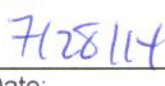
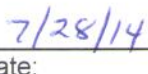




Review of Air Quality in Mecklenburg County

Prepared and submitted by:

The Mecklenburg County Air Quality Commission, an Advisory Board to the Mecklenburg Board of County Commissioners.

 _____ Keith Long, Chair	 _____ Date:
 _____ Peter McGrath, Vice Chair	 _____ Date:
 _____ Lauren Billheimer	 _____ Date:
 _____ June Blotnick	 _____ Date:
 _____ Karim Kheirreddine	 _____ Date:
 _____ Terry Lansdell	 _____ Date:
 _____ Gordon Miller	 _____ Date:
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 _____ James (Jamie) Watts	 _____ Date:



MECKLENBURG COUNTY
- *Air Quality Commission* -

September 22, 2014

Honorable Chairman Trevor Fuller
Board of County Commissioners
Charlotte Mecklenburg Government Center
600 East 4th St
Charlotte, NC 28202

Honorable Chairman Fuller:

Per the Mecklenburg County Air Quality Commission's (AQC's) charter we are to provide an annual written report of the AQC's activities, programs and progress to the Board of County Commissioners (BOCC). As our annual report we provide this letter with the attached "Review of Air Quality in Mecklenburg County" which summarizes our evaluation of air quality issues facing Mecklenburg County and its citizens.

The AQC has spent considerable time evaluating a broad list of air quality issues and challenges that potentially impact the health and welfare of Mecklenburg County's citizens culminating in the attached report wherein the AQC:

- (1) Identified and prioritized the major issues relating to ambient air quality in Mecklenburg County,
- (2) Researched and discussed the issues to develop consensus, and
- (3) Developed recommendations for addressing each of the prioritized issues.

These recommendations provide the AQC's overall input, priorities and recommended actions to Mecklenburg County Air Quality (MCAQ) staff and the BOCC. The most notable issue facing Mecklenburg County continues to be high concentrations of ozone, a key pollutant found in almost every metropolitan area that has the potential for impacts on the health of our community's residents. Six of the nine issues we summarized in the attached report are directly or indirectly related to our County's progress towards attaining the ozone ambient air quality standard.

The AQC acknowledges and appreciates the many valuable contributions of MCAQ staff to this document.

The AQC is available at any time to discuss these or any other air quality topics with the BOCC.

Respectfully yours,

Keith Long, Chairman
Mecklenburg County Air Quality Commission

Attachment: Review of Air Quality in Mecklenburg County, dated June 25, 2014

cc: Air Quality Commission Members
Leslie Rhodes, Director, Mecklenburg County Air Quality

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EXECUTIVE SUMMARY

The Mecklenburg County Air Quality Commission (AQC), a citizen advisory board to the Mecklenburg Board of County Commissioners, is required by its charter to continually perform the following functions:

1. Study and review the County's total ambient air quality program designed to promote and to protect ambient air quality and the public health of the citizens and transient guests of Mecklenburg County from hazards, threats, or influences that might undermine, place in jeopardy, in any way impair, damage, or adversely affect the environment or the public health of the community in all matters relating to ambient air; and to recommend County policies and changes whenever and wherever appropriate.
2. Study and evaluate methods of air pollution management and control as may be required or appropriate to keep the Mecklenburg County local air pollution control ordinance abreast of modern technology and scientific developments and make recommendations to local elected officials and local government agencies relating to new advances in the technology of prevention and control of such pollution.

This report is the result of a two-year consensus-driven process through which the AQC: (1) identified and prioritized the major issues relating to ambient air quality in Mecklenburg County; (2) researched and discussed the issues; and (3) developed recommendations for addressing each issue. Below is a summary of the issues in order of priority along with the recommendations.

Criteria Pollutant: Ozone

Despite decreasing ground-level ozone concentrations, Mecklenburg County remains a federally-designated nonattainment area for violation of the most recent health-based ozone National Ambient Air Quality Standard (NAAQS), which was promulgated by EPA in 2008. When a region is designated as nonattainment, the region is required to take actions to reduce emissions of pollutants that are contributing to the violation and bring the region back into compliance with the NAAQS. In the Carolinas, efforts to reduce ground-level ozone concentrations focus largely on the reduction of nitrogen oxide (NO_x) emissions, which may form ground-level ozone in the presence of sunlight.

Recommendations

- Continue the development and implementation of financial incentive programs, like GRADE and AeroGRADE, which are designed to create and achieve nitrogen oxide (NO_x) emission reductions from highway and nonroad mobile sources.
- Continue to seek funding for programs that will result in further NO_x reductions from highway and nonroad mobile sources.
- Encourage mass transit alternatives with an air quality objective of reducing ozone-forming pollutants.
- Advocate for consideration of air quality in the development of regional plans, e.g., growth and transportation.

Transportation and Land Use

On-road vehicles generate the majority of ozone-forming air pollution in Mecklenburg County. While emissions from individual vehicles have decreased due to cleaner engines and fuels, the average number of miles Mecklenburg County residents drive each year is increasing. A robust transportation network, which includes a variety of options, will be important as Mecklenburg County works to improve air quality over the coming years and decades.

Recommendations

- Use comment-making authority and opportunities to advocate for transportation planning decisions that promote clean air in Mecklenburg County.

- Support the implementation of the 2030 Transit Corridor System Plan, as conditions allow, through representation on the Metropolitan Transit Committee.
- Promote voluntary programs designed to reduce vehicle usage, like Race to the Beach.
- Continue to develop education and outreach programs that promote lifestyle changes, reduce vehicle miles travelled, and reduce air pollution in Mecklenburg County and the region.
- Advocate for the construction of facilities and infrastructure that support smart growth initiatives to reduce air quality impacts on the environment.
- Actively look for opportunities to partner with Charlotte Area Transit System to promote commuter options.
- Continue and enhance focused marketing to businesses in order to reach individuals through their employers.

Mobile Sources: On Road, Non-Road (cars, trucks, bulldozers, graders)

A mobile source of air pollution includes any emissions source that is capable of moving under its own power such as cars, trucks, construction equipment, and gas-powered lawnmowers. Emissions from mobile sources account for more than half of all the air pollution in Mecklenburg County. Reducing air pollution from mobile sources must be a part of the solution to Charlotte's ozone problem.

Recommendations

- Continue implementing the incentive-based GRADE and AeroGRADE programs, which have demonstrated success at reducing regional NOx emissions.
- Aggressively pursue opportunities to implement additional incentive-based programs aimed at replacing aging motor fleets with more efficient and lower-NOx emitting on- and nonroad engines, or otherwise reducing regional mobile source emissions.
- Assess the availability of and persistently seek additional private and/or public funds (including but not limited to grant funds) to implement additional incentive-based programs to replace or repower aging motor fleets.
- Advocate for new revenue streams from on- and nonroad mobile sources of air pollution (i.e., higher emitting and minimally regulated emission sources) to fund efforts to reduce regional mobile source emissions.
- Partner with or encourage community-based efforts to reduce vehicle miles traveled, improve mobile source engine efficiency and maintenance, or otherwise reduce regional mobile source emissions.
- Work in concert with other County agencies to reduce NOx emissions from the County motor fleets.

Criteria Pollutant: Particulate Matter

While concentrations of fine particulate matter (PM_{2.5}) in Mecklenburg County have decreased over the past decade, concentrations comply with the new annual NAAQS by only a small margin. Mecklenburg County currently has the highest PM_{2.5} concentrations in the Carolinas with an average value of 11.2 µg/m³ based on years 2009 through 2011. This average value is 93% of the new annual NAAQS of 12.0 µg/m³.

Recommendations

- Add criteria that will prioritize GRADE and AeroGRADE projects (currently focused solely on reducing NOx emissions) that will also reduce emissions of PM_{2.5} and other PM_{2.5}-forming pollutants.
- Identify additional measures that reduce emissions of PM_{2.5} and other PM_{2.5}-forming pollutants.

Hazardous and Toxic Air Pollutants

Federally identified Hazardous Air Pollutants (HAPs) and State-regulated Toxic Air Pollutants (TAPs) are pollutants known or suspected to cause cancer or other serious health illnesses, such as birth defects, or have reproductive effects at certain concentrations and durations.

Recommendations

- Continue implementation of current regulations. MCAQ has different tools, such as permitting, enforcement of HAP-targeting and TAP standards, etc., to ensure that air toxics emissions are controlled and meet different performance-based requirements. The efforts to pursue compliance with these regulations should proceed as they are currently being implemented.
- Provide education to enhance compliance. MCAQ staff should educate/inform permitted facilities about factors that trigger permit modifications and other reportable activities required by local or federal law (e.g., Toxic Release Inventory (TRI) reporting).
- Continue to inventory toxic emissions. MCAQ should continue to require all permitted facilities to submit an inventory of toxic air emissions every three years.

Outreach: Education and Awareness (Informing, Teaching)

The quality of the air in Mecklenburg County is generally getting better with lower ozone and particulate matter levels reported each year. However, air pollution limits are also going downward. As limits are lowered, actions must be taken to further reduce emissions, including those that are related to businesses and personal activities – actions as simple as driving a car or truck or mowing the lawn. These activities do not fit past regulatory models for reducing air pollution. As air quality standards are strengthened, education and outreach are critical to achieving and maintaining clean air.

Recommendations

- Establish partnerships with organizations that can publicize air awareness information.
- Develop and continue education communications for multiple demographics and audiences such as the business community, public health professionals, public school and higher education professionals.
- Identify group events through other organizations (e.g., Chamber, UNCC) that can be used to distribute education information.
- Identify and propose dedicated funding for education, communications, and events.

Regionalism: Multi-County, Multi-State

Air pollution, and in particular ozone pollution, is a regional issue that does not stop at political boundaries. Currently, Mecklenburg County and portions of adjacent counties are included in the Charlotte-Gastonia-Rock Hill metropolitan ozone nonattainment area. As a result, policy, planning, and regulatory solutions need to be based on regional coordination and participation.

Recommendations

- Raise awareness of regional air quality issues with planning and policy groups where MCAQ staff and AQC volunteers are already members.
- Raise awareness of regional air quality issues with individuals and future organizations that may become key elements of future regional planning organizations.
- Seek funding opportunities that would support the furthering of air quality issues within existing organizations and/or the formation of broader regional planning organizations.

Climate Change Pollutants (Greenhouse Gases)

Greenhouse gases (GHGs) are trace gases in the lower atmosphere that trap heat through a natural process called the "greenhouse effect." This greenhouse effect keeps the planet habitable. However, international research has linked human activities to a rapid increase in GHG concentrations in the atmosphere, contributing to changes in the global climate, and potential environmental and public health problems.

Recommendations

- Employ educational resources and incentives to inform County residents about the sources and effects of GHGs and continue to evaluate and assess emissions of GHGs from or caused by sources in Mecklenburg County.
- Include a quantification of the accompanying reductions in GHGs in analyses of future criteria pollutant reduction strategies.
- Continue to produce an inventory of the GHGs produced by Mecklenburg County Government every three years and support efforts to reduce GHGs from County operations.
- To the extent practical, develop staff expertise in the field of climate change and GHG reduction.

Maintenance of National Ambient Air Quality Standards

Mecklenburg County is currently in compliance with all NAAQS other than ozone. It is beneficial to both the economy and the environment for the County to achieve and maintain continuing compliance with all NAAQS and ensure that the consequences of noncompliance are not imposed.

