Executive Summary

Mecklenburg County is taking this opportunity to reflect on the past 20 years. Since the first State of the Environment Report (SOER) in 1987, we have made significant progress toward addressing environmental issues, and we have identified issues that continue to need work. Technology has also enabled us to identify new environmental issues, as well as creating solutions to address existing ones.

The 2008 SOER reflection is based on the same four goals of the 1987. The hope is that you, the reader, will find this to be a valuable synopsis of environmental issues over the past 20 years. We have stretched ourselves honestly to evaluate both progress and regression from the original 1987 report, and hope that you will join with us to support the findings and recommendations herein as they are the compilation of today's knowledge and yesterday's experience.

In 1987 Mecklenburg County compiled the first State of the Environment Report. The purpose of the 1987 SOER was:

- To describe Mecklenburg County's current environmental status for the public and the Board of County Commissioners,
- To highlight the major environmental issues facing us,
- To recommend direction concerning those issues, and
- To give the County objective measures to evaluate progress toward a clean healthy environment.

Then and Now

The sections (Air, Water, Waste, and Land) of the 2008 SOER begin with a "Then and Now" comparison of environmental data collected in 1987 and in 2007. The chapter articles follow "Then and Now," as each topic has a wealth of clarifying information.

Major Conclusions

1987

Air Quality: Ozone was worsening as carbon monoxide was improving

Waste: Landfill space, demolition waste, illegal dumping, and disposal of infectious waste were all significant concerns. Both hazardous and radioactive wastes were considered in good shape.

Water: Surface water quality in the lakes was considered quite good. Rural streams were classified with good water quality, suburban streams with fair water quality, and urban streams with poor water quality. Groundwater quality was an unknown due to an acknowledged lack of information.

Land Use: Although land use was acknowledged to have a role in environmental conditions, it was classified as an indefinable quality of life factor and was not specifically addressed.

2007

Air Quality: Ambient air quality has improved overall. Ozone concentrations are not as high and days over national standards are not many; however, 20 years later we violate the new national standard, and are designated as non-attainment for ozone. The particulate matter standard is barely being met.

Waste: Mecklenburg County's recycling and waste management infrastructure is among the most comprehensive in the state. There is ample waste disposal capacity to serve the community's needs for the next 20 years, if managed properly.

Water: Lake water quality is showing slight improvement since 1987. Remaining rural and suburban streams are partially supporting their designated use while urban streams are impaired or partially supporting their use. Groundwater data is now available and indicates a dramatic increase in the number of groundwater contamination sites over the last 20 years.

Land Use: Current population has increased more than 81 percent since 1987. Land use decisions in 2007 are beginning to incorporate consideration for the environment as an increase in knowledge has allowed for clearer connection between these two complicated topics. Greenway and natural heritage programs now exist; however, a deficit of parklands exists.

Environmental Assessment Factors - Then and Now

Factor	1987	2007
Population	473,760	857,379
Number of Vehicle Miles Traveled per day	11,000,000	29,950,013
Days Over the Ambient Air Quality Standard:		
Ozone: 8-hour	36	19
Carbon Monoxide	0	0
Particulate Matter	0	4
Violations by permitted air quality sources	87	107
Municipal waste disposal capacity (years)	3	>25
Groundwater Violations	60	1130
Population dependant on groundwater (%)	22	20.5
Lake Water Quality Index Rating (Lake Norman, Mountain Island Lake, and Lake Wylie combined)	75.23 (Good-Excellent)	77.6 (Good-Excellent)
Surface Water Fecal Coliform Index Rating	51.8 (Impaired)	69.5 (Impaired)
Greenways (Number)	0	11
Biologically Important Natural Areas Protected	0	15 (56% of identified areas)

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Emerging Themes

1987

Regionalism: Environment knows no boundaries; therefore, effective environmental protection and preservation should be promoted and encouraged on both regional and local levels.

Funding: Funding is required to continue environmental preservation and enhancement under the pressure of growth.

Education: Everyone supports a clean environment, but very few are educated about the facts; therefore, we have a need for education about our environment issues.

Options/Authority: The County has relatively few tools to react quickly to the changing environment. Mecklenburg County's size and growth results in unique problems apart from the rest of North Carolina; therefore, more local control to create acceptable levels of environmental protection is desired.

2007

Development of this report revealed a clearer understanding of the themes from 20 years ago as well as the addition of two new common themes: Green Development and Relationship Among Disciplines.

Regionalism: Natural resources know no man-made or political boundaries, nor do wildlife. The rivers and creeks found in Mecklenburg County are not solely contained within the County. Air quality issues and their solutions are dependent on the actions of surrounding Counties and states. The need to address environmental issues on a regional basis has been recognized and efforts are being made to address it.

Funding: Pressures of population growth on our natural resources require funding of land preservation and enhancement. User fees and state revenue sources will continue to be the primary mechanisms for ensuring that environmental issues are properly managed.

Education: Public awareness and participation in residential recycling and the protection and restoration of water quality is on the rise. Expansion of educational efforts through school programs and resources that encourage students to be proactive in the protection of the environment should be supported. Continue to raise awareness through volunteer programs, educational presentations, and media campaigns so that residents adopt behaviors that protect our natural resources.

Options/Authority: Mecklenburg County has been granted authority by the state and federal agencies to administer regulations regarding: Air Pollution, Surface Water Pollution Control, Floodplain Development, Groundwater Wells, and Business Recycling. Local control allows for more comprehensive solutions and more rapid reaction to local environmental issues, and should continue to be explored for issues not adequately funded or addressed by state or federal agencies.

Green Development: North Carolina State legislation (SL2007-546) states: "The main objectives of sustainable, energy efficient design are to avoid

resource depletion of energy, water, and raw materials; prevent environmental degradation caused by facilities and infrastructure throughout their life cycle; and create buildings that are livable, comfortable, safe, and productive." The County recognizes that green development should be considered and promoted to reduce waste and increase energy efficiency through informed site selection, design, construction, operation, and maintenance of facilities. The County should be an active participant in encouraging and offering incentives for green development.

Relationship among Disciplines: County staff are continually improving the coordination of environmental programs and activities that affect natural resources. The effect of our energy use on air quality, water quality, waste management and land use typifies the complex nature of identifying and addressing environmental issues. The County should develop actions that identify, communicate, and create solutions sensitive to the relationships between environmental issues.

Mecklenburg County Annual Survey by the Urban Institute at UNC-C

Importance of the Environment

Category and Percent Responding	1991	1993	1995	1997	1999	2001	2003	2005	2007
❶ **Importance of Protecting the Environment**									
Very Important	86.3	82.0	84.0	81.8	86.7	87.3	80.9	77.1	88.2
Some Importance	12.7	16.7	14.7	17.6	12.4	11.5	17.8	21.9	11.0
Not Important	1.0	1.3	1.3	0.6	0.9	1.2	1.3	1.1	0.8
❷ **Believe the environment receives correct amount of attention**									
Too Much Attention	1.7	5.5	3.6	3.6	4.5	3.5	3.5	4.4	3.1
Right Amount of Attention	23.8	31.5	35.1	34.3	33.9	47.7	35.2	33.4	33.0
Not Enough Attention	74.4	63.0	61.3	62.1	61.6	48.8	61.3	62.2	63.9
❸ **Would pay higher taxes to protect the environment**									
Yes	73.0	62.7	64.9	59.1	61.1	40.1	49.4	50.8	52.9
No	27.0	37.3	35.1	32.5	38.9	59.9	50.6	49.2	47.1
❹ **Level of government best for environmental regulations**									
Local	41.2	55.2	43.3	46.9	17.8	56.6	40.1	39.8	50.9
State	16.4	21.5	30.2	26.7	8.5	19.5	26.7	29.4	23.7
Federal	18.4	18.5	23.5	17.5	4.4	15.5	19.4	18.3	16.5
Combination	22.7	4.9	3.1	8.9	69.4*	8.5	13.8	12.5	8.9
Other	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*1999 was the only survey year in which "combination" was offered as a response choice. All other survey years "combination" was volunteered as a choice by the respondents.

Source: UNCC Urban Institute Annual Surveys, October 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, and 2007. Sample size 850. With 98% certainty, responses are within +/- 4% of the responses one would receive from a survey of the entire adult population of Mecklenburg County.

Air Quality 1987 Recommendations/2007 Results

By Don R. Willard, Director
Mecklenburg County Air Quality

The 1987 Mecklenburg County State of the Environment Report listed as its number-one, high-priority issue: "ozone non-attainment affecting the health and economy of Mecklenburg County." Poor air quality affects us all directly as well as the regional economy.

In 2007, it remains a high priority environmental issue. The 1987 report identified a number of air quality issues and recommendations that were grouped into four main areas: National Ambient Air Quality Standards (NAAQS), Air Toxics, Indoor Air Pollution and Solid Waste Incineration. Following is a brief description of each issue from the report, the recommendations and a commentary on the current status of the issues and recommendations.

National Ambient Air Quality Standards (NAAQS)

"There is no doubt that Mecklenburg County is currently facing a serious problem with ozone levels." (SOER 1987)

1987 Recommendations:

- Support the current Vehicle Inspection/Maintenance program.
- Support legislative action to amend the Vehicle Inspection/Maintenance program to include hydrocarbon emissions, which contribute to the ozone problem.
- Expand the Vehicle Inspection/Maintenance program to include non-Mecklenburg County commuter vehicles.
- Plan for roads that will handle increased numbers of vehicles and increased traffic, thereby alleviating congested traffic as a contributor to carbon monoxide and hydrocarbon emissions.
- Improve and expand public transportation to make it more attractive and available to commuters, thereby decreasing air pollution emissions.
- Support a regional approach to improve air quality by promoting stationary and transportation control strategies for the counties surrounding Mecklenburg County which comprise the Metropolitan Statistical Area (MSA) and which influence ozone levels in Mecklenburg County.
- Support control strategies for currently unregulated stationary sources.
- Support additional resources to implement SIP revisions.

2007 Status:

- Mecklenburg County still has a serious problem with ozone and does not comply with national standards.
- Vehicle Inspection/Maintenance (I/M) programs for automobiles have been expanded to 48 counties in NC. I/M programs have not been implemented in SC.
- Roads and public transportation have expanded but it is hard to assess the overall positive impact on air quality given the overall growth of the region, increase in population and vehicle miles traveled since 1987.
- Mecklenburg County and the surrounding counties are all now designated non-attainment for ozone thereby applying the same air pollution control rules and programs to stationary and mobile sources throughout the region. There is no "regional" air quality organization.
- Authority to charge fees as a result of the 1990 Clean Air Act amendments as well as other funding sources has provided additional resources to implement air quality programs.

Air Toxics

The first of three issues identified that will be facing Mecklenburg County in the near future.

"… toxic air pollutants… substances that pose a significant health risk to humans and for which no national standards have been set." (SOER 1987)

1987 Recommendations:

- Coordinate the development, enactment and operation of an air toxics program as part of the Air Quality Section of the Mecklenburg County Department of Environmental Protection.

- Support the employment of qualified personnel to develop modeling programs specific to Mecklenburg County sources. As of 1987, an air toxics coordinator had been hired and a position for an air toxics modeler had been approved.

2007 Status:

- Hazardous and toxic air pollutant based programs (HAPs and TAPs) have been enacted at the federal, state and local levels (HAPS – 188 pollutants, TAPS – 105 pollutants). Neither program sets ambient standards.

- Maximum Available Control Technology (MACT) and Generally Available Control Technology (GACT) are technology based federal programs for new air pollution sources.

- The North Carolina TAP rule ensures that regulated point sources that increase their air emissions do not increase the public's lifetime cancer risk by one in a million.

- Mecklenburg County employs adequate staff to evaluate and permit regulated toxic and hazardous air pollutants from stationary sources.

Indoor Air Pollution

"The second area that is rapidly becoming an issue is that of indoor air quality." (SOER 1987)

1987 Recommendations:

- Continue the clean-up of outdoor air. Unless filtration is employed, indoor air cannot be cleaner than that found in the surrounding atmosphere.

- Accurately define the scope of the problem in Mecklenburg County by a survey of existing structures. We cannot efficiently deal with the problem until the full extent is known.

- Begin extensive public education. Those who are tightening their homes and offices to save on energy costs are employing alternative means of heating and are bringing synthetic substances into their environment. The need to be alerted to the potential problems so that they can correct existing problems and avoid new ones. Increased education will act in concert with increased public awareness to spur proper regulation of the indoor environment.

- Begin monitoring of heating, ventilating and air conditioning systems in public buildings. The inspections could be much the same as present health department inspections of restaurants. The major cause of indoor air problems is poorly maintained heating, ventilating and air conditioning systems that promote the growth of fungi, bacteria and other microorganisms. These present a real and present danger to the public health and must be dealt with strictly.

- Strengthen the present building code and employ the most recent standards of the

Air Quality Retrospective continued on page 14

Air Quality Retrospective continued from page 13

American Society of Heating, Refrigerating and Air Conditioning Engineers. This may not cure existing buildings, but it can ensure that the tremendous building boom will produce buildings that can be used and enjoyed by our citizens. These standards insure that adequate ventilation is present in a building which is the best way to cure poor indoor air quality.

2007 Status:

- Indoor air pollution continues to be an important issue; however environmental regulatory agencies (e.g., USEPA) have addressed this issue mainly through education not regulation. Monitoring HVAC systems and revisions to building codes were not pursued by the local environmental regulatory agency.

