an ozone non-attainment area in March 1978. Mecklenburg County averaged four days per year from 1981 - 1987 exceeding the (then current) one-hour ozone NAAQS. 1988 monitoring data seemed to verify the 1987 SOER predictions, when 14 days were

measured above the one-hour ozone standard. After 1988, there was a decrease in the number of measurements over the one hour ozone standard, leading to a three year period from 1990 to 1992 when only two days exceeding the one-hour ozone NAAQS were recorded in the County network. The one hour NAAQS compliance value measured in the network in 1992 was 0.118 ppm (See Figure 2). To comply with the one hour NAAQS, values had to be < 0.125 ppm.

In November 1993, the North Carolina Department of Environment and Natural Resources (NCDENR) requested redesignation of the area to attainment with respect to the one-hour ozone NAAQS. EPA approved the redesignation request on July 5, 1995.

In July 1997, EPA issued a revised ozone standard that was more protective of public health and welfare. Scientific information shows that ozone can affect human health at lower levels, and over longer exposure times than one hour. The revised standard is an eight-hour standard with a level of 0.08 ppm. Mecklenburg County was designated non-attainment for the 8 hour NAAQS on June 15, 2004 based upon air quality monitoring data measured during the 2001, 2002 and 2003 ozone seasons. The compliance





value ("design value") measured in the Mecklenburg County network from 2001-2003 was 0.098 ppm. To comply with the standard, an area's design value must be < 0.085 ppm. See Figure 3 on page 22.

Although the new eight-hour ozone NAAQS only has been applicable since 1998; looking back from an historical perspective, Mecklenburg County has been in continuous violation of the eight-hour ozone standard since routine monitoring began in the early 1980s.

In 2007, the design value measured in the Mecklenburg County monitoring network was 0.093 ppm. This is the highest design value determined since the 2004 designation year. Mecklenburg County experienced 19 days when the ozone NAAQS was exceeded in 2007 — the most days measured above the eight-hour standard since 2002. Concentration values measured in 2007 were higher than those measured in each of the past four years. To put these measurements into perspective, it should be noted that meteorological conditions play a significant role in ozone formation. 2007 was the sixth-warmest summer (June - August) in North Carolina in the period from 1987 to 2007. 2007 was also the second driest summer (June - August) in North Carolina in the period from 1987 to 2007. These two pieces of information

would indicate that conditions may have been particularly favorable for ozone formation in the summer of 2007; especially in August 2007, when the highest eight-hour concentration (0.127 ppm) of the year was measured. That measurement was the highest eight-hour concentration measured since 1988. Data from 2007 would seem to indicate that the potential for the formation of unhealthy concentrations of ozone at ground-level continues to exist when conditions are optimal.

Ozone continues to be a challenge for Mecklenburg County. Concentrations measured in our network in 2007 (eight-hour design values) were lower than those measured in 1987; however, we continue to measure concentrations above the NAAQS. As stated in 1987: "We have an ozone problem."

Particulate Matter

Particulate matter is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope. Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than

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10 micro-meters and “fine particles,” with diameters that are 2.5 micrometers and smaller. How small is 2.5 micro-meters? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter — making it 30 times larger than the largest fine particle.

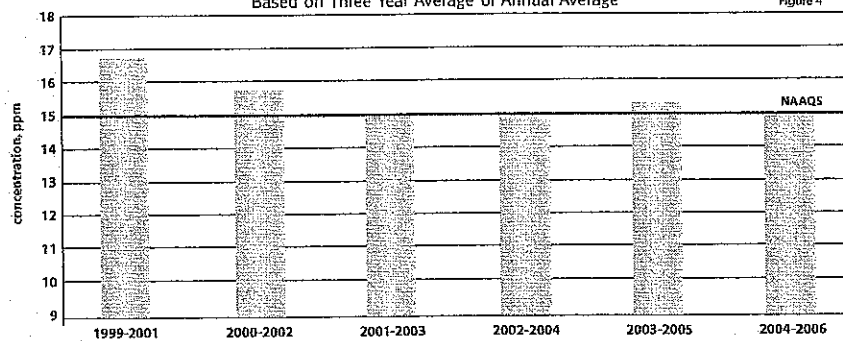
Fine particulate matter or $PM_{2.5}$ is the particle pollutant that is of the most concern in Mecklenburg County. In 1997, EPA issued two standards for $PM_{2.5}$. One standard was a short-term 24-hour standard ($65 \mu\text{g}/\text{m}^3$) and the other was a long-term annual standard ($15.0 \mu\text{g}/\text{m}^3$). The 24-hour standard was revised to a more protective level of $35 \mu\text{g}/\text{m}^3$ in 2006. The annual standard was retained at $15.0 \mu\text{g}/\text{m}^3$.