Recommendations

- Continue enforcement of all stationary source permitting programs, incentive-based mobile source programs, air quality monitoring efforts, area source oversight and education, and outreach to achieve continuing compliance with all NAAQS.

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Criteria Pollutant: Ozone

In accordance with the Federal Clean Air Act, the US EPA has established a National Ambient Air Quality Standard (NAAQS) for ozone to protect against impacts on human health and welfare. Currently Mecklenburg County is in violation of this federal health-based air quality standard, i.e., 75 parts per billion.

Ozone is not directly emitted but is produced through a complex series of atmospheric photo-chemical reactions of nitrogen oxides (NO_x) and hydrocarbons (also called volatile organic compounds (VOCs), in the presence of sun light. The rate of these reactions and the resulting ozone concentration is highly dependent upon high temperatures, stagnant wind patterns, and sunlight intensity.

Nitrogen oxides are emitted from man-made combustion sources such as engines, generators, and industrial boilers. Volatile Organic Compounds are emitted from both man-made sources (e.g. paints, solvents, and petroleum products) and natural sources (e.g. vegetation and forests). In the

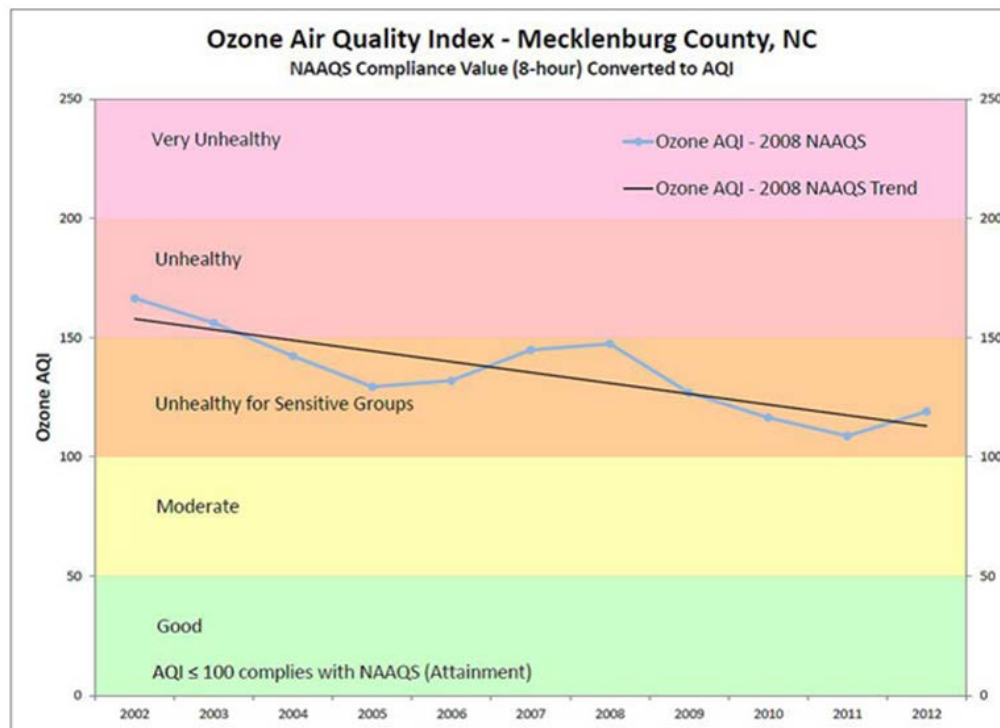


Mecklenburg County region and much of the Southeast US, the photo-chemical reactions that lead to the formation of ozone are driven largely by NO_x emissions and can only be effectively reduced by reducing NO_x emissions.

Emissions of NO_x and VOCs in Mecklenburg County occur from mobile sources (car and trucks); non-road sources (off-road equipment such as backhoes, dozers, loaders, etc.); point sources (industry), and area sources (small sources such as residential use of paints, residential generators, etc.). The emission inventory for Mecklenburg County demonstrates that almost 90% of the NO_x emissions in Mecklenburg County originate from on- and nonroad vehicles. Industrial sites (point sources) represent the smallest percentage of NO_x emissions in the County, i.e., 2% of NO_x in 2012.

On a periodic basis, EPA is required to review health and scientific studies and implement any needed adjustments to the ozone NAAQS. In past years, this has resulted in a strengthening, i.e., lowering, of the ozone standard. Historically, Mecklenburg County and parts of the surrounding region have alternated between attainment (compliance) and nonattainment (violation) of the promulgated ozone standards. Figure 1 shows the 3-yr average ozone concentration compared to the ozone standard using the EPA's Air Quality Index (AQI), where the AQI is an indicator of NAAQS attainment. The overall downward trend of the ozone concentrations (blue line in Figure 1) demonstrates that Mecklenburg County is making continuing and overall progress to improve the ozone air quality of Mecklenburg County.

Figure 1: Ozone Air Quality Index Trends



Despite decreasing ground-level ozone concentrations, Mecklenburg County remains a federally designated nonattainment area for violation of the most recent ozone NAAQS promulgated by EPA in 2008. When a region is designated as nonattainment, the region is required to take necessary actions to reduce emissions of pollutants that are contributing to the violation and bring the area back into compliance with the NAAQS. Mecklenburg County Air Quality (MCAQ) works with the Board of County Commissioners, the State of North Carolina Department of Environmental and Natural Resources, and the EPA to propose and implement regulatory programs necessary for reaching attainment of the violating standard. In addition to federally mandated emission control strategies, MCAQ has also developed and implemented non-regulatory programs to create incentives for reductions in ozone-forming emissions.

Recommendations

For Mecklenburg County to continue the positive trend of improving ozone ambient air quality in Mecklenburg County and the surrounding region, with the objective of achieving attainment of the ozone standard, the Mecklenburg Air Quality Commission recommends that MCAQ:

- Continue the development and implementation of financial incentive programs, like GRADE and AeroGRADE, which are designed to create and achieve nitrogen oxide (NO_x) emission reductions from highway and nonroad mobile sources.
- Continue to seek funding for programs that will result in further NO_x reductions from highway and nonroad mobile sources.
- Encourage mass transit alternatives with an air quality objective of reducing ozone-forming pollutants.
- Advocate for consideration of air quality in the development of regional plans, e.g., growth and transportation.

Transportation and Land Use

A robust transportation network, which includes a variety of options, will be important as Mecklenburg County works to improve air quality over the coming years and decades.

On-road vehicles generate the majority of ozone-forming air pollution in Mecklenburg County. While emissions from individual vehicles have decreased due to cleaner engines and fuels, the average number of miles Mecklenburg County residents drive each year is increasing. This increased demand on transportation infrastructure by its residents, industry, and visitors could pose challenges to Mecklenburg County's air quality as the Charlotte region continues to grow. The development of public transportation options, smart growth planning to create more transportation choices, and programs that promote the reduction of single-occupancy vehicle trips will be important for reducing air pollution from vehicles in the future. The importance of alternative modes of transportation is illustrated in Table 1.

Table 1: Comparison of Pollution Generated by Various Transportation Modes

Transportation Mode	Ozone-Forming Pollution Generated by 10,000 Commuters (lbs/day)
Single Occupancy Vehicle	472
Transit Bus	243
3-Person Carpool	157
Light Rail	6*
Bike/Walk	0
	*NOx emissions only

While Mecklenburg County government does not have direct control over how the region's transportation network will grow, it can influence transportation planning through its role on local and regional planning commissions. The County can also lead by example through its own facility planning to implement design strategies that promote alternatives to driving alone, like locating close to transit corridors or providing secure bike parking.

Infrastructure alone will not reduce air pollution. In order to realize a benefit to our air quality, citizens must use the alternative modes available to them. Community survey data collected by the University of North Carolina at Charlotte on behalf of Mecklenburg County indicate that, on average, incentives like carpool parking benefits, parking cash out (paying the employee a portion of the avoided cost of providing parking), or transit pass benefits would increase the number of people choosing alternative modes by 20%. Subsidized parking for single occupancy vehicles leads to an increase in this mode of transportation. According to the Federal Highway Administration, over 90% of private employers subsidize employee parking, while only 6% subsidize transit.

Green building practices also promote cleaner modes of transportation. This can include creating the necessary infrastructure to connect with alternative modes such as bike racks, bus stops, carpool only parking, and proximity to light rail.

A combination of smart planning, necessary transportation funding, and promotion of alternative modes of transportation is necessary for improved air quality in our region.

Recommendations

In order to contribute to the design, implementation, and promotion of transportation infrastructure that reduces the impact of mobile sources of air pollution, the Mecklenburg County Air Quality Commission recommends the following:

- Use comment-making authority and opportunities to advocate for transportation planning decisions that promote clean air in Mecklenburg County.
- Support the implementation of the 2030 Transit Corridor System Plan, as conditions allow, through representation on the Metropolitan Transit Committee.
- Promote voluntary programs designed to reduce vehicle usage, like Race to the Beach.
- Continue to develop education and outreach programs that promote lifestyle changes, reduce vehicle miles travelled, and reduce air pollution in Mecklenburg County and the region.
- Advocate for the construction of facilities and infrastructure that support smart growth initiatives to reduce air quality impacts on the environment.
- Actively look for opportunities to partner with Charlotte Area Transit System to promote commuter options.
- Continue and enhance focused marketing to businesses in order to reach individuals through their employers.

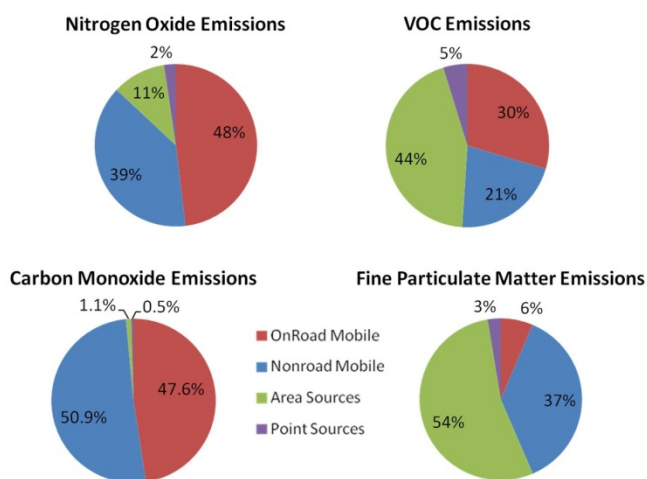
Mobile Sources: On-Road, Nonroad (cars, trucks, bulldozers, graders)

This issue paper describes air pollution emissions resulting from mobile sources, identifies policies and programs that are available to help reduce those emissions, and recommends actions to encourage the reduction of emissions from mobile sources in Mecklenburg County. A mobile source of air pollution includes any emissions source that is capable of moving under its own power. There are two categories mobile sources: on-road and nonroad. On-road mobile sources include vehicles such as cars, buses, and trucks. Nonroad, also referred to as off-road, mobile sources include equipment such as gas-powered lawnmowers and tools, farm and construction equipment, recreational vehicles, boats, planes, and trains.