- Mold and mildew is the number one complaint in Mecklenburg County.

- Radon, an indoor air pollutant, has been determined through testing not to be a problem in Mecklenburg County.

- The removal of asbestos through the demolition and renovation process continues to flourish in Mecklenburg County but is considered to be adequately regulated.

- The removal of lead based paint is also regulated locally during the permit process.

Solid Waste Incineration

"A third issue soon to demand the attention is that of waste incineration." (SOER 1987)

1987 Recommendations:

- Support enactment of regulations requiring continuous emission monitoring and Best Available Control Technology to control air emissions from all waste incinerators.

- Support a strong, integrated regulatory system to gain community confidence and support for waste incineration.

- Establish appropriate siting restrictions for all future incinerators.

- Develop regulations dealing with transportation of infectious wastes.

- Develop a licensing and inspection system for monitoring of infectious waste haulers.

2007 Status:

- Solid waste incineration has been adequately regulated at the national, state and local level.

- In 2007, one medical waste incinerator operated in Mecklenburg County.

Ambient air quality has improved overall. Ozone concentrations are not as high and days over national standards are not as many. Industrial controls for large industrial sources of air pollution (primarily coal -fired power plants) have been effective. Cars, trucks and construction equipment are less polluting per unit.

The public's awareness of our air quality situation has been heightened. However, 20 years later we still violate the national standard for ozone and barely meet the particulate matter standard. The region's population growth and our reliance on single occupancy vehicles as our primary mode of transportation are the main reasons. Meeting the current ozone standard and then the proposed new lower standard will require more from all of us, if we wish to breathe healthy air year 'round.

Air Quality: Findings and Recommendations 2008

By Don R. Willard, Director, Mecklenburg County Air Quality

Ozone pollution continues to contribute to poor air quality in Mecklenburg County. The current ozone eight hour ozone standard is 0.08 ppm (< 0.085 ppm). 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. Compliance is required by June 15, 2010. The state Implementation Plan (SIP) for ozone for this region submitted to USEPA by the North Carolina Division of Air Quality projects that we will meet the eight hour ozone standard although the margin of error is small. 2007 ozone values make the probability of attainment by 2010 less likely. Moreover, USEPA has proposed to lower the ozone standard farther in 2008.

Particulate matter also contributes to poor air quality in Mecklenburg County. The concentration measurement used to determine compliance with the 24-hour $PM_{2.5}$ standard in 2006 was 32 µg/m^3, just below the 24-hour standard of 35 µg/m^3. The annual compliance value for 2006 was 14.9 µg/m^3. For 2007, particulate matter concentrations continue to measure just under the annual health-based standard of 15.0 µg/m^3 .

Many new pollution reduction efforts at the federal, state, and local levels are focused on highway and off road vehicles. Latest calculated estimates show that mobile sources account for 66 percent of volatile organic compound (VOC) and 92 percent of nitrogen oxide emissions (NO_x) in Mecklenburg County.

The current transportation and land use planning efforts in Mecklenburg County are consistent with nationally recognized strategies to connect transportation, land use and air quality.

Greenhouse gas emissions have become a national and international environmental issue, which is expected to translate into the need for local action in future years.

Reduce locally generated air emissions, particularly mobile source emissions including non-road construction equipment. Federal and state regulations will compel needed reductions over time. Local action is needed now if we want ensure attainment of the ozone standard and the annual particulate matter standard. 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 our local solution to improving our air quality.

Promote land development that reduces vehicle miles of travel and continue to support alternative forms of transportation, including mass transit.

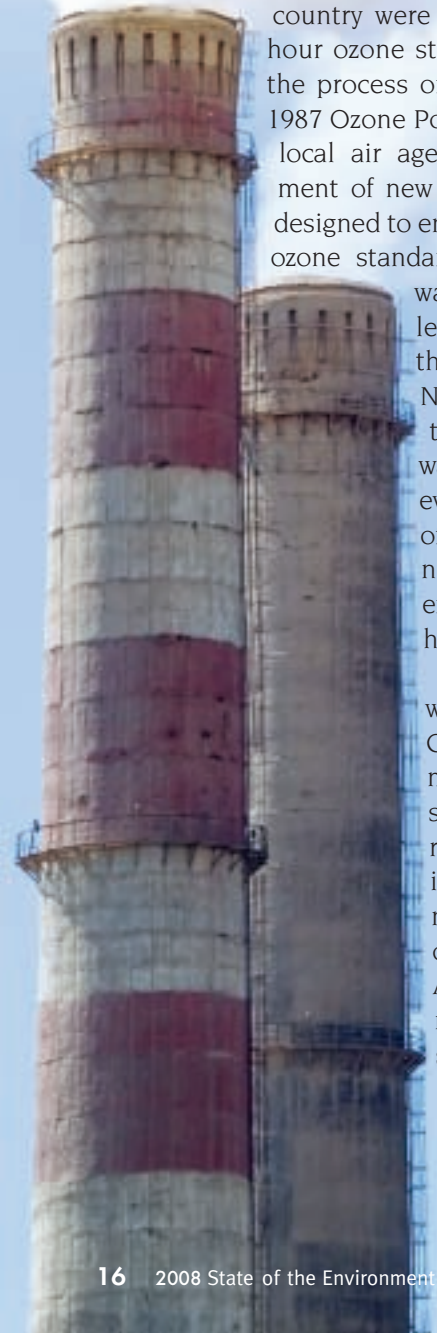
Identify sources and amounts of locally generated greenhouse gases and encourage and promote measures that increase energy efficiency and promote energy conservation thereby reducing greenhouse gas emissions.

State of the Environment Report - 2008
Air Quality Environmental Indicators

	2007	1987
Air Quality Index Designations		
Good (Green)	189	N/A
Moderate (Yellow Days)	157	N/A
Unhealthy for Sensitive Groups (Orange Days)	17	N/A
Unhealthy (Red Days)	1	N/A
Very Unhealthy (Purple Days)	1	N/A
N/A - The color codes were not used to designate air quality at this time.		
Days Over the Ambient Standard		
Ozone: 1-hour	2	7
Ozone: 8-hour	19	36
Carbon Monoxide	0	0
Particulate Matter -Total Suspended (TSP)	N/A	0
Particulate Matter < 10 microns (PM_{10})	0	N/A
Particulate Matter < 2.5 microns ($PM_{2.5}$)	4	N/A
Nitrogen Oxide	0	0
Sulfur Dioxide	0	0
N/A indicates pollutants not monitored at that time.		
Permitted Facilities		
Major	12	91
Minor	212	115
NESHAP/MACT	20	5
Stage I	329	N/A
N/A - not regulated		
Mobile Source Activity		
Registered Vehicles	640,282	376,964
Vehicle Miles Traveled per Day	29,950,013	11,000,000
Mass Transit Daily Ridership	73,102	36,623
Air Quality Violations	107	87
Activity Levels		
Citizen Requests for Service	154	630
NESHAP Notifications ("Asbestos Removals")	575	31
Air Pollution (tons/yr)	**2007**	**1987**
Carbon Monoxide (CO)	207,674	183,738
Volatile Organic Compounds (VOC)	22,064	35,183
Nitrogen Oxides (NO_x)	23,196	23,106
Sulfur Dioxide (SO_2)	1,644	6,973
Particulate Matter Total	1,824	35,077
Particulate Matter (PM_{10})	1,436	N/A
Particulate Matter ($PM_{2.5}$)	942	N/A
N/A indicates pollutants not measured at that time		

Control Initiatives to Reduce Pollution from Industrial Sources: A 20-Year Review

By Sheila Holman, Planning Section Chief
Division of Air Quality
North Carolina Department of Environment and Natural Resources



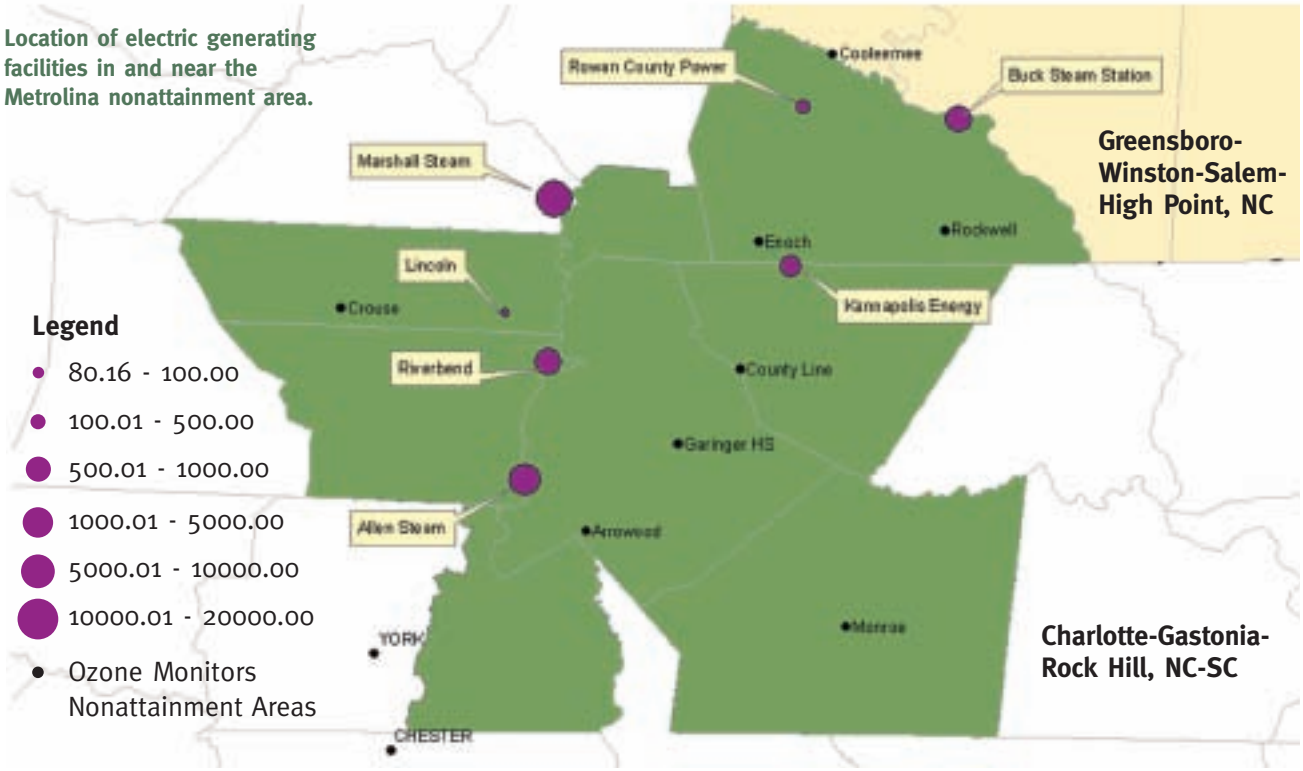
In 1987, ground level ozone was a particular concern for the United States Environmental Protection Agency (USEPA), as well as state and local air agencies. Numerous areas across the country were not meeting the one-hour ozone standard. USEPA was in the process of developing the post-1987 Ozone Policy to guide state and local air agencies in the development of new implementation plans designed to ensure that the one-hour ozone standard was met. Congress was beginning to look at legislative revisions to the Clean Air Act. The National Acid Precipitation Assessment Program was in its seventh year of evaluating the effects of sulfur dioxide and nitrogen oxides on the environment and public health.

Three years later, with the passage of the Clean Air Act Amendments of 1990, the first step in significant reduction requirements in sulfur dioxide and nitrogen oxide would occur with the Title IV Acid Deposition Control requirements. Title IV set goals for Jan. 1, 2000, of reducing annual sulfur dioxide (S02) emissions by 10 million tons and annual nitrogen oxides (NO_x) emissions by 2.0 million tons from 1980 levels. Beginning in the year 2000, total utility $S0_2$ emissions are limited to 8.9 million tons and total industrial $S0_2$ emissions are limited to 5.6 million tons. The focus of the controls was on electric generating units, either utility boilers or large industrial boilers that sold to the grid. The industry could decide how to meet their individual unit allocations — through controls at the unit, or through the purchase of allowances from other sources.

During the implementation of Title IV, some areas continued to struggle with meeting the one-hour ozone standard. There became a general recognition of transport of pollution that was attributed to affecting these areas' ability to meet the standard. In short, a growing community believed that regional controls were necessary to reduce the level of NO_x emissions transported in the eastern United States. In 1995, the Ozone Transport Assessment Group (OTAG) was formed to study this issue. Following the conclusion of OTAG, USEPA then promulgated the NOx State Implementation Plan (SIP) Call in 1998, which required 22 states in the eastern United States, including North Carolina, to reduce NO_x emissions from large utility and industrial boilers during the high ozone season (May 1 through September 30).