Nationwide monitoring for $PM_{2.5}$ began in 1999. The following graphic (Figure 4) depicts annual standard data collected in the network to date.

EPA issued designations for non-attainment of the $PM_{2.5}$ NAAQS in December 2004 based on 2001-2003 data. (A three-year average is used.) At the time, Mecklenburg County data was below the annual standard, and the county was not designated. The annual compliance value for 2006, our most recent complete data set, was $14.9 \mu\text{g}/\text{m}^3$. Annual NAAQS compliance values are very close to the $PM_{2.5}$ annual NAAQS of $15.0 \mu\text{g}/\text{m}^3$.

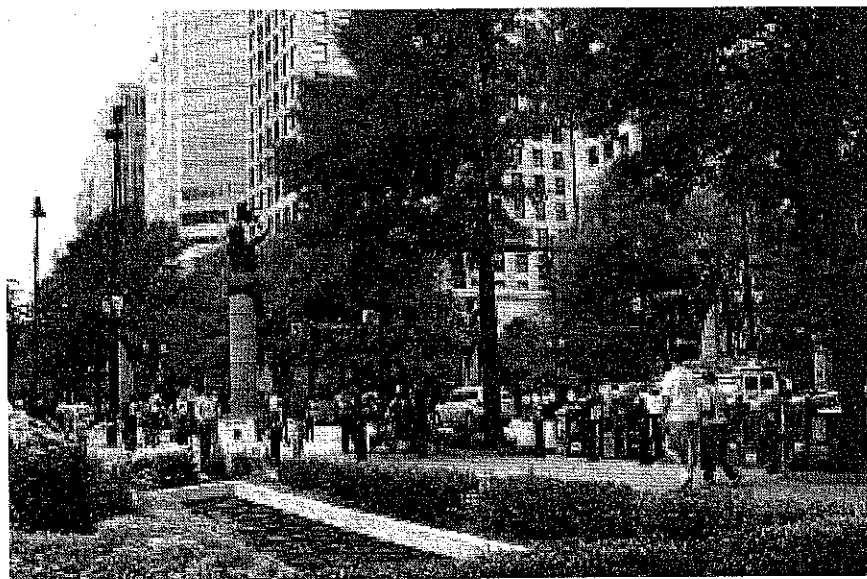
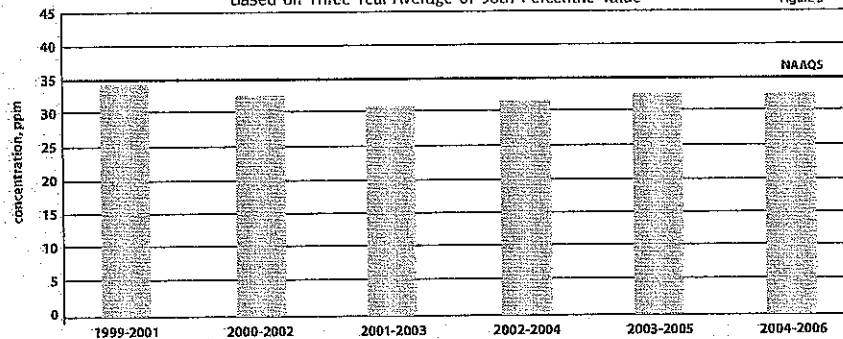
PM2.5 Air Quality, 1999-2007
Mecklenburg County
NAAQS Annual Comparison
Based on Three Year Average of Annual Average

Figure 4



PM2.5 Air Quality, 1999-2007
Mecklenburg County
NAAQS 24-Hour Average Comparison
Based on Three Year Average of 98th Percentile Value

Figure 5



The concentration measurement used to determine compliance with the 24-hour $PM_{2.5}$ standard in 2006 was $32 \mu\text{g}/\text{m}^3$, just below the 24-hour standard of $35 \mu\text{g}/\text{m}^3$. Figure 5 compares data measured in the Mecklenburg County network with the 24-hour NAAQS. Mecklenburg County's 24-hour concentrations are below the 24-hour $PM_{2.5}$ NAAQS.