Emissions from mobile sources result primarily from the combustion of fuel in internal combustion engines (*i.e.*, exhaust emissions). Exhaust emissions from mobile sources include nitrogen oxide (NO_x), which is the primary pollutant responsible for the formation of ground-level ozone in the southeastern United States. Currently, Mecklenburg County is not attaining the National Ambient Air Quality Standard (NAAQS) for ground-level ozone. Reducing NO_x emissions from mobile sources is essential to attaining the NAAQS for ground-level ozone. In addition to exhaust emissions, emissions of volatile organic compounds (VOCs) may result from the evaporation of unburned fuels (*i.e.*, evaporative emissions).

As shown in the figure below, emissions from mobile sources account for the majority of all the air pollution in Mecklenburg County.

2012 Mecklenburg County Emissions, by Source



Combined, on-road, and nonroad mobile sources account for 84% of NO_x emissions, 51% of VOC emissions, 98.5% of carbon monoxide (CO) emissions, and 43% of particulate matter (PM) emissions in Mecklenburg County. Mobile sources are also known contributors of other hazardous and toxic air pollutants (HAPs and TAPS), including acetaldehyde, acrolien, benzene, 1,3-butadiene, formaldehyde, acetaldehyde, naphthalene, and polycyclic organic matter (POM).

The United States Environmental Protection Agency (US EPA) has adopted many emissions standards that apply to mobile sources.¹ However, state and local governments have limited

¹ Programs include, but are not limited to, the Heavy-Duty Onboard Diagnostic Rule (74 Fed. Reg. 8,310; Feb. 24, 2009), the Small Spark Injection and Marine Spark Injection Engine Rule (73 Fed. Reg. 59,034; Oct. 8, 2008), the Locomotive and Commercial Marine Rule (73 Fed. Reg. 25,098; May 6, 2008); the Clean Air Non-

authority to regulate emissions from mobile sources. Section 209(a) of the Clean Air Act forbids state and local governments from adopting emission source standards to control emissions from new motor vehicles. Therefore, local air quality agencies, including Mecklenburg County Air Quality (MCAQ), must think creatively about how to promote voluntary actions to reduce pollution from mobile sources, including cars, trucks, and nonroad equipment.

MCAQ is already administering several creative and unique programs to reduce emissions from mobile sources in Mecklenburg County and other nearby counties that affect Mecklenburg County air quality. A summary of existing policies follows:

GRADE (Grants to Replace Aging Diesel Engines)

GRADE is a local incentive-based program designed and implemented by MCAQ to reduce NO_x and ground-level ozone. GRADE is a first-of-its-kind local solution to a regional air quality problem, ground-level ozone. The program works by encouraging owners of heavy-duty nonroad diesel equipment to replace their aging engines with newer, cleaner ones. The program was initially launched in 2007 in a seven-county region, and it provided incentive funding to public and private organizations that replaced or repowered heavy-duty nonroad construction equipment. The program now includes thirteen counties in North and South Carolina and has been expanded to address construction, agricultural, industrial, and commercial sectors operating nonroad diesel, on-road heavy-duty diesel, and stationary diesel equipment.

To apply for a grant, an organization must complete a simple application detailing the project scope by providing information such as engine horsepower, annual hours of operation, annual miles driven, percentage of time operating within the thirteen county region, and project costs. Through this highly successful incentive-based program, Mecklenburg County and grant participants have the opportunity to demonstrate local and regional leadership, avoid burdensome regulations, involve the private sector in a solution, and successfully improve the quality of our air.

Currently, GRADE recipients can receive up to 50% of the cost of replacing equipment with newer, lower-emitting equipment. Replacement grants require that the old equipment be permanently destroyed. Equipment owners may also be awarded a grant of up to 75% of the cost of repowering equipment, or replacing an old engine with a new, rebuilt, or remanufactured engine with lower associated emissions. Repowering grants also require that the old engine be permanently destroyed.

AeroGRADE

Based on the success of GRADE, MCAQ applied for and received \$800,000 in funding from the US EPA in 2011 to implement what has been described by Scott Davis, Chief - Air Planning Branch USEPA Region 4, as "the first in the nation air rebate program." The rebate program, appropriately named "AeroGRADE," is an incentive-based program under which the owners of diesel-powered ground support equipment (GSE) operated at the Charlotte-Douglas International Airport (CDIA) may obtain funds to replace engines and equipment with newer, cleaner, less polluting sources. The primary goal of AeroGRADE is to reduce NO_x emissions from diesel engines.

Through AeroGRADE, airlines and other businesses that own or operate GSE at CDIA are invited to apply for funding to replace their aging equipment or repower GSE equipment with newer engines. Any company that operates nonroad GSE at CDIA is eligible to apply for funding. AeroGRADE is currently funded by the US EPA grant, and is administered by MCAQ. In addition to the air quality benefits, recipients of AeroGRADE funds benefit from reduced equipment maintenance costs; reduced operating costs of newer, more efficient equipment; listing clean construction equipment in

Road Diesel Rule (69 Fed. Reg. 38,957; June 29, 2004), the Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (66 Fed. Reg. 5,002; Jan. 18, 2001), and the Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements (65 Fed. Reg. 6,698; Feb. 10, 2000).

proposals and bids; fostering a positive public image for being the stewards of clean air in the community; and promoting health benefits to the community.

“Smokin’ & Chokin’” Program

Poorly maintained or malfunctioning engines may not be burning fuel efficiently, resulting in “visible emissions” (or “smoking”) and increased emissions of various air pollutants including VOC, PM, and toxics. State law provides that no gasoline-powered vehicle that is registered and operated in North Carolina may emit any visible emissions for longer than five consecutive seconds, and no diesel-powered vehicle registered and operated in North Carolina may emit visible emissions with an opacity of greater than 20% for longer than five consecutive seconds. [N.C. Gen. Stat. § 20-128.1].

Pursuant to this state law, MCAQ administers the “Smokin’ & Chokin’” Program, under which any person may report the license plate number of a smoking vehicle by calling 311, by fax, by email, or by completing an online form available on the MCAQ website. Any person found in violation of this standard must be given at least 30 days to make necessary repairs to the vehicle and report the repairs to MCAQ.

When MCAQ receives a report of a smoking vehicle, it may use the license plate information to get the owner's information from the North Carolina Department of Motor Vehicles and send a letter to the owner of the vehicle indicating that the engine may be smoking and in need of a tune up. Letters provided by MCAQ are intended to inform the owner of a potential engine problem and prompt the owner to obtain a vehicle tune-up, which will improve the fuel efficiency of the vehicle, potentially identify serious problems with the engine before it progresses, and minimize excess emissions to the atmosphere.

Heavy-Duty Idle Reduction Program

State regulations provide that no person who operates a heavy-duty vehicle (meaning a motor vehicle with a gross vehicle weight rating of 10,001 pounds or greater excluding the trailer), may cause, let, permit, suffer, or allow the vehicle to idle for a period in excess of 5 consecutive minutes in any 60 minute period, unless an exemption applies. [15A NCAC 02D .1010].

MCAQ works in concert with the North Carolina Division of Air Quality (NC DAQ) to implement the idling reduction regulation. Any person that observes a violation of this regulation in Mecklenburg County may report the violation by calling 311 or by completing an online form available on the MCAQ website.

There are opportunities for MCAQ to administer additional programs to improve the emissions profile of mobile source engines operating within Mecklenburg County (and within other regional counties that affect Mecklenburg County air quality). In particular, an incentive-based program could be established to encourage the electrification of business motor fleets. MCAQ's successful administration of GRADE and AeroGRADE to achieve actual mobile source emissions reductions demonstrates the value of these incentive-based programs. The primary challenge of establishing additional incentive-based programs will be securing funds from private entities and/or from Federal, state, or local government.

In addition to implementing incentive-based programs, MCAQ could work in concert with other County agencies to reduce mobile source emissions from the County's motor fleet. MCAQ currently completes annual analyses of County-owned mobile fleet equipment and associated exhaust emissions. The 2012 inventory showed that over 85% of the County's mobile fleet NO_x emissions come from nonroad diesel-fueled equipment. In 2012, nonroad mobile sources emitted over 32 tons of NO_x. By monitoring and characterizing NO_x emissions generated by the County's motor fleet, MCAQ has the opportunity to recommend and encourage other County agencies to manage fleet operations so as to reduce NO_x emissions. Fleet management methods may include the maintenance and replacement of on- and nonroad mobile sources, in addition to reducing hours of

operation of non-essential mobile sources on days where high ground-level ozone levels are predicted.

RECOMMENDATIONS

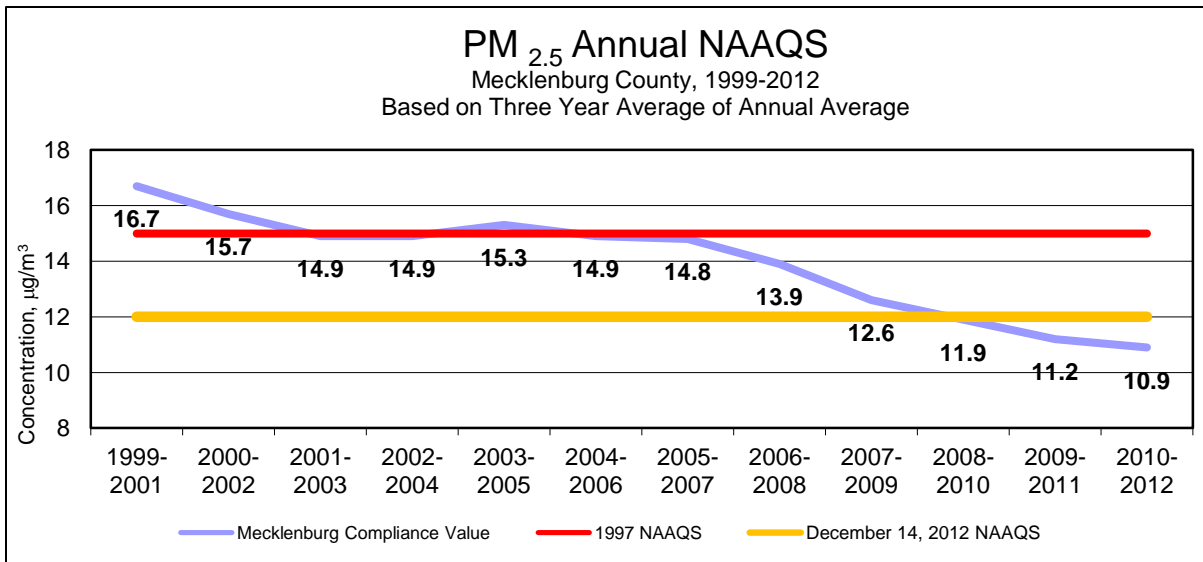
Because both financial and human resources at MCAQ are limited, efforts should be geared at reducing NO_x emissions. Reducing emissions of this ozone precursor from mobile sources will move the County toward achieving the increasingly stringent ground-level ozone NAAQS. In addition, NO_x emissions reduction measures (including replacement of older engines with new, lower-emitting engines, fleet electrification, County motor fleet management, etc.) also reduce emissions of other air pollutants, including VOC, PM, and toxics. As stated previously, Section 209(a) of the Clean Air Act forbids MCAQ from adopting emission source standards to control emissions from new motor vehicles. Therefore, MCAQ must pursue emissions reductions from mobile sources by promoting voluntary actions by the owners and operators of on-road and nonroad sources to reduce associated emissions. MCAQ should concurrently promote the voluntary programs, to the extent that MCAQ resources allow. In particular, MCAQ should:

- Continue implementing the incentive-based GRADE and AeroGRADE programs, which have demonstrated success at reducing regional NO_x emissions.
- Aggressively pursue opportunities to implement additional incentive-based programs aimed at replacing aging motor fleets with more efficient and lower-NO_x emitting on- and nonroad engines, or otherwise reducing regional mobile source emissions.
- Assess the availability of and persistently seek additional private and/or public funds (including but not limited to grant funds) to implement additional incentive-based programs to replace or repower aging motor fleets.
- Advocate for new revenue streams from on- and nonroad mobile sources of air pollution (i.e., higher emitting and minimally regulated emission sources) to fund efforts to reduce regional mobile source emissions.
- Partner with or encourage community-based efforts to reduce vehicle miles traveled, improve mobile source engine efficiency and maintenance, or otherwise reduce regional mobile source emissions.
- Work in concert with other County agencies to reduce NO_x emissions from the County motor fleets.