In 1997, USEPA issued a new tighter ozone standard, often called the eight-hour ozone standard, as well as a new fine particle standard, or $PM_{2.5}$ standard. North Carolina realized that to achieve both of these standards would require significant controls in and around North Carolina from both the mobile and industrial sectors. In 1999, the North Carolina General Assembly enacted the Clean Air Bill, a series of measures that addressed mobile source emissions, including an expansive

Metrolina Area Utilities Annual NO_x Emissions



vehicle inspection and maintenance program. In 2002, the North Carolina General Assembly enacted the Clean Smokestacks Act, requiring coal-fired power plants to reduce annual NO_x emissions by 78 percent by 2009. These power plants also must reduce annual sulfur dioxide emissions by 49 percent by 2009 and by 74 percent by 2013. The Clean Smokestacks Act reduces NO_x emissions beyond the requirements of the NO_x SIP Call. One of the first state laws of its kind in the nation, this legislation provides a model for other states in controlling multiple air pollutants from older coal-fired power plants. These two sets of legislation form the basis of the state implementation plans for the current eight-hour ozone standard and the fine particle standard, as well as regional haze.

As other state and local agencies struggled with the eight-hour ozone standard and the new fine particle standard, USEPA moved forward with the adoption of the Clean Air Interstate Rule (CAIR). The purpose of the CAIR is to reduce interstate transport of precursors to fine particle and ozone pollution. The CAIR is similar to the North Carolina Clean Smokestacks Act, in that it establishes more requirements on fossil-fuel-fired boiler or combustion turbine. The rule sets annual state caps for NO_x and $S0_2$ in two phases. Like the original Title IV program, the caps can be met through a cap and trade program if a state chooses to participate.

The aggregate effect of these various control programs is improved air quality in North Carolina and throughout the eastern United States. These programs helped the Charlotte area to attain the old one-hour standard and the fine particle standard, and to reduce the levels of the new eight-hour ozone standard. The improvements in air quality would not have been possible without the significant reductions of the industrial sector over the last 20 years. As we look ahead at the next 20 years, the question will be how much further can the industrial sector reduce emissions? Where will state and local air planners look for emission reductions? How will areas attain tighter health based standards, such as the proposed new eight-hour ozone standard, scheduled to be finalized in March 2008? Will the focus shift to the mobile and non-road sectors? Will there be greater reliance on local measures versus state or federal measures? Will there continue to be cleaner technologies introduced for the industrial sector? All of these questions are on the forefront of the air quality planners' minds. The future will require even more teamwork and collaboration by all parties to achieve the health-based standards and provide the clean air that our citizens deserve.

The Clean Air Act: Then and Now

By Joan Liu, P.E., Program Manager
Mecklenburg County Air Quality

The Clean Air Act first was enacted in 1955, with major revisions in 1970, 1977 and 1990. Its purpose is to protect human health and the environment from emissions that pollute ambient, or outdoor, air.

The Clean Air Act Prior to 1990

The 1970 Clean Air Act is the first comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency (EPA) to establish health based National Ambient Air Quality Standards (NAAQS), and defines the air pollution control program we have today. It also sent a compelling message to the nation: "The time has come for us to get serious about protecting the environment."

The goal of the act was to set and achieve NAAQS in every state by 1975. The setting of maximum ambient pollutant levels was coupled with directing the states to develop state implementation plans (SIPs) applicable to appropriate industrial sources in the state. Much of this country's environmental progress can be credited to the changes in attitude signaled by the 1970 Clean Air Act.

When many of the deadlines passed without achieving most NAAQS, the Act was amended in 1977. The 1977 law included a "non-attainment" section, primarily to set new dates, extended five years, for attaining NAAQS. It also incorporated a provision to prevent the significant deterioration of air quality in regions where the air is already cleaner than NAAQS.

1990 Clean Air Act Amendments

In 1990, Congress dramatically revised and expanded the Clean Air Act, providing the EPA with even broader authority to implement and enforce regulations reducing air pollutant emissions. The 1990 Clean Air Act Amendments (90 CAAA) were intended to meet unaddressed or insufficiently addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics. The 90 CAAA also placed an increased emphasis on more cost-effective approaches to reduce air pollution.

This represented a significant departure from the past. The new law was a major milestone in the evolution of environmental protection in the United States. It provided innovative approaches to pollution control, envisioned an unprecedented degree of cooperation between government and the private sector, and promised a renewed national commitment to environmental protection.

1990 was the last amendment to the Clean Air Act, and it is law under which we now operate. It is a flexible, results-oriented law designed with the marketplace in mind to achieve specific and ambitious environmental goals without necessarily damaging the nation's economic health or hampering its growth. It sets specific air quality standards, yet it also allows a great deal of latitude in deciding how to achieve these objectives. Equally important, the law provides real incentives for companies to seek environmental solutions that work best for them, instead of waiting for the EPA, state, and local authorities to impose solutions through government directives. Ultimately, the 1990 Clean Air Act challenges industry to seize the initiative: to take the lead in the business of environmental protection.

The 90 CAAA consists of the nine separate Titles listed in Table 1 on page 15. Each of these Titles is subdivided into Parts, which are further subdivided into Sections.

Table 1. 1990 Clean Air Act Amendment Titles

Title I	Provisions for Attainment and Maintenance of National Ambient Air Quality Standards
Title II	Provisions Relating to Mobile Sources
Title III	Hazardous Air Pollutants
Title IV	Acid Deposition Control
Title V	Stationary Source Operating Permits
Title VI	Stratospheric Ozone and Global Climate Protection
Title VII	Provisions Relating to Enforcement
Title VIII	Miscellaneous Provisions
Title IX	Clean Air Research

The major 90 CAAA changes include provisions to

- classify non-attainment areas according to the extent they exceed the standard, tailoring deadlines, planning, and controls to each area's status;
- tighten emission standards for autos and other mobile source, and require reformulated and alternative fuels in the most polluted areas;
- revise the air toxics section, establishing a new program of technology-based standards for 188 hazardous air pollutants and addressing the problem of sudden, catastrophic releases of toxics;
- establish an acid rain control program, with a marketable allowance scheme to provide flexibility in implementation;
- require a state-run permit program for the operation of major sources of air pollutants;
- phase out most stratospheric ozone-depleting chemicals; and
- update the enforcement provisions including authority for EPA to assess administrative penalties.

Air Quality History in Mecklenburg County

Since 1977, Mecklenburg County has always met the NAAQS for Sulfur Oxides, Nitrogen Dioxide, Lead, Total Suspended Particulates, and inhalable coarse particles (PM_{10}, particles that have aerodynamic diameter less than or equal to 10 µm). Monitoring data indicate improving or stable pollution trends for these pollutants. The compliance status for these pollutants is not expected to deteriorate in the near future.

On March 3, 1978, the EPA designated Mecklenburg County as a non-attainment area for ozone and carbon monoxide. The North Carolina SIP was revised several times to include control measures for stationary sources and transportation measures for traffic improvements. On July 5, 1995, Mecklenburg County officially was designated as an area that met the carbon monoxide and one-hour ozone standards.

On July 17, 1997, EPA announced a new eight-hour ozone and a fine particle ($PM_{2.5}$, particles that have aerodynamic diameter less than or equal to 2.5 µm) NAAQS. On April 15, 2004, Mecklenburg County was designated as a moderate non-attainment area for the eight-hour ozone standard, and is required to comply with the standard by June 15, 2010. On June 15, 2007, the North Carolina SIP was submitted to the EPA, which demonstrated that Mecklenburg County can meet the standard by 2010.

In 1999 Mecklenburg County began monitoring for $PM_{2.5}$. On October 17, 2006, EPA revised the daily $PM_{2.5}$ NAAQS. Up to 2007, the measured monitoring data demonstrated that the County can meet both the 1997 and 2006 daily $PM_{2.5}$ standards, but continue to hover near the annual standard. By implementing all promulgated control measures required by the 90 CAAA, the modeling results conducted by the State of North Carolina's Division of Air Quality indicate that Mecklenburg County can meet the $PM_{2.5}$ annual standard in 2009 and 2018.

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 (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), lead (Pb), and sulfur dioxide (SO_2). 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-PM_{10}, 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

Air Quality continued on page 22

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 - $PM_{2.5}$
Montclaire	Particulate Matter - $PM_{2.5}$
Oakdale	Particulate Matter - $PM_{2.5}$

Air Quality continued from page 21

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.

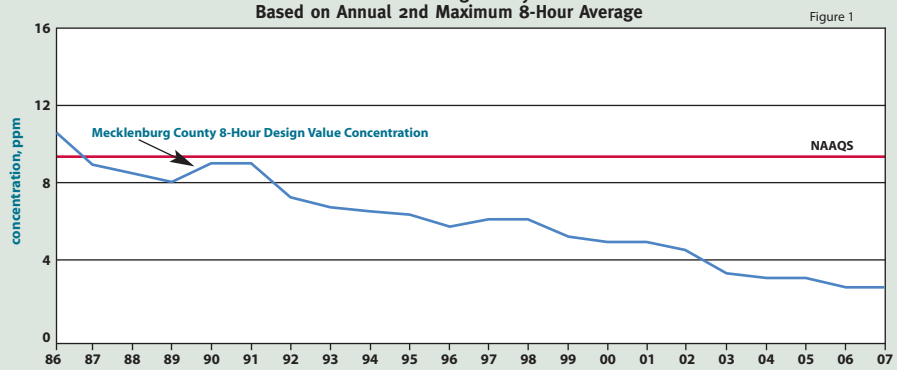
Mecklenburg County was designated as an ozone non-attainment area in March 1978. Mecklenburg County averaged four days per year from 1981 - 1987 exceeding the (then current) one-hour ozone NAAQS. 1988 monitoring data seemed to verify the 1987 SOER predictions, when 14 days were measured above the one-hour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

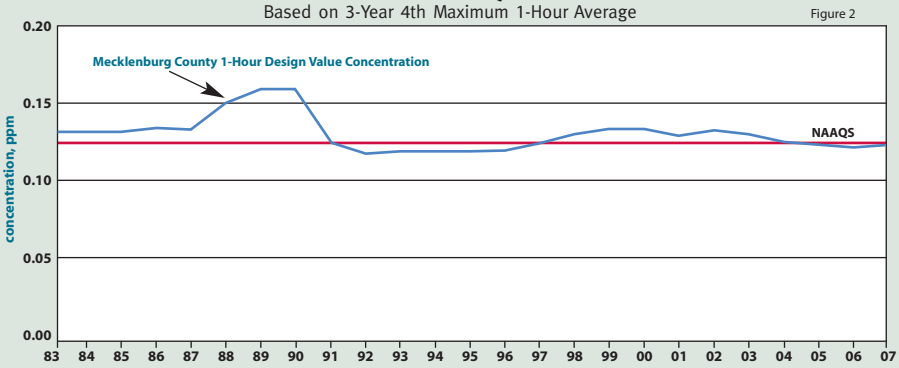
CO Air Quality, 1986-2007
Mecklenburg County
Based on Annual 2nd Maximum 8-Hour Average

Figure 1



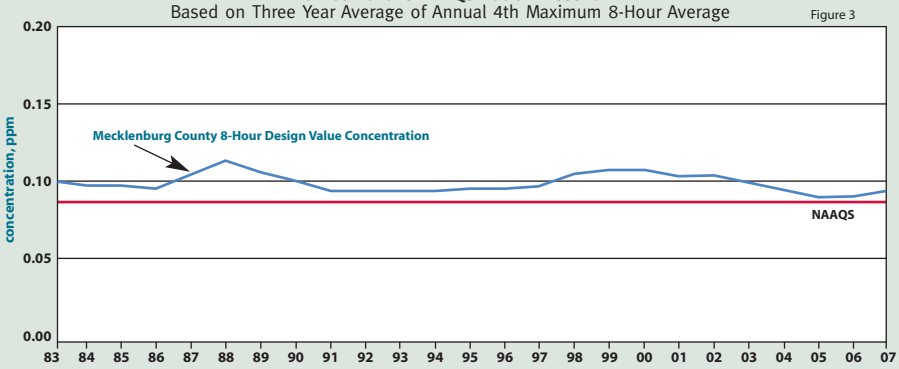
Ozone Air Quality, 1983-2007
Mecklenburg County 1-Hour Design Value Concentration
1-Hour Ozone NAAQS 1979
Based on 3-Year 4th Maximum 1-Hour Average

Figure 2



Ozone Air Quality, 1983-2007
Mecklenburg County 8-Hour Design Value Concentration
8-Hour Ozone NAAQS 1998 - Present
Based on Three Year Average of Annual 4th Maximum 8-Hour Average

Figure 3



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.

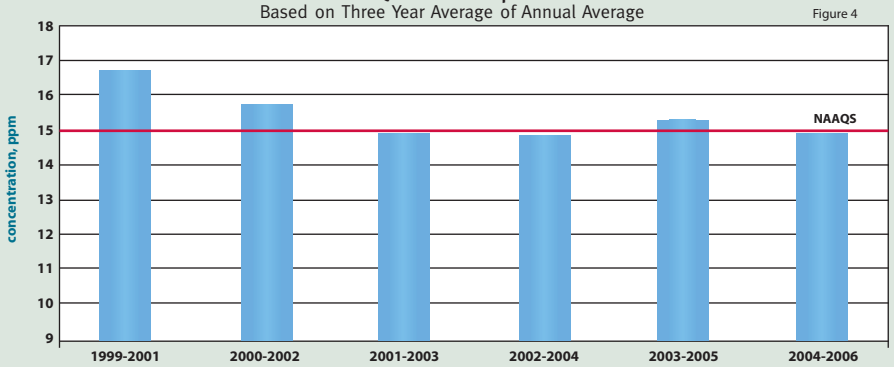
Fine particulate matter or $PM_{2.5}$ is the particle pollutant that is of the most concern in Mecklenburg County. In 1997, EPA issued two standards for $PM_{2.5}$. One standard was a short-term 24-hour standard (65 µg/m³) and the other was a long-term annual standard (15.0 µg/m³). The 24-hour standard was revised to a more protective level of 35 µg/m³ in 2006. The annual standard was retained at 15.0 µg/m³.