Criteria Pollutant: Particulate Matter

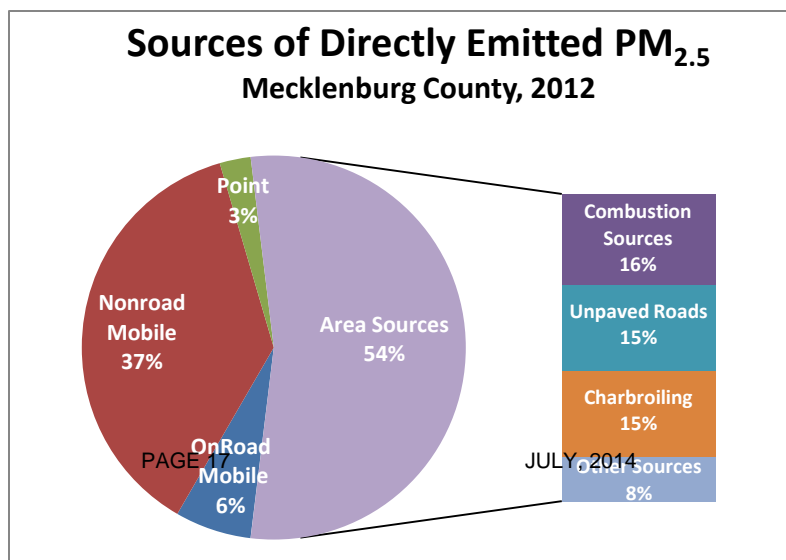
In recent years, scientific research has highlighted health concerns with increasingly smaller fractions of particulate matter. Coarse particles (PM₁₀) have diameters between 2.5 and 10 micrometers and often emanate from road dust that is kicked up by traffic, some agricultural operations, industrial processes, and construction and demolition operations. Fine particles (PM_{2.5}) are 2.5 micrometers in diameter and smaller and can be emitted directly from a variety of sources including vehicles, smokestacks, and biomass combustion. PM_{2.5} can also form when gases, like nitrogen dioxide (NO₂) and sulfur dioxide (SO₂) emitted by power plants, industrial processes, and gasoline and diesel engines, react in the atmosphere.

Mecklenburg County monitors both PM₁₀ and PM_{2.5}; however, the category of greatest concern is PM_{2.5}. EPA, through its periodic review of the National Ambient Air Quality Standards (NAAQS), issued a new PM_{2.5} standard in early 2013, lowering the annual PM_{2.5} limit from 15.0 to 12.0 µg/m³. The 24-hour PM_{2.5} NAAQS standard remains at 35 µg/m³. While concentrations of fine particulate matter (PM_{2.5}) in Mecklenburg County have decreased over the past decade, concentrations comply with the new annual NAAQS by only a small margin. Mecklenburg County currently has the highest PM_{2.5} concentrations in the Carolinas with an average value of 11.2 µg/m³ based on years 2009 through 2011. This average value is 93% of the new annual NAAQS of 12.0 µg/m³. Note that nonattainment designations will be made under this standard by December 2014 using data from the 2010-2012 time period.



Approximately 54% of PM_{2.5} emissions originated from area sources in 2012 and another 37% originated from nonroad mobile sources. While mobile sources in Mecklenburg and the surrounding counties continue to grow (see Mobile Source paper), PM concentrations are still decreasing.

EPA has indicated that nationwide emission reductions from federal and state rules already on the



books will continue to drive down PM concentrations. At the federal level, rules have been enacted to reduce PM emissions from diesel engines and require the use of cleaner diesel fuels. In 2002, The State of North Carolina enacted Clean Smokestacks legislation designed to reduce pollution from coal burning power plants. As of 2012, North Carolina's two largest utilities had reduced PM-forming emissions by 85%.²

At the local level, Mecklenburg County has implemented voluntary, incentive-based programs such as Grants to Replace Aging Diesel Engines (GRADE), which provides grants to equipment owners who replace or upgrade nonroad diesel engines. While this program is primarily focused on reducing NOx emissions, it can also have the co-benefit of reducing particulate emissions. Likewise, the AeroGRADE program focuses on reducing emissions from older diesel equipment at Charlotte-Douglas International Airport.

While monitoring data suggests significant improvements in ambient concentration of PM, changes to Mecklenburg County's monitoring network could change the picture of air quality in the county. Currently, Mecklenburg County's monitoring network is sited to measure representative ambient concentrations of air pollution, not air pollution hot spots. EPA is now requiring Mecklenburg County to add a near-road monitor, which will begin measuring PM_{2.5} by the end of 2016. The monitor will be located by one of Charlotte's most heavily traveled sections of interstate and will likely measure higher PM_{2.5} concentrations. In the future, EPA plans to consider the data collected at this near-road monitor when determining compliance with the NAAQS.

RECOMMENDATIONS

The evidence of decreasing PM concentrations, along with EPA's projections of additional programmatic reductions provides indication that the county will be in attainment as the new lower annual PM_{2.5} standard is implemented. However, Mecklenburg remains uncomfortably close to the limit and must continue to reduce emissions to maintain compliance and build a larger compliance margin in anticipation of expected growth and a potential lowering of this limit in the years to come.

Therefore, the Mecklenburg County Air Quality Commission recommends that MCAQ:

- Add criteria that will prioritize GRADE and AeroGRADE projects (currently focused solely on reducing NOx emissions) that will also reduce emissions of PM_{2.5} and other PM_{2.5}-forming pollutants.
- Identify additional measures that reduce emissions of PM_{2.5} and other PM_{2.5}-forming pollutants.

² *Implementation of the "Clean Smokestacks Act": A Report to the Environmental Review Commission and the Joint Legislative Commission on Governmental Operations*, June 1, 2012.

http://www.ncair.org/news/leg/2012_Clean_Smokestacks_Act_Report.pdf

Hazardous and Toxic Air Pollutants

Hazardous Air Pollutants (HAPs) and Toxic Air Pollutants (TAPs) are generated mostly from anthropogenic sources, which include stationary sources (power plants, manufacturing facilities, etc.), mobile sources (on-road and nonroad vehicles), and indoor sources (cleaning solvents, building materials, etc.), and to a lesser extent from natural causes such as volcanic eruptions and forest fires. Some common air toxics include benzene (gasoline), perchloroethylene (dry cleaning facilities), methylene chloride (solvent and paint stripper), dioxin, asbestos (building materials), toluene (solvent), and metals such as cadmium, mercury, chromium, and lead compounds. The EPA has identified 187 hazardous air pollutants released to the environment that are known or suspected to cause cancer or other serious health illnesses such as birth defects or reproductive effects at sufficient concentrations and durations.

Humans can be exposed to air toxics by the following ways:

- Breathing contaminated air.
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil on which air toxics have been deposited.
- Drinking water contaminated by air toxics.
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths.
- Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies).

Reducing air toxics emissions will improve the general health and environment in Mecklenburg County.

The 1990 Clean Air Act Amendments (“the Act”) reinvigorated the US Environmental Protection Agency’s (EPA) efforts to develop and implement federal rules addressing the emissions of HAPs, also known as air toxics, from stationary sources. EPA created health-based emission standards for HAPs known as National Emission Standards for Hazardous Air Pollutants (NESHAPs), consisting of 187 chemicals. Initially EPA focused its rule making efforts on large or “major” HAP emissions sources. The Act required that for each type of HAP emitting process at a major source, EPA develop emission control standards based on the best practices and emission controls currently used by industry. These best practices are referred to as Maximum Achievable Control Technology (MACT), and the rules have generally become known as MACT standards. In Mecklenburg County, these major source MACT standards affect facilities such as large printing and coating facilities and chemical manufacturing plants.

Since 1990, EPA has promulgated MACT standards for all 94 major source categories and 16 area source categories. Work continues on the development and promulgation of new standards for more area source categories. Today in Mecklenburg County, federal air toxics control requirements apply to 6 different major sources and more than 100 area sources. The facilities affected come from 17 unique source categories including Printing and Publishing, Magnetic Tape Surface Coating, Chromium Electroplating, and Drycleaners. These facilities have taken action to reduce HAP emissions by upgrading control equipment, substituting raw materials, and/or improving work practices.

Federal efforts to control air toxics have had a direct impact on the air quality in Mecklenburg County. HAPs and TAPs programs have been enacted at the federal, state, and local levels (HAPS –187 pollutants, TAPS – 105 pollutants). Neither program establishes ambient standards. MACT and Generally Available Control Technology (GACT) standards have helped ensure that the best emission control techniques and production practices from across the country are in place locally. The North Carolina TAP rule is structured to ensure that regulated point sources that increase their TAP emissions do not increase the public’s lifetime cancer risk by one in a million. As EPA continues

its focus on area sources, and completes a review of residual risk, additional HAP reductions become possible.

Some of the most stringent air pollution regulations for air pollution sources are the North Carolina air toxics regulations. North Carolina's air toxics program is based upon protection of public health. It established airborne concentration of chemicals "above which the substance may be considered to have an adverse effect on human health." The toxics program is designed to protect public health by minimizing exposure to and risk from toxic air pollutants emitted from permitted anthropogenic sources. The toxics program controls what facilities add to the existing environment, ensuring that toxic air pollutants emitted from new or modified facilities do not result in ambient toxic air pollutant levels in excess of established Acceptable Ambient Levels. For substances known to cause cancer (carcinogens) in humans, AALs are set at levels calculated to represent an increment of "one in a million" risk. That is, if one million individuals are exposed continuously for 70 years to a carcinogen at the concentration of the AAL, one person might be expected to contract cancer as a result of that exposure. For "probable" and "possible" human carcinogens, the risk levels increase to "one in one hundred thousand" and "one in ten thousand," respectively. Facilities are required to complete computer air dispersion modeling of toxic emissions from their operations to ensure TAPs concentrations are not exceeding regulated limits.

RECOMMENDATIONS

The following actions are recommended for Mecklenburg County Air Quality (MCAQ) by the Mecklenburg County Air Quality Commission:

- Continue implementation of current regulations. MCAQ has different tools, such as permitting, enforcement of HAP-targeting and TAP standards, etc. to ensure that air toxics emissions are controlled and meet different performance-based requirements. The efforts to pursue compliance with these regulations should proceed as they are currently being implemented.
- Provide education to enhance compliance. MCAQ staff should educate and inform permitted facilities about factors that trigger permit modifications and other reportable activities required by local or federal law (e.g., Toxic Release Inventory (TRI) reporting).
- Continue to inventory toxic emissions. MCAQ should continue to require all permitted facilities to submit an inventory of toxic air emissions every three years.

Education and Outreach

Good air quality is something every citizen wants. Poor air quality adversely impacts human health and welfare, the flora and fauna of Mecklenburg County and surrounding areas, and materials that make up our lives. The quality of the air in Mecklenburg County is generally getting better with lower ozone and particulate matter levels reported each year. However, air pollution limits are also going downward, as science is moving forward with better studies and better identification of air pollution related human and non-human impacts.

As limits are lowered, actions must be taken to further reduce emissions, including those that are related to businesses as well as personal activities – actions as simple as driving a car or truck or mowing the lawn. Reductions from these individual activities must take place since other options for control are either nearly exhausted as an option or present little impact.

The problem then is how do we further educate and reach out to the population of Mecklenburg County to reduce emissions that begin to impact daily lifestyle choices – do I drive my car or car pool or take public transit? These types of choices are challenges for the future in reducing air pollution.



Mecklenburg County Air Quality currently reaches out to the businesses and citizens through the website as well as specific outreach initiatives including but not limited to those highlighted below.

Website Information

The Air Quality website has a number of information and outreach options available including:

- What Can You Do?
- Listings of Permitted Air Pollution Sources
- Control Options (to reduce air pollution)
- The “State of the Environment Report” including air and other environmental media information – developed in “even numbered” years
- Air Awareness Information
- Specifics About Air Pollutants
- A Citizen’s Complaint Log (includes “Smokin’ and Chokin’” for smoky vehicle reporting)
- The Air Quality Commission – a citizens group that provides input and support for air quality initiatives in Mecklenburg County

Outreach Initiatives

- NC Air Awareness
- Permitted Source Seminars and Meetings (at least once annually)
- Mobile Source Emissions Reduction Program (to reduce commuting mileage each summer)
- Gas Cap Testing Programs
- Earth Day and Related Community Outreach at Public Programs

Air Quality Index

AQI Color Code	AQI Value	Air Quality
Green	0-50	Good
Yellow	51-100	Moderate
Orange	101-150	Unhealthy for Sensitive Groups
Red	151-200	Unhealthy
Purple	201-300	Very Unhealthy

A system of rating air quality, the common “Green, Yellow, Orange, Red, and Purple” codes are used to inform the public about what expected levels of air pollution may be, with ratings above “100” judged to be a possible health issue. This warning is provided through local television and radio reports, twitter, email listserves, as well as local newspaper reports.

In Matthews, NC, the Code for the day is reported on roadside signs that are maintained by the Town of Matthews to alert citizens.

Recommendations

The Air Quality Commission recommends the following:

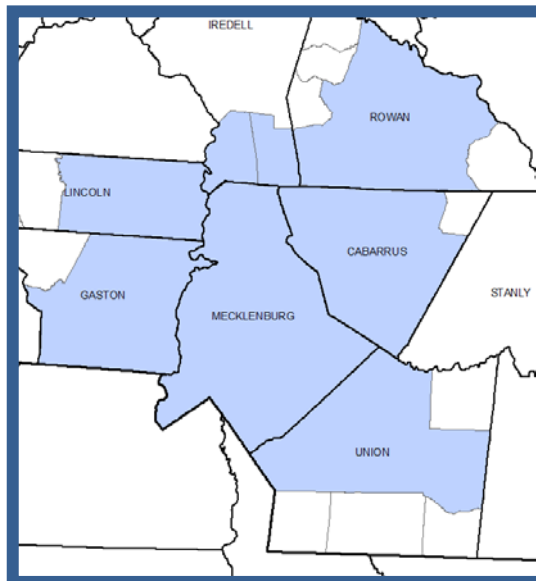
- Establish partnerships with organizations that can publicize air awareness information.
- Develop and continue education communications for multiple demographics and audiences such as the business community, public health professionals, public school and higher education professionals.
- Identify group events through other organizations (e.g., Chamber, UNCC) that can be used to distribute education information.
- Identify and propose dedicated funding for education, communications, and events.

Regionalism: Multi-County and Multi-State

Currently, Mecklenburg County and portions of adjacent counties are included in the Charlotte-Gastonia-Rock Hill metropolitan ozone nonattainment area. One factor contributing to ozone nonattainment in this geography is the wide distribution of emission sources and transportation sources spread throughout the counties, including interstates that transect the entire region. There are close regional ties between these counties that include commerce, transportation modes and routes, and some planning functions.

The following portions of the Charlotte-Gastonia-Rock Hill metropolitan area have been designated by EPA to be part of the “Charlotte” nonattainment area:

- All of Mecklenburg County
- Portions of Lincoln, Rowan, Cabarrus, Union, and Gaston Counties in North Carolina
- A portion of York County in South Carolina



Monitoring and modeling data indicate that the region is on a path to achieving the National Ambient Air Quality Standard (NAAQS) for ozone due to cleaner engines and industrial source reductions. However, EPA is currently reviewing the ozone NAAQS and considering taking action to further strengthen (lower) the national standard. This will result in the need for additional regional coordination among multiple regulatory, planning, and policy setting groups throughout the region, even extending to areas outside the nonattainment counties.

Mobile sources (both on-road and nonroad) and area sources comprise more than 95% of the ozone-forming emissions in Mecklenburg County. Current emission source regulations are applicable to mobile, point, and area sources of ozone-forming emissions located in the regulated portions of these counties. As the region continues to grow, the majority of the regional growth will occur outside of Mecklenburg County with an emission profile that is assumed to be much like that in Mecklenburg County, namely 95% of the ozone-forming emissions from non-point sources. These regional emissions will have an effect on the ozone nonattainment status of the entire region. Thus, any solution to future ozone nonattainment of the region will need to include adjacent counties.

If the EPA pursues a further reduction in the ozone NAAQS below the current 0.075 ppm standard, then it is extremely likely that the current Charlotte-Gastonia-Rock Hill nonattainment area will be further extended to include other parts of the regulated counties and, potentially, additional counties or portions of additional counties. This extended geography will be included to ensure that any additional regulations will have an opportunity to sufficiently lower ozone-forming emissions. The implementation of these extended regulations will require enhanced coordination of policy-setting/planning, regulated, and political groups throughout the region.

Thus, the effect of current emission distribution, anticipated growth patterns, and the potential for a lowered ozone NAAQS will result in policy, planning, and regulatory solutions that will need to be based even more firmly on regional coordination and participation.

While there are councils of governments and transportation coordination and planning organizations, these organizations are not always focused on aspects of their charters that can influence reductions in ozone-forming emissions.

MCAQ and the AQC should make connections with organizations and groups that can influence and direct community planning, funding, and regulatory efforts that will affect the future planning and attainment issues, e.g., Centralina Council of Governments and local metropolitan/rural planning organizations. In addition to connection with other organizations, MCAQ and the AQC should consider membership and participation in these other regional organizations if appropriate.

Recommendations

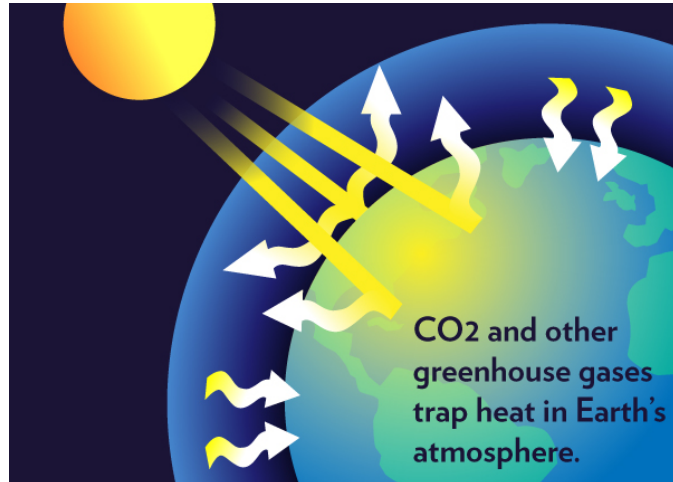
To advance regional planning and coordination efforts, the following recommendations should be considered for implementation by MCAQ staff and AQC commissioners:

- Raise awareness of regional air quality issues with planning and policy groups where this group is already members.
- Raise awareness of regional air quality issues with individuals and future organizations that may become key elements of future regional planning organizations.
- Seek funding opportunities that would support the furthering of air quality issues within existing organizations and/or the formation of broader regional planning organizations.

Climate Change Pollutants (Greenhouse Gases)

Greenhouse gases are trace gases in the lower atmosphere that trap heat through a natural process called the "greenhouse effect."

The United States Environmental Protection Agency's report *Climate Change Indicators in the United States, 2012* states that "Human activities have substantially increased the amount of greenhouse gases in the atmosphere, leading to warming of the climate and many other changes around the world—effects that will persist over a long time." Specifically:



- US Greenhouse Gas Emissions.** In the United States, greenhouse gas emissions caused by human activities increased by 10% from 1990 to 2010. Carbon dioxide accounts for most of the nation's emissions and most of this increase. Electricity generation is the largest source of greenhouse gas emissions in the United States, followed by transportation. Emissions per person have decreased slightly in the last few years.
- Global Greenhouse Gas Emissions.** Worldwide, emissions of greenhouse gases from human activities increased by 26% from 1990 to 2005. Emissions of carbon dioxide, which account for nearly three-fourths of total emissions, increased by 31% over this period. As with the United States, the majority of the world's emissions result from energy production and use.
- Atmospheric Concentrations of Greenhouse Gases.** Concentrations of carbon dioxide and other greenhouse gases in the atmosphere have increased since the beginning of the industrial era. Almost all of this increase is attributable to human activities. Historical measurements show that current levels of many greenhouse gases are higher than any levels recorded for hundreds of thousands of years, even after accounting for natural fluctuations.
- Climate Forcing.** Climate or "radiative" forcing is the measurement of how substances such as greenhouse gases affect the amount of energy absorbed by the atmosphere. An increase in radiative forcing means a heating effect, which leads to warming, while a decrease in forcing produces cooling. From 1990 to 2011, the total radiative forcing from greenhouse gases added by humans to the Earth's atmosphere increased by 30%. Carbon dioxide has accounted for approximately 80% of this increase.

International research has linked human activities to a rapid increase in GHG concentrations in the atmosphere, contributing to changes in the global climate and potential environmental problems. Such shifts also could have public health effects arising out of drought-related food shortages, harm to water resources, and heat stress impacts. Those impacts could be especially dangerous among the poor, the very young, the elderly, those in poor health, the disabled, those living alone, and indigenous populations dependent on one or a few resources.

Types of Greenhouse Gases

Greenhouse gases are defined in two categories; naturally occurring and manmade (also known as anthropogenic emissions). Ice core samples indicate that concentrations of naturally occurring GHGs have remained relatively steady for thousands of years (fluctuating within a range of 100 parts per million (ppm) of naturally occurring carbon dioxide over the last 400,000 years). Among others, these naturally occurring GHGs include:

- Carbon dioxide (CO₂)

- Methane (CH₄)
- Nitrous oxide (N₂O)

Manmade greenhouse gases are a particular problem as they remain in the atmosphere for thousands of years and can be thousands of times more effective at trapping heat. Among others, these gases include:

- Perfluorocarbons (PFCs)
- Hydrofluorocarbons (HFCs)
- Sulfur hexafluoride (SF₆)

In addition, anthropogenic emissions of CO₂, CH₄, and N₂O have caused the concentrations of GHGs in the atmosphere to increase outside of the naturally occurring range of fluctuations.