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 µg/m³. Annual NAAQS compliance values are very close to the $PM_{2.5}$ annual NAAQS of 15.0 µg/m³.

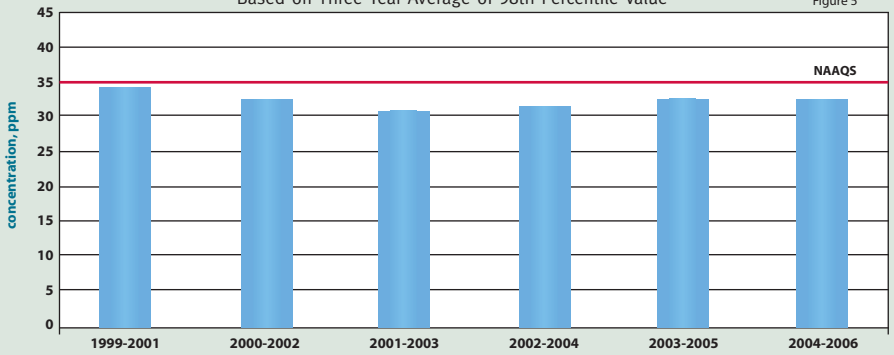
PM2.5 Air Quality, 1999-2007
Mecklenburg County
NAAQS Annual Comparison
Based on Three Year Average of Annual Average

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 µg/m³, just below the 24-hour standard of 35 µg/m³. 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.

Standard Setting and Attainment of the National Ambient Air Quality Standards

By Brian Palm and Shannan Wheat, Air Quality Specialists
Mecklenburg County Air Quality

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) is responsible for setting air quality standards (how much air pollution is unhealthy for people to breathe) and requiring and approving plans to meet the standards. The National Ambient Air Quality Standard (NAAQS) is an officially determined limit of a specific outdoor air pollutant. Each standard is established as a precise concentration of a particular pollutant measured over a specified time. These standards only apply to ambient or outdoor air. The State Implementation Plan (SIP) is the state submitted and EPA approved plan to attain the standards.

The CAA establishes two types of national air quality standards. The primary standards set limits to protect public health, including the health of "sensitive" populations such as those with respiratory problems, children, and the elderly, with an "adequate margin of safety." The secondary standards set limits to protect public welfare, such as crops, vegetation, wildlife, buildings, and national monuments. The NAAQS are goals for clean air for every jurisdiction in the nation.

The original NAAQS were set in 1971, as required by the CAA amendments of 1970 for particulate matter (PM), photochemical oxidants (later to become ozone), carbon monoxide (CO), sulfur oxides (measured as SO_2), nitrogen oxides (NO_x)(measured as NO_2), and hydrocarbons (which was revoked in 1983). An initial review of lead (Pb) was started in 1975, and lead standards first were set in 1978.

The CAA requires EPA to review and, if necessary, modify the NAAQS for criteria pollutants every five years. This review includes a thorough assessment of the latest scientific and medical knowledge upon which the standards are based and the standards themselves.

The 1970 CAA set forth a method for attaining or maintaining these standards uniformly across the nation. To accomplish this, the 1970 CAA required each state to submit a SIP by January 1972 detailing how each NAAQS would be attained and subsequently maintained. Each plan was to include emissions limitations and control strategies for emission sources. An area is designated "attainment" or "non-attainment" for each pollutant according to whether or not it meets the national standard. Over the years, Mecklenburg County has met the NAAQS for CO, SO_2, NO_2, total suspended particulates (TSP), coarse particulates (PM-10), fine particulates (PM-2.5), and Lead. We currently are designated "non-attainment" for O_3, and have the special attainment designation of being a "maintenance area" for CO.

Ozone

Ozone is Mecklenburg's long-term problem pollutant caused by NO_x and volatile organic compound (VOC) emissions from industries, cars, trucks, and construction equipment. Initially published in 1971 as photochemical oxidants, the one-hour standard was set at 0.08 parts per million (ppm) measured as ozone. Then in 1979, the NAAQS for photochemical oxidants was revised and expressed specifically as ground level ozone (O_3) at 0.12 ppm measured over one hour.

The 1990 Clean Air Act Amendment (1990 CAAA) contained several new provisions to bring non-attainment areas into attainment. Each area has a design value for each pollutant. For ozone non-attainment areas, there are six classifications and attainment deadlines (time allowed to achieve standard in years): marginal (3), moderate (6), serious (9), severe (15), more severe (17) and extreme (20), depending on the design value established for a particular area.

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As a result of the 1990 CAAA, Mecklenburg and Gaston counties were designated as a moderate one-hour ozone non-attainment area. During the period from 1990 through 1993, the non-attainment area had ambient monitoring data that showed no violations of the ozone NAAQS; therefore, the State of North Carolina submitted an ozone maintenance plan and requested re-designation of the area to attainment with respect to the one-hour ozone NAAQS. EPA approved the re-designation request on July 5, 1995.

Studies found that O_3 exposure becomes increasingly significant over longer averaging times, suggesting the need for a change from the original one-hour standard. In July 1997, EPA promulgated new standards, an eight-hour averaged ozone standard, and daily- and annually-averaged $PM_{2.5}$ standards. The new ozone standard is 0.08 ppm averaged over an eight-hour period (because of rounding technique, this standard is effectively 0.084 ppm). With the passage of the new standard, EPA revoked the old one-hour ozone standard in many areas that met the old standard, including Mecklenburg County.

On April 15, 2004, Mecklenburg County and seven surrounding counties (southern Iredell, Rowan, Cabarrus, Union, Gaston, Lincoln, and part of York County, SC) were designated as a moderate non-attainment area for the eight-hour ozone standard. The region, identified by the North Carolina Division of Air Quality (NCDAQ) as "Metrolina," now is required to meet the national ozone standard by June 15, 2010,(i.e., the end of 2009 ozone season). Mecklenburg County's long-term ambient data show that it never has been able to meet the eight-hour ozone standard. As a result of the ozone non-attainment designation, NCDAQ submitted a SIP to USEPA in June 2007 that demonstrates this region can meet the standard by 2010.

The Metrolina region is a "NO_x limited" area. This means that the area needs to control NO_x emissions to reduce ozone formation effectively. The major sources of NO_x emissions in the region come from mobile sources and electric generating facilities. Reduction of emissions from these two source sectors significantly can influence the ozone formation in this region. The SIP for the Metrolina region includes the following control measures:

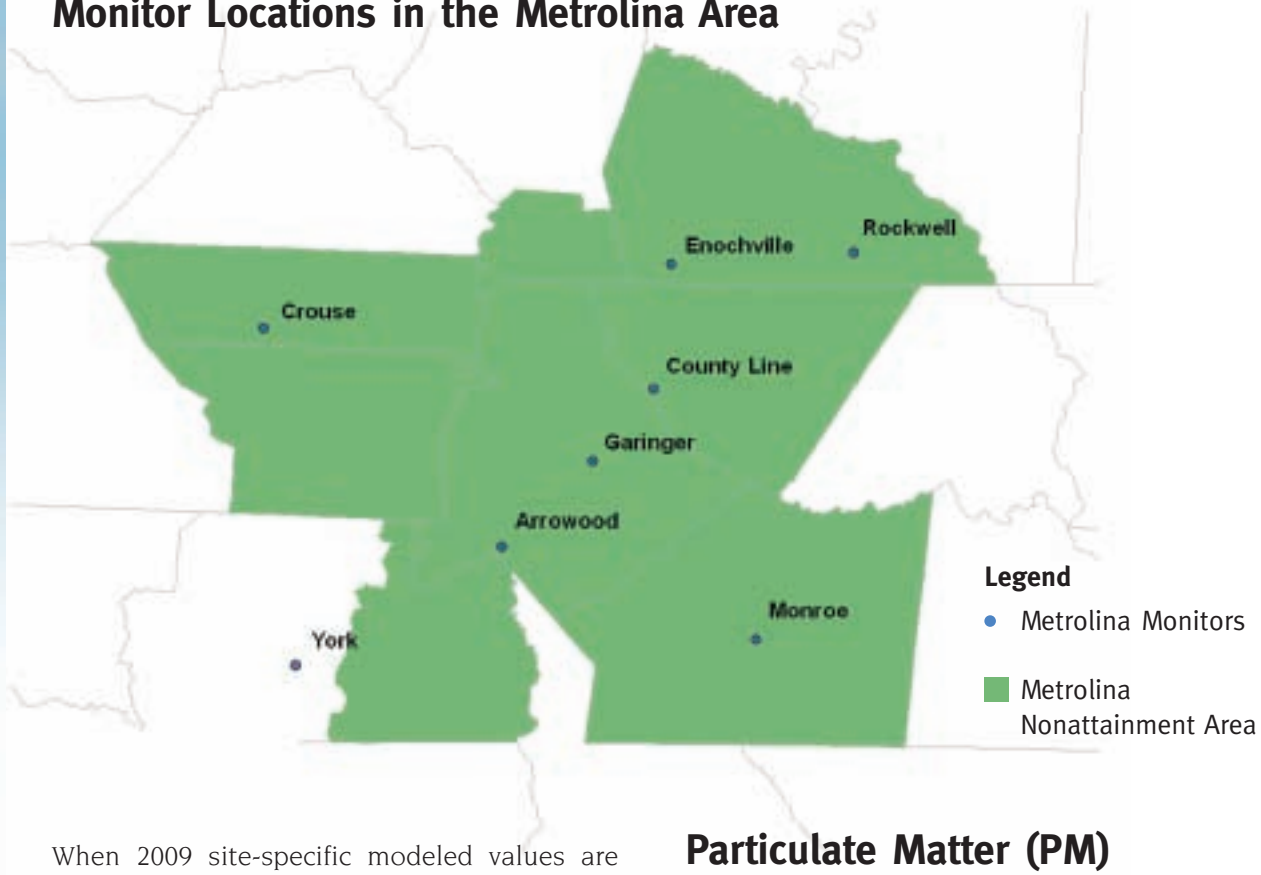
- 15% VOC Reasonable Further Progress (RFP) Plan;
- VOC and NOx Reasonably Available Control Technology (RACT);
- Reasonably Available Control Measures (RACM);
- Motor Vehicle Inspection and Maintenance programs (I/M);
- Federal Emission Standards for highway vehicles and non-road equipment;
- Fuel Standards; and
- Industrial NO_x emission reductions required by federal and state control initiatives such as the NO_x SIP call, Clean Air Interstate Rule, and NC Clean Smokestacks Act.

In the 2007 SIP, 2002 was used as the base year for emissions inventory, monitoring, and meteorological data. One of the SIP requirements is a modeling attainment demonstration. The new modeling attainment test uses a combination of real ambient air quality data with relative changes in ozone in the air quality modeling. The Metrolina 2009 expected ozone levels are listed in the following table with the monitored 2007 design value.

Modeled Ozone Compliance Values - Metrolina NC

Monitoring Sites	Current Design Value 2005-2007	Modeled Design Value 2009
County Line	0.093	0.085
Enochville	0.091	0.084
Rockwell	0.089	0.083
Garinger (Plaza)	0.090	0.084
Crouse	0.083	0.078
Arrowood	0.083	0.075
Monroe	0.081	0.076
York, SC	0.079	0.071

Monitor Locations in the Metrolina Area



When 2009 site-specific modeled values are between 0.082 and 0.087 part per million (ppm), a "weight of evidence" analysis is required as part of the SIP submittal. A weight of evidence analysis is a supplement to the modeled attainment demonstration and further supports that the area will attain the NAAQS for eight-hour ozone by June 15, 2010. As part of the weight of evidence analysis, the NCDAQ proposes an alternative method to calculate the base design value, evaluates the modeling metric, reviews other air quality modeling results, and lists further control strategies that are not included in the modeling.

NCDAQ believes that the modeling attainment demonstration, in conjunction with the weight of evidence analyses, provides the necessary evidence that the Metrolina area will attain the ozone NAAQS by the prescribed attainment date.

On June 20, 2007 the EPA proposed revisions to the eight-hour O_3 NAAQS. These changes are based on current scientific studies which reveal that the current eight-hour O_3 standard is not adequate to protect public health. The EPA has proposed that the new standard be set within the range of 0.070 ppm, 0.075 ppm and 0.080 ppm. A 90-day public comment period ended in September 2007, and the final rule was expected in March 2008.

Particulate Matter (PM)

Mecklenburg currently measures PM-2.5 levels near the annual standard, and it continues to be a pollutant of concern. Since the inception of the particulate matter NAAQS, there have been many changes. One significant change has been the classification of the PM standards. The term PM consists of both solid particles and liquid droplets (also known as "condensables" or "mists") found in the air. Many manmade and natural sources emit PM directly, or discharge other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a broad range of sizes.

The original 1971 NAAQS established limits for PM as TSP. These standards addressed all particulate matter regardless of its size. EPA acknowledged, after the TSP standards were established, that larger particles were not as significant a health risk as smaller particles, and smaller particles were more responsible for human health effects. This is because smaller particles have a greater ability to penetrate into the upper respiratory system and lungs while the larger particles settle to the ground quickly and can be filtered and expelled by the body when inhaled.