The six gases listed above were identified in Executive Order (E.O.) 13514 as the major contributors to global climate change. Other greenhouse gases pose significant concerns also. Nitrogen trifluoride (NF₃) is receiving increasing attention across the globe due to its high global warming potential. Black carbon has been the subject of a recent USEPA report to Congress. Black Carbon is a sooty black material emitted from gas and diesel engines, coal-fired power plants, and other sources that burn fossil fuel. It comprises a significant portion of airborne particulate matter. The EPA believes black carbon is a global environmental problem that has negative implications for both human health and our climate. Inhalation of black carbon is associated with health problems including respiratory and cardiovascular disease, cancer, and even birth defects. And because of its ability to absorb light as heat, it also contributes to climate change. For example, as black carbon warms the air, rapid changes in patterns of rain and clouds can occur. This absorption quality also impacts polar ice. As black carbon deposits in the Arctic, the particles cover the snow and ice, decreasing the Earth's ability to reflect the warming rays of the sun, while absorbing heat and hastening melt.

Burning fossil fuels, increased agriculture, and deforestation all emit natural greenhouse gases and are concerning due to their contribution to increased concentrations of these greenhouse gases. Human activities also increase GHG emissions that are not naturally occurring in the atmosphere. These activities include semiconductor manufacturing, refrigerant leaks, and other industrial sources. The high level of greenhouse gases trap heat close to the surface of the earth, contributing to major shifts in the global climate.

Recommendations

The AQC recommends that, to the extent practical, MCAQ take the following actions:

- Employ educational resources and incentives to inform County residents about the sources and effects of GHGs and continue to evaluate and assess emissions of GHGs from or caused by sources in Mecklenburg County.
- Include a quantification of the accompanying reductions in GHGs in analyses of future criteria pollutant reduction strategies.
- Continue to produce an inventory of the GHGs produced by Mecklenburg County Government every three years and support efforts to reduce GHGs from County operations.
- To the extent practical, develop staff expertise in the field of climate change and GHG reduction.

Maintenance of National Ambient Air Quality Standards

Ambient air in Mecklenburg County currently is in compliance with all national ambient air quality standards other than ozone. It is in the best interests of County citizens and County government that the County can achieve and maintain continuing compliance with all National Ambient Air Quality Standards (NAAQS) other than ozone and ensure that noncompliance or nonattainment sanctions are not imposed.

The Clean Air Act requires the EPA to develop NAAQS to regulate pollutants present in the ambient (outside) air that are harmful to human health and the environment and that result from numerous and diverse stationary or mobile sources. The Clean Air Act identifies two types of NAAQS: primary standards, providing public health protection, including protection for sensitive populations; and secondary standards, providing protection against damage to animals, crops, vegetation, buildings, and decreased visibility. Reflecting their derivation, primary standards are often referred to as “health standards,” and secondary standards are often called “welfare standards.”

The EPA has set NAAQS for the six “criteria” pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate pollution, including both coarse (“PM₁₀”) and fine (“PM_{2.5}”) particles. Some of these pollutants are emitted directly from sources (e.g., SO₂, CO, lead). Others are formed in the atmosphere by chemical reactions involving precursor pollutants; ground-level ozone, for instance, is created in the atmosphere through reactions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Some pollutants, such as fine particulate matter, are both emitted directly and also formed by reactions in the atmosphere. In addition, some criteria pollutants occur naturally (e.g., low levels of ozone, particulate matter from wildfires and dust, and certain VOCs from trees and other plants). Further, virtually all of these pollutants can be transported by prevailing winds to other jurisdictions, although typical transport distances vary greatly.

The EPA establishes a standard for each criteria pollutant – designated as a primary or secondary standard (or both) – that includes an averaging time over which the pollutant is measured, a physical limit (typically expressed as the concentration of the pollutant in the outdoor air), and a provision that stipulates whether or how often the limit can be exceeded and still allow an area to meet the NAAQS for that pollutant.

States are required to monitor and analyze ambient concentrations of criteria pollutants throughout their jurisdictions, and the EPA provides funding for these activities. Based on monitored data, the EPA designates counties as being in “attainment” or “nonattainment” for each criteria pollutant, depending on whether ambient pollutant concentrations in the area violate the NAAQS. In the case of broad urban areas, the EPA often applies consistent designations across census-based metropolitan statistical areas (MSAs) or consolidated MSAs (CMSAs). Such designations may include counties in more than one state. An area may be in attainment for some pollutants and nonattainment for others. Designated nonattainment areas are also classified with respect to the severity of their unhealthy pollution levels.

There could be indirect, costly consequences due to a nonattainment designation. Industrial facilities could be required to install pollution control equipment, take limits on their production, or otherwise find reductions in emissions by “offsetting” in order to expand. New facilities wanting to locate in a nonattainment area will most likely be required to install pollution controls or take stringent operational limits. To avoid those consequences, and to ensure air quality is healthy, the County should strive to ensure that for all NAAQS with which the County air is currently in compliance, it maintains continuing compliance.

The County is currently in attainment status with respect to the Particulate Matter NAAQS for PM₁₀ and PM_{2.5}, SO₂, CO and lead standards.

Recommendations

The AQC recommends that, to the extent practical, MCAQ continue enforcement of all stationary source permitting programs, air quality monitoring efforts, area source oversight, and education and outreach to achieve continuing compliance with all NAAQS.

Appendix A:

Background Data and Information

Provided by Mecklenburg County Air Quality Staff

2012 Air Quality Indicators

Sources of Air Pollution

Mobile Source Indicators

Stationary Sources

Area Sources

Health Effects of Air Pollution

2014 State of the Environment Report - Air

2012 Air Quality Indicators

Mecklenburg County, North Carolina



Mecklenburg County Air Quality (MCAQ) presents the list of environmental indicators for calendar year 2012 below that give information about the air quality in Mecklenburg County as well as programmatic activities. Environmental indicators are scientifically-based measures that tell us what is happening in our environment. Since the environment is complex, indicators provide a practical and economical way to track the state of the environment. By monitoring the environment using indicators, Mecklenburg County Air Quality (MCAQ) can better share environmental information with the public and can make better environmental decisions.

Air Quality Index Days in 2012

Good (Green Days)	279
Moderate (Yellow Days)	77
Unhealthy for Sensitive Groups (Orange Days)	9
Unhealthy (Red Days)	0
Very Unhealthy (Purple Days)	0

Days Over the National Ambient Standard in 2012

Ozone: 1 hour	0
Ozone: 8 hour	9
Carbon Monoxide	0
Particulate Matter < 10 microns (PM ₁₀)	0
Particulate Matter < 2.5 microns (PM _{2.5})	0
Nitrogen Oxide	0
Sulfur Dioxide	0

Air Pollution* (tons/year): CY 2012

Carbon Monoxide (CO)	201,651
Volatile Organic Compounds (VOC)	23,642
Nitrogen Oxides (NOx)	16,505
Sulfur Dioxide (SO ₂)	1,554
Particulate Matter (PM _{2.5})	1,454

*Emissions from stationary, area & mobile sources

Toxics (TAPS/HAPS)**	328
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** 2011 toxic emissions from stationary sources

Program Activity Levels in 2012

Citizen Requests for Service	40
NESHAP Inspections ("Asbestos Removals")	379
Permits Issued	63
Permit Applicability Determinations	42
Stationary Source Inspections Conducted	337

Permitted Stationary Sources in 2012

Major (Title V)	9
Minor	226
Stage I (Gasoline Stations)	331

Air Pollution Source Violations in 2012

Recordkeeping	29
Applicability	9
Emission Standards	23

Mobile Source Data in 2012

Registered Vehicles	707,195
Vehicle Miles Traveled per Day	33,062,395
Mass Transit Average Daily Ridership	82,407
Permitted Transportation Facilities	18

Ambient Monitoring in 2012

Number of Sites	6
Number of Monitors Operated	30
Number of Measurements/Year	99,261



[Health Effects](#)



[Air Quality Data](#)



[Pollution Sources](#)



[Stationary Sources](#)



[Area Sources](#)



[Mobile Sources](#)



[Ambient Monitoring](#)



[Indoor Air Quality](#)

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<http://airquality.charmeck.org>

Sources of Air Pollution

Mecklenburg County, North Carolina



Here in Mecklenburg County, air pollution emissions are primarily generated from one of three distinct emission sources: Mobile, Stationary, and Area.

Mobile Sources

The group identified as Mobile Sources includes vehicles and pieces of equipment that by design and function emit pollutants while driving or moving throughout Mecklenburg County. Examples of this source type include: On-Road vehicles (cars, motorcycles, all types of trucks and buses); and Non-Road equipment and vehicles (tractors, dozers, locomotives, boats, lawnmowers, and mobile generators).

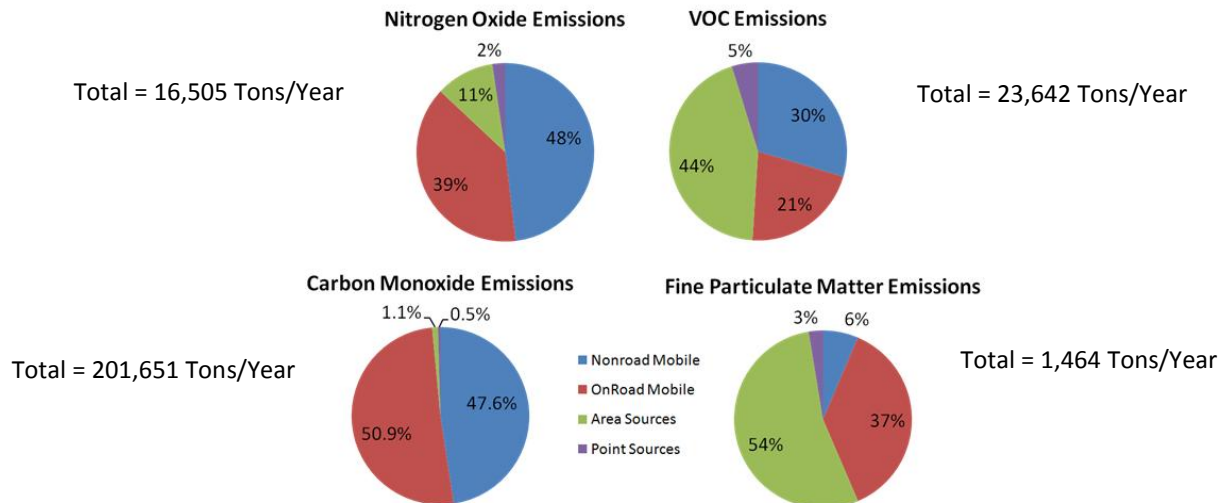
Stationary Sources

Unlike the Mobile Sources group, the collection of air pollution sources known as Stationary Sources do not move from location to location but remain in one location as the label implies. Some examples of Stationary Sources are: chemical facilities, motor-fuel terminals, electric power generating facilities, manufacturing facilities, and label printers.