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EPA began to evaluate the TSP standards in October 1979. After an extensive review, EPA announced a considerable modification to the original standard on July 1, 1987. With these revised standards, EPA changed the indicator for particles from TSP to PM-10, which focused on particles with an aerodynamic diameter less than or equal to 10 micrometers (µm). PM-10, referred to as inhalable coarse particles, pose a health concern because they can accumulate in the respiratory system

In 1997, EPA announced a new NAAQS for PM which retained the PM-10 standard and introduced an additional PM-2.5 standard. Particles with aerodynamic diameter less than 2.5 µm are referred to as "fine" particles, and are believed to pose the largest health risks. Because of their small size (less than one-seventh the average width of a human hair), fine particles can be inhaled deeply into the lungs.

In September 2006, the agency revised the 1997 PM standards. The 2006 revisions addressed both PM-2.5 and PM10. The 24-hour PM-2.5 standard was tightened from 65 micrograms per cubic meter (µg/m^3) to 35 µg/m^3, and the annual PM-10 standard was revoked due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution. Both the annual PM-2.5 standard of 15.0 µg/m^3 and the 24-hour PM-10 standard of 150 µg/m^3 were retained.

The speciation of PM-2.5 monitoring data indicates that sulfate, the condensate of SO_2, is one major contributor to PM-2.5 formation. Controlling SO_2 emission sources in this region may reduce PM-2.5 concentrations in the County. A regional model performed by a consortium of southeastern state air regulatory agencies (Association for Southeastern Integrated Planning) projects that Mecklenburg County will meet the current standards by 2009.

Carbon Monoxide, Sulfur Oxides, Nitrogen Oxides and Lead

In March 1978, the USEPA designated Mecklenburg County as a non-attainment area for ozone and carbon monoxide. The North Carolina SIP was revised in 1979 to address Mecklenburg County as a non-attainment area. It included more stringent regulations of the larger stationary sources of VOC, which also are known as hydrocarbons or solvents, and the transportation control measures for traffic improvements.

The 1977 Clean Air Act Amendment (1977 CAAA) required achievement of NAAQS by December 1982. Mecklenburg County was granted a five-year extension for carbon monoxide when the revised plan demonstrated that attainment was not possible by 1982, despite the implementation of all reasonably available stationary and transportation control measures.

Faced with the possibility of a construction ban and the withholding of federal transportation funds, an inspection/maintenance (I/M) program for the control of carbon monoxide emissions from automobiles was instituted in Mecklenburg County on December 1, 1982. The County has complied with the CO NAAQS since 1986, and officially was designated as a carbon monoxide attainment area on July 5, 1995.

Although retained through a number of NAAQS reviews, EPA initiated another review of the sulfur oxides standards in May 2006. The proposed rule is due July 2009 and the final rule will be by March 2010.

On April 30, 1971, the EPA promulgated identical primary and secondary NAAQS for NO_x measured as nitrogen dioxide (NO_2) of 0.053 ppm (100µg/m^3) averaged over one year. The primary and secondary NO_2 standards were reviewed several times, most recently in 2007, and the EPA decided that the existing standards adequately protected against adverse health and welfare effects. The original 1971 NO2 standards remain unchanged to this day.

On November 1, 2007, EPA released recommendations to strengthen the existing Pb standards to be further protective of public health. The recommendations suggested EPA to lower the current primary standard of 1.5 µg/m^3 to a range of 0.1-0.2 µg/m^3 (levels that currently are seen in many urban areas across the US), and 0.02-0.05 µg/m^3 (the lowest levels assessed). The current schedule calls for the EPA to propose actions no later than May 2008, and to take final action by September 2008.

Air Quality Title V Operating Permit Program: Local Authority

By Donna Cavaliere, P.E., Sr. Air Quality Specialist
Mecklenburg County Air Quality

Known as the Operating Permit Program, Title V was enacted on November 15, 1990 as part of the 1990 amendments to the Clean Air Act (CAA). The goal of the Operating Permit Program was to ensure compliance, and more thorough air pollution control, by consolidating all air pollution requirements into a comprehensive permit that details all aspects of a source's yearly air emission activities. Modeled after the National Pollution Discharge Elimination System (NPDES) Permit required by the Clean Water Act (CWA), the Title V permit program required states to develop and implement the program and the Environmental Protection Agency (EPA) to provide assistance to states and local governments in developing and implementing these programs. Title V permits are required for major sources of regulated pollutants. A major source is defined as any stationary source or group of stationary sources located within a contiguous area under common control that emits or has the potential to emit greater than 100 tons per year of any criteria pollutant, 10 tons per year of any individual hazardous air pollutant (HAP), or 25 tons per year of any combination of HAPs.

On February 23, 1994, Mecklenburg County Air Quality submitted its revised and final Title V Operating Permit Program Plan to the EPA. The plan included a copy of the Title V regulations adopted by the Mecklenburg County board of County Commissioners on January 18, 1994, which became effective February 1, 1994 (a.k.a. MCAPCO).

In 1996 and early 1997, there were 16 identified Title V-applicable facilities. Fifteen initial Title V permits eventually were issued. Since that time, several facilities have dropped out of the Title V program by either accepting limits to become classified as "Synthetic Minor" facilities, or by the closing of the facility. In addition there has been one facility that was reclassified from Synthetic Minor to Title V after an increase in production made it impossible to meet their Synthetic Minor limits. At the time of this writing, there are 12 facilities classified as Title V in Mecklenburg County.

The Title V program also required state and local air agencies to collect fees from the air quality permit holders to support operation of the respective permit programs. As such, the Title V program was designed to be completely self sufficient, relying on these fees to offset program expenditures.

Mecklenburg County is also required to notify affected states, those in the surrounding areas, of pending permits, and provide time for review of the proposed permit if requested.

Section 507 of the CAA requires states to establish a small business stationary source technical and environmental compliance assistance program. Mecklenburg County went one step further and established an assistance program at the local level. We now enjoy a working relationship with the University of North Carolina at Charlotte's (UNCC) Environmental Assistance Office (EAO) for Small Business. Over the past 10 years, the EAO has held successful pollution prevention workshops, and provided one-on-one assistance to nearly 300 industry and business representatives in the manufacturing and service sectors.

Since 1996 when the first Title V permit applications began arriving, Mecklenburg County Air Quality has been able to write more comprehensive permits for major facilities, and provide better enforcement based on enhanced monitoring and reporting requirements, while still providing more permitting flexibility for the facilities. Results from an EPA audit conducted on our program on September 12, 13, and 16, 2005 indicate that the Mecklenburg County Title V Permitting Program is "operating at a high level of proficiency."

Mobile Sources: Then and Now 1987-2007

By Dana Etherton, Air Quality Specialist
Mecklenburg County Air Quality

Over the past 20 years, there has been significant effort devoted to cleaning up mobile sources of air pollution. Mobile sources are categorized as either on-road (cars, trucks, and buses) or off-road (bulldozers, forklifts, lawnmowers, etc). Thanks to increasingly stringent engine and fuel standards, pollution from these sources is decreasing; how-ever, there are several factors that threaten to negate the progress that has been made.

EPA Gets the Lead Out

The past two decades have seen one of the greatest air quality success stories. In 1973, the United States Environmental Protection Agency (EPA) slowly began to phase out lead from gasoline used in passenger cars and light duty trucks. The change to unleaded gasoline was complete by 1996. This single action reduced ambient concentrations of lead from hazardous levels to the point where they are so low that we no longer need to monitor this pollutant.

NC Makes Changes to the Vehicle Inspection and Maintenance Program

Mecklenburg County has had an inspection and maintenance (I/M) program for passenger cars since the early 1980s. Historically, this consisted of a technician directly measuring the gases coming from a vehicle's tailpipe. Beginning in 1996, all light-duty vehicles were required to be equipped with On-Board Diagnostic (OBD) systems. These computer systems constantly check all components of a vehicle's exhaust and emission control system (engine, catalytic converter, oxygen sensor, gas cap, etc.) to verify that they are working within the manufacturer's specifications. If something is not right, the vehicle's check engine light will alert the driver of a potential problem. Because of this change, the tailpipe test was discontinued in Mecklenburg County on January 1, 2006. When a vehicle now is inspected, the technician connects the car to a computer to verify that all systems are functioning normally. This change in the I/M program will ensure that all inspected vehicles are operating efficiently and that necessary repairs are made.

Federal Engine Standards Help Reduce Ozone-Forming Pollution

EPA has adopted two sets of engine standards for manufacturers of cars and light duty trucks. Tier 1 standards were phased-in between 1994 and 1997, and were followed up with Tier 2 standards between 2004 and 2009. These standards primarily address nitrogen oxide (NO_x) pollution, which is the main ingredient of Mecklenburg County's ground level ozone problem. NO_x emissions will decrease from 1 gram per mile before 1994 to an average of 0.07 grams per mile after 2009 for most light duty vehicles, a 93-percent improvement. In 2005, EPA also limited the amount of sulfur in gasoline to 30 ppm (formerly 300 ppm). Sulfur in gasoline decreases the effectiveness of the catalytic converters that were required on passenger cars since the mid 1970s. Catalytic converters, through a combination of heat and chemical reactions, reduce the emissions of carbon monoxide, volatile organic compounds, and NO_x. By lowering the amount of sulfur in gas, in-use vehicles automatically will become cleaner.

Finally, EPA has set more stringent standards for on-road heavy duty diesel trucks as well. Sulfur in on-road diesel fuel was reduced from 500 ppm to 15 ppm by October 2006. This allowed engine manufactures to use more advanced emission control devices to meet 2007 standards, and even more stringent standards are scheduled to take effect in

2010. By 2010, diesel engines will be more than 90 percent cleaner than they were in the 1990s.

Despite these gains in emission control technology, certain social factors are threatening to cause an increase in total pollution coming from on-road mobile sources. The population of Mecklenburg County almost has doubled between 1987 and 2007. In addition to the growing population, it has become popular for the average family to have two or three vehicles. Finally, as the population grows, people are moving farther away from the center of the city, increasing the average distance that each person drives in a day. These factors all contributed to an increase in the total number of vehicle miles traveled per day from 11 million in 1987 to almost 30 million in 2006.

Federal Standards for Off Road Equipment Take Effect

Regulation of non-road vehicles and equipment only began within the last 10 years. Federal Tier 1 engine standards for non-road diesel engines were introduced for larger engines (175 horsepower and larger) in 1996, and were in place for all engine sizes by 2000. Tier 2 standards were phased-in between 2001 and 2007. In 2006, sulfur in most non-road diesel fuel was limited to 500 ppm (formerly 3000 ppm), and further will be capped at 15 ppm between 2010 and 2012. Removing the sulfur from non-road diesel fuel will pave the way for advanced emission control technologies that will be necessary to meet the Tier 3 and Tier 4 engine standards starting between 2006 and 2011. These new standards will reduce pollution from these non-road engines approximately 97 percent.

EPA also has begun to address emissions from small non-road gasoline engines like those found in lawnmowers and weed eaters. The first emission standards were set for these engines in 1997. Another rule was proposed in 2007 to further limit pollution from this sector starting in 2011. The proposed standards will reduce exhaust emissions by 35 percent.

As with the on-road mobile sources, there are obstacles to achieving the anticipated emission reductions from new off-road engine standards. Diesel engines are popular because they are very durable and last a long time, sometimes more than 30 years. The engines manufactured in the early 1990s, before the new regulations began to take effect, possibly could be in use into the 2020s. Because new off-road equipment is very expensive (hundreds of thousands of dollars in many cases), very few companies voluntarily will upgrade their equipment to get the new, cleaner engines into service.

There has been significant progress made by efforts to control emissions from new on-road and off-road mobile sources; however, the maximum benefits of these new regulations will not be seen until considerable fleet turnover has occurred, and old engines are no longer in service.

Reducing TAPs and VOCs at Gasoline Dispensing Facilities

By Dan Hardin, Air Quality Specialist
Mecklenburg County Air Quality

In many ways, controlling toxic air pollutants (TAPs) and volatile organic compounds (VOCs) being emitted from gasoline dispensing facilities ("facilities") is a lot like trying to eat an elephant. An enormous challenge awaits, and the only way to address it figuratively is to take one bite at a time.

Between 1987 and 1992, the facilities in Mecklenburg County did not have any air pollution control equipment controlling TAP or VOC emissions from the underground storage tanks (USTs) at a gasoline dispensing facility; however, with the arrival of Stage I vapor recovery in 1993, it all began to change for the better.

Stage I

In 1990, Congress passed a law known as the Clean Air Act Amendments (CAAA). Title III of the 1990 CAAA established technology based requirements for 188 toxic air pollutants. In 1990, the State of North Carolina also implemented a health-based air toxics program. Gasoline dispensing facilities emit several toxic air pollutants such as benzene, toluene, and xylene. After a series of meetings between government regulators and industry associations, a difficult decision was made as to how to regulate the facilities.

Effective in 1993, any facility that sold more than 50,000 gallons of gasoline in a calendar year was required to be equipped with a new "closed loop" vapor balance system, known as Stage I. It consisted of piping and valves interconnecting USTs and vapor tight tanker trucks, which captured toxic vapor at a 95-percent efficiency when they were displaced from USTs receiving gasoline products. The vapors captured in the emptied tanker trucks were transported to a bulk gasoline terminal. When the tanker truck is loaded with another batch of product, the displaced vapors are controlled by either a vapor recovery or combustion unit at that terminal. At this time, there are more than 300 permitted Stage I gasoline stations in Mecklenburg County.