Area Sources

This category is broad by definition and includes several smaller sized Stationary Sources that emit a similar pollutant(s) and are clustered together in one geographical area. Examples of some Area Sources are: vehicle parking decks, clothing dry cleaners, motor vehicle re-fueling stations, and automotive refinishing/painting operations.

2012 Mecklenburg County Emissions Inventory



In summary, the air we breathe in Mecklenburg County is impacted by all three of these air pollution sources. The pie charts above illustrate that On-Road and Non-Road Mobile Sources are the leading cause of air pollution in Mecklenburg County. This means individual driving decisions that you make every day directly contribute to Mobile Source air pollution. Mobile Source air pollution can be reduced, if everyone makes an effort to improve driving habits by carpooling; combining trips, to be more efficient; and by driving and operating cleaner vehicles and equipment.

More information

- [Mobile Sources](#)
- [Stationary Sources](#)
- [Area Sources](#)
- [Health Effects of Air Pollution](#)

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Mobile Source Indicators

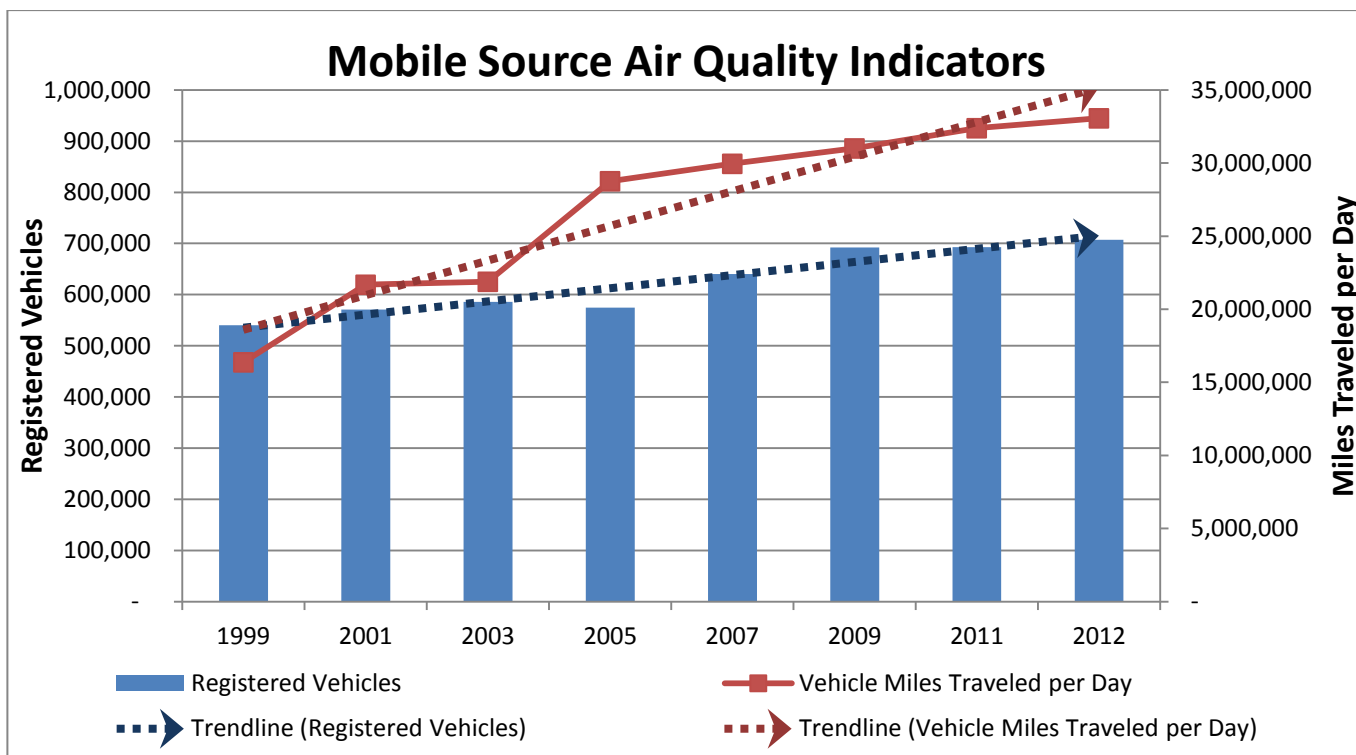
Mecklenburg County, North Carolina



Recent emission inventories show that most [ozone-forming air pollution](#) in Mecklenburg County comes from cars, trucks and other on-road vehicles. The graph below shows two indicators associated with on-road mobile source air pollution:

1. **Registered Vehicles** – The total number of on-road vehicles registered in Mecklenburg County. This data is plotted on the graph with blue bars, along with a dotted blue trend line.
2. **Vehicle Miles Traveled (VMT)** – The average number of miles traveled each day by on-road vehicles in Mecklenburg County. This data is plotted on the graph with red squares connected by a line, along with a dotted red trend line.

The graph below shows that average daily VMT and the number of registered vehicles in Mecklenburg County have both increased over the past decade. However, the trend lines on the graph show that VMT is growing more quickly than vehicle registration. This indicates that the average Mecklenburg County resident is driving more each year than the year before.



The amount of air pollution generated by a single car depends on how clean the car's engine runs and how many miles the car is driven. Newer models of on-road vehicles continue to be built with smaller and typically cleaner engines, reducing the amount of air pollution emitted for each mile driven. Unfortunately, the trend of driving more miles each year could reduce or even eliminate the air quality benefit from having cleaner cars and trucks on the road.

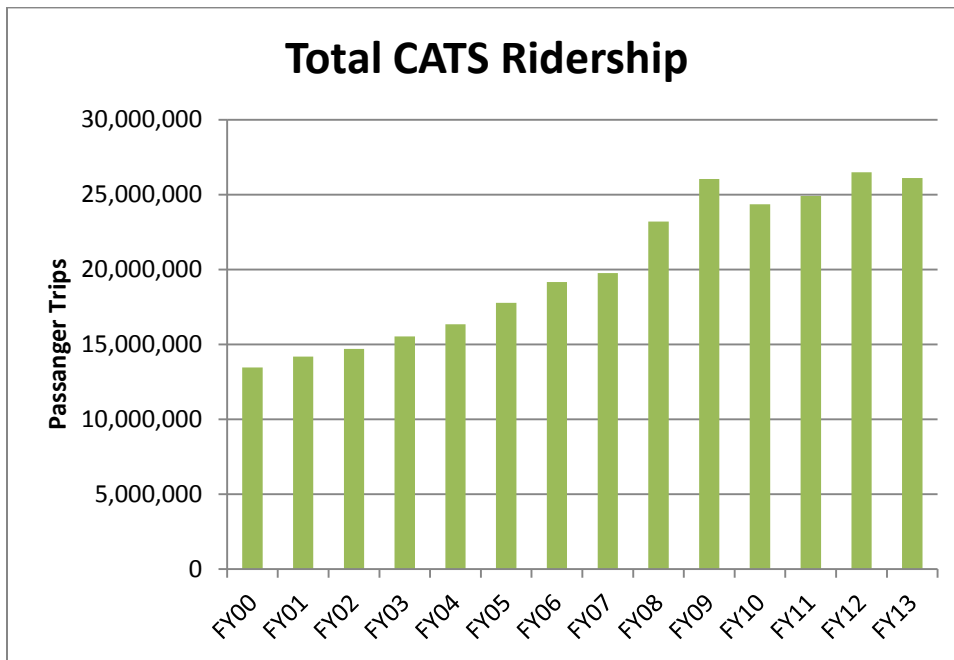
Citizens can reduce the number of miles they drive each year by "trip-chaining," combining errands into a single multi-stop trip rather than multiple single-stop trips. Drivers can also replace car trips they would normally make alone with a ["cleaner" alternative](#), such as carpooling, biking, walking, or using mass transit.

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The graph below shows that that an increasing number of residents are turning to Charlotte Area Transit System (CATS) services as an alternative to driving alone.



According to transit officials, CATS “is committed to providing outstanding community-wide public transportation. Over the past decade, CATS has significantly increased routes and expanded service hours and frequency. This, along with improved safety and accessibility, has resulted in overall ridership gains. In fiscal years 2008 and 2009, CATS experienced large increases in ridership due to the introduction of the LYNX Blue Line, North Carolina’s first light rail service, and the national effects of Hurricane Katrina on gas prices, respectively. In FY10 CATS experienced a drop in ridership due to the nation’s recession.”

More information

- [Mecklenburg County Air Quality - Mobile Sources Smokestacks On Wheels](#)
- [EPA - On-Road Vehicles and Engines](#)
- [EPA - Non-Road Engines, Equipment and Vehicles](#)

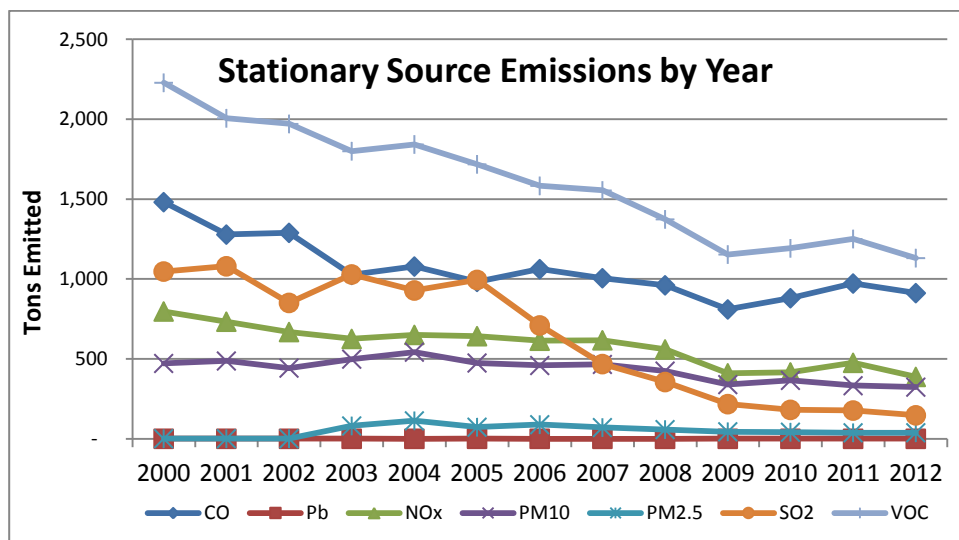
Stationary Sources

Mecklenburg County, North Carolina



Industrial and commercial operations often emit pollutants into the air. These types of air pollution contributors, called *stationary sources*, are generally non-mobile, larger emitting sources. Examples include power generating plants, mining sites, petroleum facilities, and chemical plants. Pollutants released from this category include all of the criteria pollutants along with state and federally regulated air toxic pollutants. Pollution is released from a wide variety of processes at stationary sources, but most commonly from operations such as fossil fuel combustion, solvent evaporation, and raw material handling.

Stationary sources can be made up of many different emission points. An emission point is the specific place or piece of equipment from which a pollutant is emitted. Air pollutants are frequently emitted from smokestacks, storage tanks, equipment leaks, process wastewater handling/treatment areas, loading and unloading operations, and process vents. Emissions from all the emission points at a stationary source are summed up and used to classify the source as a major or minor source. A major source is one that emits, or has the potential to emit, pollutants over a major source threshold. A minor source is any source which emits fewer pollutants than the major source threshold.