Stage II and ORVR

Since the 1990 CAAA designated Mecklenburg County as a moderate non-attainment area for ozone, it was required to take actions to reduce VOC emissions including a new control measure called Stage II vapor recovery (Stage II). Piping and valves are placed on both the UST and the gasoline dispenser to capture 95 percent of the vapors that otherwise would have escaped unscathed to the atmosphere during a passenger vehicle refueling event. The VOCs and toxics in the vapors are returned to the UST for containment.

Ozone monitoring data between calendar years 1990 and 1993 indicated Mecklenburg County was in compliance with the one-hour ozone standard and, active Stage II would not have to be implemented at the facilities as a VOC control; however, addressing the toxics emissions (such as benzene, hexane, toluene, and xylene) was a horse of a different color. Stage II already had proven to be very effective at capturing vapors from facilities elsewhere in the United States where their VOC and toxic problems were much worse than those occurring in Mecklenburg County.

Effective June 30, 1994, any facilities dispensing greater than 10,000 gallons of gasoline in a calendar month were required to install Stage II vapor recovery piping when installing, replacing, removing, or repairing a UST. The Mecklenburg County Air Pollution Control Ordinance (MCAPCO) exempts these same facilities from Local air toxic regulation applicability because of this requirement. To date, approximately half of the permitted Stage I facilities now are equipped with inactive Stage II piping.

The 1990 CAAA also required new passenger cars to capture refueling emissions. On April 6, 1994, the US Environmental Protection Agency published a final rule requiring the control of vehicle refueling emissions through the use of Onboard Refueling Vapor Recovery (ORVR) vehicle-based systems. The requirement was

implemented in phases. Simply put, ORVR is like an operable Stage II vapor recovery system, only it is part of the vehicle's emission control system, not a part of the UST. During vehicle refueling events, 95 percent of the VOCs emitted are captured, placed in a special charcoal canister, and sent to the engine to be consumed as fuel. Beginning in 1998, ORVR was placed on 40 percent of the new cars with 80 percent placed on the new cars in 1999. By 2000, 100 percent of the new cars produced were similarly quipped. By 2006, all new trucks to an 8,500 pound gross vehicle weight rating also had an ORVR in place as standard equipment.

The federal regulation allows an area to remove Stage II vapor recovery systems when the percentage of the vehicle fleet equipped with ORVR equals or exceeds 90 percent. Due to the fleet turn over rate, many areas of the United States soon may be able to remove Stage II from service. Effective March 1, 2007, MCAPCO no longer required Stage II vapor recovery piping to be installed in Mecklenburg County.

Preventing the Accidental Release of Hazardous Materials to the Air

By Chuck Greco, Air Quality Supervisor
Mecklenburg County Air Quality

Public awareness of the potential danger from accidental releases of hazardous chemicals has increased over the years as serious chemical accidents have occurred around the world. After the 1984 chemical tragedy in Bhopal, India, the U.S. Environmental Protection Agency (EPA) began programs to improve emergency planning at the local level. In 1986, Congress adopted many aspects of these programs as the Emergency Planning and Community Right-to-Know Act (EPCRA). As its title indicates, EPRCA focuses on understanding hazards and planning for emergencies to ensure that when an accidental release occurs, the local responders, such as the fire department, will be able to take quick, effective actions to protect public health and the environment.

The EPA recognized, however, that for hazardous gases — and liquids that rapidly become gases when released — emergency response was not enough. These hazardous substances move quickly into the community when an accident occurs; emergency response actions can limit the release, but may not be sufficient to protect public health. For these materials, the focus shall be on accident prevention as well as emergency response.

In 1986, the EPA began working with industry to identify ways to improve safety practices. In 1990, Congress formalized this program by including prevention requirements in its amendments to the Clean Air Act to address the dangers of hazardous chemicals released to the air. (These prevention requirements can be found in section 112(r) of the Clean Air Act; therefore, the program is referred to as the 112(r) program.) EPA set regulations implementing the 112(r) program in 1996 called the Chemical Accident Prevention rule, but probably is best known as the Risk Management Plan (RMP) rule.

In the rule, the EPA identified 77 toxic and 63 flammable materials of concern, and established threshold quantities for each chemical. The rule, which is built on existing industry codes and standards, requires companies of all sizes that use or store greater than a threshold quantity of any one of those chemicals, to develop an RMP.

A facility's RMP is submitted directly to the EPA according to the required schedules. Each facility is required to review, update, and resubmit its RMP at least every five years. Since the original 1999 submissions, some facilities have eliminated use of the material that made them subject to the rule, for example the Charlotte-Mecklenburg Utility Department waste water treatment plants have stopped using chlorine in favor of ultraviolet light for disinfection. Facilities also have been added to the program due to changes to a process or material usage.

In March 2003, Mecklenburg County Air Quality (MCAQ) was granted authority to administer the RMP program within Mecklenburg County. At this time, there are 22 facilities with active RMPs in the County. These include a wide range of processes

and materials, from chlorine for water treatment plants and ammonia for refrigeration systems at large regional distribution centers for the food industry, to ethylene oxide for sterilizing medical supplies and butane for the production of plastic foam trays for the meat packaging industry.

As the implementing agency for the RMP program in Mecklenburg County, it is the goal of MCAQ to assure that all facilities in the County subject to the rule have submitted an RMP, that the plans developed by each facility meet the requirements of the rule, and that each facility actively is implementing the plan it submitted. MCAQ aims to accomplish this goal in two ways:

1. Providing information and guidance on the requirements of the RMP program to facilities in the County through the air quality permitting process and the MCAQ Web site, and
2. Conducting compliance inspections/audits of facilities subject to the rule.

General Duty Clause

Even a facility not required to submit an RMP may be subject to the rule through the section known as the General Duty Clause. While the EPA has delegated responsibility for implementing the bulk of the RMP program to state and local authorities, the EPA maintained authority to enforce this section. The General Duty Clause states that owners and operators of a facility processing, handling, or storing extremely hazardous substances have a general duty to:

1. Identify hazards associated with a potential accidental release;
2. Design and maintain a safe facility, taking steps to prevent releases; and
3. Minimize the consequences of accidental releases that do occur.

Note that this requirement is not limited to the finite list of chemicals or established thresholds in the RMP regulation. Congress has made it clear that the term "extremely hazardous substance" includes:

- Other agents which may as the result of short term exposures associated with releases to the air cause death, injury, or property damage, and/or
- The release of any substance that causes death or serious injury because of its acute toxic effect or as a result of an explosion or fire or that causes substantial property damage by blast, fire, corrosion, or other reaction.

Such an incident would trigger substantial public and regulatory agency involvement, and could result in citations and penalties on the basis of violating "general duty" requirements.

Federal Regulation of Air Toxics - Pre-1990 vs. Post-1990

By M. Jason Rayfield, Air Quality Supervisor
Mecklenburg County Air Quality

Reduction of toxic air pollutants or air toxics has been a concern in Mecklenburg County since the 1980s. Air toxics are a select number of chemicals that are released into the atmosphere by natural, industrial, residential, and mobile sources. Exposure to certain levels of these pollutants may cause a number of serious health problems including cancer. Since 1990, Mecklenburg County Air Quality (MCAQ) has administered two separate programs targeting a reduction in air toxics — a federal, technology-based program and a state, health-based program. The federal program implemented by the Environmental Protection Agency (EPA) under the 1990 Clean Air Act Amendments (CAAA) has proven to be effective in regulating a significant number of emission source types as well as pollutants.

Prior to 1990, federal efforts to regulate air toxics were based on a health-based approach in which numerical emission standards were to be established for each pollutant. With the enactment of the 1970 CAAA, EPA was assigned the responsibility for identifying "hazardous air pollutants" (HAPs), and developing emission limitations for each pollutant. EPA found that setting health-based standards was a difficult process because of uncertainty in assessing health effects and the number of pollutants to study. As a result, standards were set for only eight pollutants over a 20-year period. These standards, referred to as National Emission Standards for Hazardous Air Pollutants (NESHAPs), remain in place for pollutants such as asbestos, benzene, arsenic, and mercury.

Passage of the 1990 CAAA renewed emphasis on controlling emissions of air toxics at the federal level, and later would have a direct impact on air quality in Mecklenburg County. With the amendments, EPA changed its method of regulating HAPs to an approach based on the implementation of existing emission control technology. Congress provided EPA with a list of 1891 compounds it deemed hazardous and required EPA to establish NESHAPs for industrial sectors emitting those pollutants. These industrial sectors, or "source categories," had to include major sources emitting 10 tons/year of any one, or 25 tons/year of any combination of HAPs, and area sources (smaller sources, such as dry cleaners).

In the first regulatory phase of the new air toxics program, the CAAA required two types of emission standards for promulgation: maximum achievable control technologies (MACTs) and generally available control technologies (GACTs). MACTs are emission standards that achieve the maximum degree of reduction in emissions of the hazardous air pollutants. MACT is determined differently for new and existing sources of HAPs. For new sources, MACT is equivalent to the best controlled similar source in a given industry. For existing sources, MACT represents the average emission limit achieved by the best performing 12 percent of existing sources for which EPA has information. GACTs are less stringent emission standards based on the use of more standard technologies and work practices. After EPA issued MACT or GACT emission standards for a certain source category, sources had up to three years to come into compliance.

In the second regulatory phase of the air toxics program, EPA was instructed to conduct an assessment of, and report on, the residual risk due to HAPs likely to remain after implementation of the MACT and GACT standards. The goal of the residual risk assessment is to ensure that an ample margin of safety is provided by the emission standards to protect public health and the environment. Based on this assessment, EPA possibly would implement additional standards to address any significant remaining health or environmental risks.

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 MACT or GACT 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. Many more area source facilities will be required to reduce HAP emissions as new standards for source categories such as Gasoline Stage I Distribution and Autobody Refinishing Paint Shops are promulgated. Additional air toxic reductions are possible through the North Carolina local program as MACT promulgation date affects applicability of our local air toxic rules.

In summary, federal efforts to control air toxics have had a direct impact on the air we breathe in Mecklenburg County. MACT and GACT standards have helped ensure that the best emission control techniques and production practices from across the country are in place locally. As EPA continues its focus on area sources, and completes a review of residual risk, additional HAP reductions become possible.

[1] *EPA's list of 189 HAPs was amended in 1996 and 2005. Today's list includes 187 chemicals.*

National Emission Standards for Hazardous Air Pollutants (NESHAPs)

Source Categories Affected In Mecklenburg County (as of 1/1/2008)

Source Category	# of facilities in Meck Co.
Dry Cleaning	94
Chromium Electroplating	4
Magnetic Tape (surface coating)	2
Organic Liquids Distribution	2
Printing and Publishing (surface coating)	2
Commercial Sterilizers	1
Fabric Printing, Coating & Dyeing	1
Flexible Polyurethane Foam Fabrication Operation	1
Hazardous Organic NESHAP	1
Misc. Metal Parts and Products (surface coating)	1
Misc. Organic Chemical Production and Processes	1
Paper and Other Web (surface coating)	1
Polymers & Resins	1
Reinforced Plastic Composites Production	1
Rubber Tire Manufacturing	1
Tetrahydrobenzaldehyde Manufacture	1
Wood Furniture (surface coating)	1

Local Air Toxics Program

By S. David Ross, Sr. Air Quality Specialist
Mecklenburg County Air Quality

As the U.S. Environmental Protection Agency (EPA) was developing ways to protect public health from specific pollutants beyond the broad class of ozone precursor volatile organic compounds (also known as hydrocarbons or solvents) and particulates (also known as dust), they were torn between developing a program based on the latest technology, or looking at the public health impact of communities surrounding pollution sources. The EPA initially decided to develop a technology-based program, and asked the states to develop a community health-based program.

In the very late 1980s, the State of North Carolina began assessing the health risks from various air toxics. The original toxics program proposals were based on a factored approach using only the threshold limit values (TLVs) developed by the American Conference of Governmental Industrial Hygienists (ACGIH) for worker exposure. This was superseded by using a risk assessment approach developed by the North Carolina Academy of Sciences. It was this last technique that was incorporated into the rules, and still is in use today.

There are two parts to the North Carolina toxics regulation. The toxics screening levels, or ***de minimis*** levels, are modeling based. Any emissions above those thresholds require site specific modeling to determine compliance with the acceptable ambient levels (AALs), which is concentration based, at or beyond the property line. These AALs are designed to protect the general public. If the modeling demonstrated that an AAL is being exceeded, the facility has to take actions to reduce the emissions.

The models used to determine the total impact are computer programs that consider the location of the pollution sources, distance to where people could be affected by the pollution, and the weather. In order to determine the ***de minimis*** levels, a very conservative model considered a single emission source very close to where people could be, and the worst meteorological condition. The models used to demonstrate compliance with the AALs are less conservative, and more realistic. The AAL compliance models use real temperature and wind information for the Charlotte area, and are updated as the science is improved.

Among 219 existing permitted facilities in Mecklenburg County, 165 facilities have been evaluated by Mecklenburg County Air Quality (MCAQ) for compliance with the Air Toxics regulations. As facilities became subject to the state and federal toxic regulations, most were required to take emission reduction measures to comply, such as product reformulation, process modification, or emission control equipment installation.

Since 1994, MCAQ conducts a countywide air toxics emission inventory periodically. The last inventory was conducted for calendar year 2005. The data indicated the toxics emissions downward trend from 1994 to 2005. The inventory data also was useful to identify significant toxic emission sources that had not been subject to the toxic regulatory requirement. MCAQ has sent voluntary toxics compliance demonstration requests to 22 facilities. After taking various control measures, all of them could comply with the local regulations.

The Asbestos NESHAP In Mecklenburg County: A 20-Year Overview

By Rick Nelson, Air Quality Specialist
Mecklenburg County Air Quality


Asbestos tiles from an old building


Demolition site

The Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) is a federal air quality regulation set by the USEPA in 1973 under the authority of the Clean Air Act (CAA) of 1970. The CAA was made law to regulate hazardous air pollutants which may cause or contribute to an increase in mortality or an increase in severe irreversible or incapacitating reversible illness. The purpose of the asbestos NESHAP was to protect the public from exposure to asbestos in the ambient air by controlling and minimizing emissions of asbestos to the environment from:

- Asbestos mills and the disposal of mill waste;
- Use of asbestos tailings or waste in roadways;
- Manufacturing and fabricating operations;
- Spray application of asbestos and the use of molded and wet-applied asbestos insulation;
- Demolitions and renovations;
- Asbestos waste disposal and active and inactive waste disposal sites.

As a result of the adoption of the Mecklenburg County Air Pollution Control Ordinance (MCAPCO), including the asbestos NESHAP, by the Mecklenburg County Board of Commissioners in 1985, Mecklenburg County Air Quality (MCAQ) began to regulate demolitions and renovations and the collection, processing, packaging, and transportation of asbestos-containing waste materials (ACWM) under the asbestos NESHAP regulation.

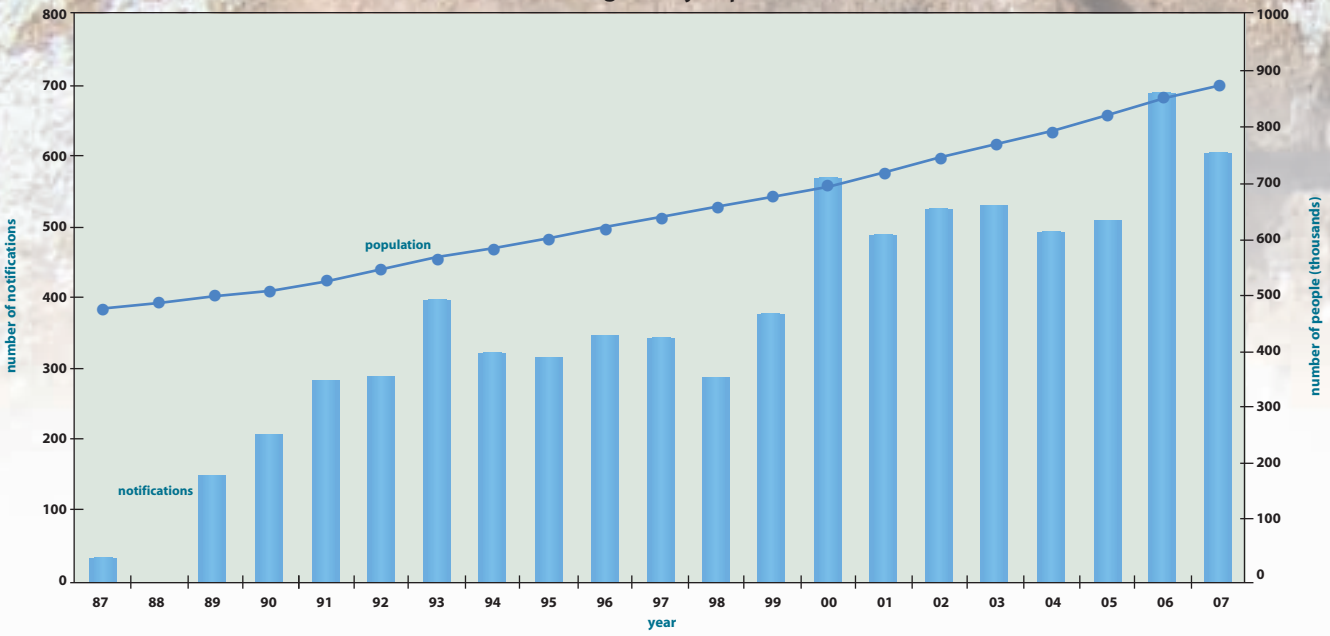
In 1987, there were five stationary sources in Mecklenburg County engaged in the manufacturing and fabrication of products containing asbestos — most were brake and clutch reliners or asbestos textile producers. Today, these facilities no longer are using asbestos in their operations, or the facilities have shut down. At least one such site, the former Southern Manufacturing plant in Charlotte, is being redeveloped into an arts and music-related center called the North Carolina Music Factory. This is being done as part of the North Carolina Brownfields Program, which is managed by the State Division of Solid Waste.

The growth of the city of Charlotte and other communities in Mecklenburg County has resulted in an increasing volume of asbestos NESHAP notifications for demolition and renovation from 1987 to the present (see Figure 1 on page 40). In 1987, when MCAQ began administering the asbestos NESHAP program, 33 notifications for demolition and renovation of buildings were submitted to

Asbestos continued on page 40

Figure 1

Number of NESHAP Notifications and Mecklenburg County Population Growth



Asbestos continued from page 39

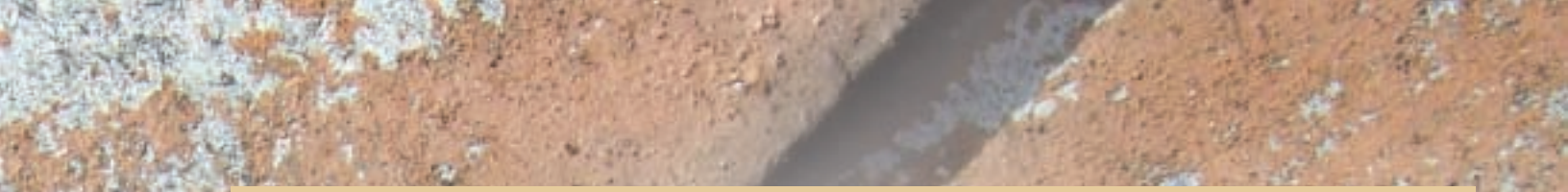
MCAQ in accordance with the regulation. At that time, commercial building demolitions and renovations were the main focus of the asbestos NESHAP program because the asbestos NESHAP excludes single residential buildings from the requirements of the regulation. Then much of the land being used for new development was generally rural.

Today, the number of NESHAP notifications has grown to 684 in 2006 and an estimated 600 notifications in 2007. In the last five years particularly, with the availability of large land tracts shrinking, developers have begun buying and combining individual adjoining land parcels to create the larger tracts needed for new development. When the land is cleared for new construction, the demolition of the residential buildings on the combined parcels is an activity that is subject to the asbestos NESHAP rules. This has resulted in residential demolitions becoming an increasingly larger percentage of the NESHAP notifications received.

Since 1987, several large residential apartment and housing complexes have been demolished to make way for new commercial and residential development. Since many of these were built in the 1940 through 1960, most had at least some asbestos-containing material (ACM) that was required to be removed prior to demolition. In 1995-1998, the old Earle Village, a total of 409 housing units in Charlotte's First Ward, was razed and reborn as the mixed-use and mixed-income neighborhood now known as the Garden District. More recently, Belvedere Homes, Mayfield Terrace/Pitts Drive Apartments, Piedmont Courts, Westwood Apartments, Villa Heights Apartments, and Morningside Apartments, a total of 236 multiple housing unit buildings, were razed for new commercial and residential development.

In the last decade, several public projects have added significantly to the number of demolitions subject to the NESHAP regulation. These have been associated with the Charlotte Area Transit System (CATS), Charlotte-Mecklenburg Storm Water Services, Mecklenburg County Department of Parks and Recreation, and the Charlotte-Douglas International Airport.

The CATS Light Rail Line construction required many commercial and residential buildings along South Boulevard and adjoining areas to be demolished for the rail facility and various stations. This project has resulted in many other demolitions along the rail line as



Why Is Asbestos a Concern?

Asbestos is the common name for a group of naturally occurring silicate minerals that separate into strong fibers having exceptional thermal and electrical insulating properties. They are so small (the same size range as most bacteria) that individual asbestos fibers cannot be seen without the aid of a microscope, and are easily inhaled into the lungs. Acute symptoms of exposure are minimal, and asbestos-related diseases have a long latency period, typically 15-30 years. Asbestos-related diseases are progressive, disabling, and often fatal, and include asbestosis (lung tissue inflammation, scarring, fibrosis, and impaired breathing), lung cancer, and mesothelioma (cancer of the chest cavity lining).

EPA considers asbestos exposure such a threat that it has pursued banning most uses of asbestos. A rule published July 12, 1989, banned most applications of asbestos, only to be overturned by the Fifth Circuit Court of Appeals in October 1991; however, the court did maintain the ban on certain uses of asbestos, such as in textured ceiling spray and sprayed-on fireproofing for structural support beams.

The best advice is to take appropriate steps to minimize the likelihood of asbestos exposure. There are still no regulations that require removal of asbestos containing materials unless the structures are being demolished or renovated. Asbestos-Containing Materials (ACM) that are in good condition and are not sanded or sawed are often better left in place and perhaps covered over for additional stability and protection. EPA recommends a proactive established management program with removal of the ACM occurring only if in poor condition, or when likely to release asbestos fibers as a result of some type of activity.

developers move forward with new transit-friendly commercial and residential projects. The South Boulevard Lowe's store and the associated mixed residential and retail district is one example that required 29 residential and commercial building demolitions.

The Mecklenburg County Storm Water program to purchase and remove flood prone commercial and residential buildings from flood plains and the joint Charlotte-Mecklenburg Storm Water and Mecklenburg County Department of Parks and Recreation program for restoring Charlotte creeks to their natural habitat and adding greenways have resulted in many demolitions of structures in those areas. In 2001, the Mecklenburg County Storm Water Floodplain Project resulted in the demolition of 112 homes. In 2007, Mecklenburg County began "uncapping" the Little Sugar Creek in the old Midtown Square area by demolishing the concrete caps that about 40 years ago were installed to enclose the creek and allow it to be paved over for parking and business development. Mecklenburg County Department of Parks and Recreation also demolished 26 buildings in the Lincoln Heights area for the construction of a new park.

The Charlotte-Douglas International Airport expansion project over the last five years has required at least 34 commercial and residential buildings being demolished to the west and south of the airport for new runway construction and for additional parking. In addition, the City of Charlotte has purchased and demolished structures around the airport that were subject to the substantial noise during take-off and landing of aircraft.

At the same time as the aforementioned public projects were taking place, a number of private projects in the public interest also were taking place. These include expansions of local hospitals and colleges. The Charlotte-Mecklenburg Housing Partner-ship, Inc demolished 25 buildings in the Druid Hills area for urban renewal.

There are still many structures in Mecklenburg County that have substantial quantities of ACM as part of the building materials and insulation used in their construction. The asbestos NESHAP, while an old regulation, is still in force to require elimination of ACM for demolition and renovation activities which may result in substantial asbestos emissions to the air. Mecklenburg County residents are safer from the health effects of asbestos because of the MCAQ asbestos NESHAP program.

North Carolina Considers Actions to Address Climate Change

By S. Sean Garner, R.S., Air Quality Specialist
Mecklenburg County Air Quality

Looking back to 1987, one can find many environmental areas of concern that still are being addressed today; however, you would have to carefully sift through old newspapers and environmental reports to find any mention of global climate change. If you did find something, it most likely would be referred to by the public and media as "the greenhouse effect." Now more appropriately called global climate change, this enhanced greenhouse effect is believed to cause a variation in the Earth's global climate. climate change is caused by increased amounts of air pollutants such as carbon dioxide and methane called greenhouse gases.

The increase in greenhouse gas emissions, and their potential effects, has spurred concern from the public, and has prompted initial responses by local, state and federal governments as well as some business and industry. North Carolina is one of the states taking a progressive approach toward climate change.

What is Climate Change?

The Earth absorbs energy from the sun, and radiates energy back into space. Much of the energy going back to space is absorbed by "greenhouse" gases (GHG) in the atmosphere and radiated back to the Earth's surface warming it. Without the natural "greenhouse effect," surface temperatures would be about 60° F lower. Conversely, an increase in greenhouse gases can cause temperatures to rise.

Expanding population growth and industrialized human activity in the past century has added to the amount of greenhouse gases in the atmosphere. The burning of fossil fuels to power our cars, factories, and homes has added gases, primarily carbon dioxide and methane, to the atmosphere that enhance the natural greenhouse effect. The majority of the scientific community now believes that this increase is likely to contribute to an increase in global average temperature and related climate changes. climate change gained worldwide attention in 1997 with the Kyoto Protocol. Signing countries agreed to reduce greenhouse gas emissions by 55 percent of 1990 levels.

What is North Carolina Doing About Climate Change?