2012 Stationary Source Emissions	
Pollutant	Tons/Year
CO	912
Pb	0.03
NOx	388
PM ₁₀	323
PM _{2.5}	38
SO ₂	147
VOC	1,131
TOTAL	2,939

Stationary sources are subject to various federal, state, and county regulations for the purpose of minimizing pollution and its impact on our environment. Many of these regulations were developed as a result of the federal Clean Air Act of 1970 and amendments made to the Act in 1990. Mecklenburg County Air Quality (“MCAQ”) has been delegated the authority to implement these requirements locally.

MCAQ issues air quality permits, conducts inspections, and reviews emission reports for air pollution sources in the county. Currently, there are approximately 235 permitted stationary sources in our database, representing a wide range of industry types. Of these permitted sites, nine (9) are considered major sources and the remaining are minor source types. The most common permitted industries as identified by the North American Industrial Classification System (NAICS) are:

- Ready-mix Concrete Manufacturing – 15 sites
- Asphalt Paving and Block Manufacturing – 10 sites
- Petroleum Bulk Stations and Terminals – 9 sites
- Commercial Lithographic Printing – 6 sites
- Fabricated Metal Product Manufacturing – 6 sites
- General Medical and Surgical Hospitals – 6 sites
- Stone Mining and Quarrying – 6 sites

More information

- [EPA - Summary of the Clear Air Act](#)
- [Mecklenburg County Air Quality Home Page](#)
- [Mecklenburg County Air Pollution Facility Information](#)

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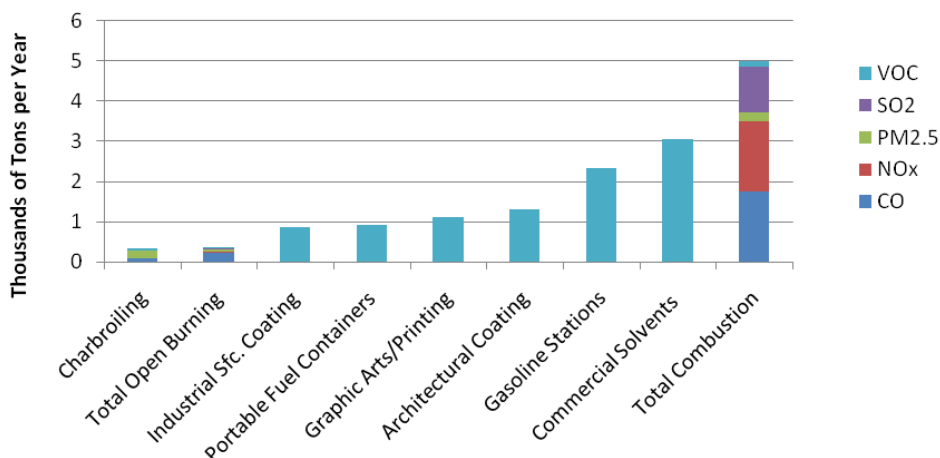
Area Sources

Mecklenburg County, North Carolina



An area source is a collection of individually small emission sources within a single geographical area that produces similar air pollutants. Area sources are classified together by air quality control agencies to facilitate estimating emissions from their activities because they are usually too small or too numerous to be inventoried individually. Examples of area sources in Mecklenburg County include dry cleaners, parking decks, automobile refinishing operations, gas stations, and even the family lawnmower, barbecue grill, or fire pit. Area sources are not all man-made - they also include emissions from wildfires and other natural occurrences. Although emissions from individual area sources are relatively small, collectively their emissions can be of concern - particularly where a large number of sources are located together in heavily populated areas. In Mecklenburg County alone, more than 10,000 tons per year of volatile organic compounds (VOC) were estimated to be emitted from area sources in 2012 - this is almost nine times the VOC emissions reported from permitted stationary sources in 2012! Area sources can require permitting, and many of the larger individual facilities such as gas stations or automobile refinishing shops are issued air quality permits in Mecklenburg County. However, most are exempt from permitting due to their size, activity, or emission rate. Emissions data from select area source categories in Mecklenburg County are displayed in the graph below.

2012 Mecklenburg County Area Emission Sources



Data provided in part by North Carolina Department Environment and Natural Resources (NCDENR).
Data for Gasoline Stations is from the 2012 Mecklenburg County Air Emissions Inventory.

2012 Area Source Emissions	
Pollutant	Tons/Year
CO	2,151
NOx	1,764
PM2.5	789
SO2	1,129
VOC	10,450
Total	16,282

What you can do to help reduce area source pollution in Mecklenburg County

- Minimize use of fireplaces, fire pits and open burning as these activities generate SO₂, PM, NO_x, VOC and CO.
- Minimize use of commercially available VOC containing solvents and paints. You can switch to “green” alternatives to minimize VOC emissions.
- Minimize dispensing of gasoline into portable containers to minimize VOC emissions.

More information

- [EPA Area Source Standards](#)
- [Scorecard - The Pollution Information Site](#)
- [Area-wide Source Categories - California Air Resources Board \(CARB\)](#)
- [Sources of Air Pollution - Area Sources Texas Commission on Environmental Quality](#)
- [What are Point, Area and Mobile Sources? - New Jersey Department of Environmental Protection](#)

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Health Effects of Air Pollution

Mecklenburg County, North Carolina

Breathing polluted air can affect everyone. Air pollution can affect our health in many ways through both *short-term* and *long-term* effects. Health effects vary greatly from person to person. Some high-risk individuals are much more sensitive to pollutants than are others. Elderly people and people with health problems such as [asthma](#), heart and lung disease often suffer more from the effects of air pollution. [Children](#) are also at greater risk because they are generally more active outdoors and their lungs are still developing. Short-term effects are usually immediate and often reversible when exposure to the pollutant ends. Long-term effects are usually not immediate and tend not to be reversible when exposure to the pollutant ends.



Examples of **short-term effects** include irritation to the eyes, nose and throat, and upper respiratory infections such as bronchitis and pneumonia. Other symptoms can include headaches, nausea, and allergic reactions. Short-term air pollution can aggravate the medical conditions of individuals with asthma and emphysema.

Long-term health effects can include chronic [respiratory disease](#), lung cancer, [heart disease](#), and even damage to the brain, nerves, liver, or kidneys. Continual exposure to air pollution affects the lungs of growing children and may aggravate or complicate medical conditions in the elderly.

Ground-level [ozone](#) and [particulate matter](#) are the primary air pollutants of concern for the health of Mecklenburg County residents.

Inhalation of ozone can trigger a variety of health problems including chest pain, coughing, throat irritation and congestion. It can worsen respiratory conditions such as bronchitis, emphysema and asthma. Exposure to ozone can reduce the volume of air that the lungs breathe in and cause shortness of breath. Children, adolescents and adults who exercise or work outdoors, where ozone concentrations are highest, are at the greatest risk of harm.

Particulate matter, especially fine particulate matter (PM_{2.5}), also contributes to respiratory problems. These tiny particles in the air can get deep into the lungs and can worsen lung disease, cause asthma attacks, chest discomfort, wheezing, unusual fatigue, and shortness of breath.

Research into the health effects of air pollution is ongoing. Medical conditions arising from air pollution can be very expensive. Healthcare costs, lost productivity in the workplace, and human welfare impacts cost billions of dollars each year.

More information

- [Health Effects of Air Pollution – California Air Resources Board](#)
- [Air Now – Your Health](#)
- [Air Pollution and Respiratory Health](#)
- [What you can do to improve air quality in Mecklenburg County](#)

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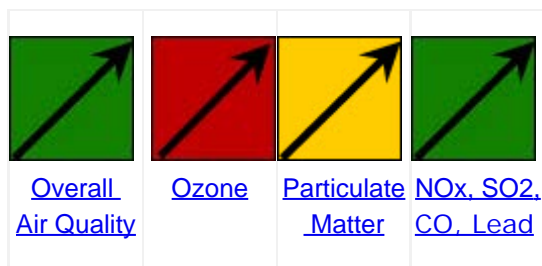
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2014 State of the Environment Report - Air

Mecklenburg County overall ambient air quality continues to improve.

In 2012, the average annual air quality index (AQI) value for Mecklenburg County was 45, which equates to good air quality. From 2002 to 2012, the average annual AQI has progressed from 64 to 45 - an 27.9% improvement over the period. The two primary contributors to the County's AQI value are particulate matter (PM 2.5) and ozone (O3) and the most significant sources of air pollution are mobile sources. Although PM 2.5 contributes to decreased air quality, the County meets national standards. Mecklenburg County achieved compliance with the 1997 ozone standard but O3 levels violate the 2008 national standard of 0.075 ppm.

Air Quality Environmental Indicators



Recommendations

- **Continue to comply with the federally mandated, health based ambient ozone standard.** Locally generated air emissions, particularly on-road and non-road mobile source emissions, need to be reduced. Federal and state regulations will yield the needed reductions over time; however, local action is needed now if attainment of the ozone and annual particulate matter standards are to be ensured. Actions by business, industry, government and individuals relative to reducing per capita vehicle miles traveled, managing energy demand and making "greener" purchasing decisions must be a part of the local solution to improving Mecklenburg County air quality.
- **Develop and implement new initiatives and new funding sources** for regulatory, incentive-based and voluntary programs to reduce the emissions of ozone-forming pollutants from mobile sources. In order to identify and promote programs that will achieve local and regional emission reductions, state legislation is needed to provide dedicated funding to counties for clean air programs targeting mobile sources.
- **Reduce vehicle miles traveled** by promoting transportation-friendly land development and continuing to support all alternative forms of transportation, including mass transit. The most significant sources of air pollution in Mecklenburg County are mobile sources. Many new pollution reduction efforts at the federal, state, and local levels are focused on highway and off road vehicles. Recent estimates indicate that mobile sources account for considerable amounts of ozone precursor emissions: 51% of the volatile organic compound and 87% of the nitrogen oxide emissions in Mecklenburg County.

Commonly Used Acronyms

CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FRN	Federal Register Notice
FTA	Federal Transit Administration
GACT	Generally Available Control Technology
HAP	Hazardous Air Pollutant
HC	Hydrocarbons
HOV	High Occupancy Vehicle
I/M	Inspection and Maintenance Program
ISTEA	Intermodal Surface Transportation and Equity Act
LRP	Long Range Plan
MACT	Maximum Achievable Control Technology
MCAPCO	Mecklenburg County Air Pollution Control Ordinance
MCAQ	Mecklenburg County Air Quality
MOVES	Motor Vehicle Emissions Simulator
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
NH ₃	Ammonia
NO _x	Nitrogen Oxides
O ₃	Ozone
Pb	Lead
PIP	Public Involvement Plan
PM	Particulate Matter
RFP	Rate of Further Progress
ROP	Rate of Progress
RTP	Regional Transportation Plan
SIP	State Implementation Plan
SO _x	Sulfur Oxides
SOV	Single Occupancy Vehicle
STIP	Statewide Transportation Improvements Program
STP	Surface Transportation Program
TCM	Transportation Control Measure
TEA-21	Transportation Equity Act for the 21 st Century
TERM	Transportation Emission Reduction Measure
TIP	Transportation Improvement Program
UPWP	Unified Planning Work Program
US DOT	United States Department of Transportation
USC	United States Code
VMT	Vehicle Miles of Travel
VOC	Volatile Organic Compounds

Resource and acronym look-up tool:

FHWA Planning Glossary http://www.fhwa.dot.gov/planning/glossary/glossary_listing.cfm