North Carolina has formed two groups to study climate change and propose approaches to address the problem. The North Carolina Climate Action Plan Advisory Group (CAPAG), a stakeholder group charged with recommending mitigation strategies to the North Carolina Division of Air Quality, began meeting in February 2006. The group developed recommendations in the areas of: residential, commercial, and industrial energy supply; transportation and land use; agriculture, forestry, and waste management; and cross-cutting issues.

CAPAG identified 56 options for further study and potential adoption that are believed to be most important for mitigating North Carolina's GHG emissions. Some of these options include revising state energy codes, increasing use of biofuels like ethanol or biodiesel, and providing incentives to encourage the construction of more energy efficient buildings.

It is estimated that full adoption by the state of CAPAG's recommendations would reduce North Carolina's gross GHG emissions by approximately 47

percent, from 256 million metric tons of carbon dioxide equivalent (MMTCO2e) to 137 MMTCO2e by 2020, or within one percentage point of 1990 levels.

Also in 2006, the Legislative Commission on Global Climate Change (LCGCC) held its first meeting. The North Carolina General Assembly charged the Commission to determine, among other things, if a cap or limit on greenhouse gas emissions was warranted. If the commission found that this was warranted, they were charged with determining the level at which the cap should be set.

Many of the strategies that the LCGCC had identified focus on energy production, consumption, and management. Considering that three megawatt-hours of electricity generates more than two tons of GHG in the electric grid that services this area, it is clear that energy production plays an important role. North Carolina is looking at energy management, alternative fuels, and renewable energy to address climate change as well as energy supply concerns, but no definitive plans have been made.

Along with the aforementioned groups, the North Carolina Utilities Commission responded to a request by the Environmental Review Commission (ERC) of the North Carolina General Assembly to undertake a study of the potential costs and benefits of enacting a Renewable Energy Portfolio Standard (REP) in this state in February 2006, which is in line with recommendations by CAPAG. On August 20, 2007, North Carolina became the first state in the Southeast to adopt a REPS.

Under this new law, investor-owned utilities in North Carolina will be required to meet up to 12.5 percent of their energy needs through renewable energy resources or energy efficiency measures. Rural electric cooperatives and municipal electric suppliers are subject to a 10 percent REPS requirement. Renewable energy effectively utilizes natural resources such as sunlight, wind, tides and geothermal heat, which are naturally replenished. Renewable energy technologies range from solar power, wind power, and hydroelectricity to biomass and biofuels for transportation Shifting electric production from fossil fuels will reduce GHG produced by an estimated 15 million tons a year.

Electric power suppliers generally may comply with the REPS requirement in a number of ways, including:

- the use of renewable fuels in existing electric generating facilities,
- the generation of power at new renewable energy facilities,
- the purchase of power from renewable energy facilities,
- the purchase of renewable energy certificates, or
- the implementation of energy efficiency measures.

North Carolina continues to move forward addressing climate change with a variety of techniques. The progressive approach seeks to improve our environment while encouraging growth in new areas, and improve energy efficiency in existing business and industry.

Both Mecklenburg County Government and the City of Charlotte are making the first step toward taking action to reduce greenhouse gases by completing operational greenhouse gas inventories. This inventory process estimates the amount of carbon dioxide, methane and other greenhouse gases produced by government operations. Mecklenburg County will evaluate the contribution from energy usage in County-owned buildings, vehicles, and off-road equipment. Once completed, the inventory will help highlight opportunities for pollution reduction, and allow for tracking improvements due to environmental leadership initiatives, including the Energy Management Plan and the activities that are in place to purchase cleaner cars and equipment.

While climate change is only beginning to be addressed through regulations, there is certainly an expectation that more action to reduce greenhouse gases will be taken at all levels of government, and by many businesses.

Linking Land Use, Transportation, and Air Quality in Mecklenburg County

By Leslie Rhodes, Mobile Source Program Manager
Mecklenburg County Air Quality

The Link

With 90 percent of ozone-forming pollution and fine particulate matter coming from cars, trucks and things that move, understanding the connection between land use, transportation, and air quality is critical to future efforts to improve the air quality in Mecklenburg County. How we arrange the places where people live, work, and play effects how they choose to get there and how far they must travel to get there. It is easy to see this link between land use and transportation. What most people miss is how this connects to air quality. The more miles traveled in an automobile, the more air pollution that is generated. Even if the most convenient mode of transportation continues to be the automobile, effective land use and transportation planning can result in shorter trips in the car which, in turn, lowers air pollution. Land use and transportation infrastructure can either work to create dependency on motor vehicles or serve to promote and encourage alternate forms of transportation such as walking, biking, or taking transit. By creating access to attractive alternatives to driving, we can encourage citizens to travel to their desired destinations without creating as much air pollution.

While land use and transportation planning is a very long-term strategy to address air pollution, most urban communities agree that it is essential for management of growth and preservation of natural resources. In the City of Charlotte and Mecklenburg County, we can see evidence of at least three strategies that are expected to effect travel activity and work to control automobile pollution in the future, thus recognizing the link between land use, transportation, and air quality. These activities include:

1. increasing density of development in appropriate areas,
2. creating an accessible transit system, and
3. promoting a mix of land uses within an area.

Density

Density is the compactness of an area such as the amount of residential dwellings per acre of land. The 2015 Land Use Plan, adopted by the Mecklenburg County Board of Commissioners and the Charlotte City Council in 1997, laid out a "Centers and Corridors" approach to land use and transportation planning. This approach, as it is currently implemented through the City of Charlotte's General Development Policies, promotes higher density development around existing and proposed transit stations, and along five major transit corridors. High density residential development in the area between the corridors, known as the "wedges," is discouraged. It generally is accepted by air quality professionals that if dense development in the appropriate areas successfully is achieved, it can lead to a reduction in vehicle miles traveled and a reduction of air pollution from motor vehicles; however, the density alone will not make this goal a reality. The compactly developed area must be served by an accessible transit system.

Transit

When citizens choose to use transit, there are air quality benefits because multiple people traveling to the same area together in one vehicle greatly reduce the total number of miles driven. The 2025 Corridor System Plan adopted by the Charlotte area's Metropolitan Transit Commission outlines a strategy for providing transit solutions that meets the land use objectives and mobility needs along each of the five corridors. If successful, land use plans create density in certain areas so that transit is a viable option, and likewise, transit serves the most, dense areas so that encouraging

dense development is a viable strategy. These two must work together in order to see air quality benefits in the future.

Mix of Land Uses

The densely developed areas served by transit must contain a mixture of uses in order to meet the needs of the citizens and reduce their need to travel long distances frequently. The "Centers and Corridors" approach encourages co-location of residential, office, service-oriented, retail and civic uses that are transit supportive. This arrangement of land uses promotes walking, biking, or shorter automobile trips.

In summary, understanding the connection between transportation and land use is a key to reducing the dependency of our citizens on the automobile. This in turn benefits air quality by reducing pollution. While it can take decades to realize the effects of these efforts, most air quality experts agree that this is one of the pieces of the puzzle that must be in place to protect public health in the future. The current transportation and land use planning efforts in Mecklenburg County are consistent with nationally recognized strategies to connect transportation, land use, and air quality.

- When desired destinations are well arranged to reduce the miles traveled in an automobile to reach them, air pollution is reduced.
- A "Centers and Corridors" Plan in Mecklenburg County can reap air quality benefits.
- Land uses that encourage transportation alternatives such as walking, biking and taking transit benefit air quality by reducing automobile pollution

Air Quality Enforcement: An Education

By Jimmy Pascal, R. S., Retired, Air Quality Specialist
Mecklenburg County Air Quality

When the Clean Air Act of 1970 (CAA) became law, the means to enforce the law also were created. These means only were enforceable through court actions, and were considered misdemeanor violations at the worst. Industry quickly responded to these enforcement actions by considering court actions and penalties a routine cost of doing business. Little effort, time, or funds were provided by industry for reducing air pollution from their facilities. It became obvious to Congress that a law with easier enforcement and harsher penalties was required if the nation really wanted cleaner air.

The Clean Air Act Amendments of 1990 (CAAA) took air pollution enforcement seriously and addressed CAA deficiencies. Today, violations of the CAA now can be addressed by issuing Civil Penalties up to $25,000 for each violation each day that the violation occurs. Also, if court actions are necessary, the violations are now considered felonies[1]. It is not a joke for the person who signs environmental documents (permit applications, emission reports) to be referred to as the facility's "designated felon."

The CAAA allows citizen suits against persons, private corporations, or government agencies alleged to have violated emissions standards or permit requirements. It also provides for suits against the United States Environmental Protection Agency (EPA) in cases where the administrator of the EPA has failed to perform an action that is not optional under the CAA. Citizen groups have used this provision to compel the administrator to set regulations required by the law[2].

The EPA and State of North Carolina delegated authority to Mecklenburg County Air Quality (MCAQ) to enforce the CAA. This delegation of authority allowed MCAQ to create the Mecklenburg County Air Pollution Control Ordinance, which is based upon the CAA and State of North Carolina's Air Quality regulations. When enforcement of MCAPCO is required, MCAQ normally sends a letter notifying the facility of a violation. This notice of violation requires that corrective action be taken by the facility. If the violation continues, is of a serious nature, or is repeated, a civil penalty may be assessed. The enforcement process for a violation escalates to an appeal to the Mecklenburg County Air Quality Commission (a citizen advisory board appointed by the Mecklenburg County Board of County Commissioners) or the courts.

MCAQ strives to serve the community not only as enforcement officers, but also as educators. Annual meetings, workshops, our Web site, and newsletters are produced to inform facilities of ordinance and permit requirements. These are just a few of the activities MCAQ conducts with the hopes of reducing enforcement actions. Facilities also have an assigned staff person from MCAQ, who is available to answer questions that might arise. The University of North Carolina's Charlotte campus has an Environmental Assistance Office that promotes air quality compliance. This office, partially funded by MCAQ, works with the facility under the stipulation they are not required to advise MCAQ of possible air quality concerns.

[1.] Clean Air Act Amendments of 1990; Summary of Key Titles; Title VII

[2.] Clean Air Act: A Summary of the Act and Its Major Requirements; James E. McCarthy, Coordinator Specialist in Environmental Policy Resources, Science, and Industry Division; Congressional Research Service - The Library of Congress; Updated May 9, 2005

Adding Individual Actions Can Help Clear the Air

By Alan Giles, Air Quality Specialist
Mecklenburg County Air Quality

Twenty years ago, the State of the Environment Report listed Ozone attainment as a "high priority" issue for Mecklenburg County. Ozone attainment is still the most important health and environmental issue for this region in 2007, as this area again was designated by the United States Environmental Protection Agency (EPA) as "non-attainment" in 2004.

According to the North Carolina Division of Air Quality (NCDAQ) Sheila Holman, **"None of the things that we look at from this point on are going to be easy to implement, and a lot of them will be disruptive to businesses and consumers."** Our continuing struggle with meeting the ozone standard can be directly related to the County's population, which has almost doubled since 1987, and the vehicle miles traveled (VMT), which have tripled since 1985.

The area is working to reduce mobile source emissions at the local level. A Mobile Source group was established with Mecklenburg County Air Quality (MCAQ" in 2004 focusing on the reduction of mobile source pollution. Federal and state efforts are projected to bring us much closer if not all the way to attainment of the National Ambient Air Quality Standards; however, we believe that local action is still needed, and the community should be encouraged to contribute to the improvement of air quality. In addition to ozone non-attainment and a possible lowering of that standard by the EPA, we are also very close to the fine particulate standard for 2007; therefore, current efforts focus on reduction of nitrogen oxides, volatile organic compounds, and fine particulate matter. Mobile sources such as cars and trucks are the largest contributor of each of these pollutants

Industrial Controls continued on page 44

Industrial Controls continued from page 43

in Mecklenburg County. Reaching attainment will require a combination of both regulatory and aggressive voluntary actions.

According to the 2006 Mecklenburg County Community Survey, the number of people willing to use public transportation for their commute to work has increased by 5 percent since 2003, while willingness to use other commute actions, such as carpooling and vanpooling, have shown little change. There are several programs in this area which include emphasis on alternate commute behaviors and work to promote voluntary air pollution emission reduction actions through employers.

North Carolina Air Awareness

NC Air Awareness is a program that has been operated since 1997 in the non-attainment regions by NCDAQ. The goal of the program is to reduce air pollution though voluntary actions by individuals, employers and other organizations. The Charlotte Region's coordinator for Air Awareness promotes emission reductions through a business coalition encouraging actions from employees.

In 2007 there were 68 different organizations actively participating in the Air Awareness Business Coalition, and its efforts reached over 50,000 employees. All of the coalition partners distribute the air quality forecast on unhealthy days; however, most distribute it everyday during ozone season. Most of the coalition members are encouraging actions to help improve air quality on Air Quality Action Days (days when air quality levels are predicted to be unhealthy).

Charlotte Area Transit

People seeking alternative transportation have increased ridership on Charlotte Area Transit (CATS) over the last nine years by more than 67 percent. CATS, transporting over 19 million passengers in 2007, operated 78 vanpools (an increase of 8.1 percent over 2006). More than 47 businesses in the Charlotte area participate in the CATS Employee Transportation Coordinator (ETC) program, which provides commute related services such as ride sharing, transit pass sales and other promotional activities to support this employer-based service.

In November, 2007 CATS opened the first rapid transit rail line in North Carolina. The LYNX Blue line in Charlotte is expected to carry 9,100 passengers each weekday during its first year of operation.

"Best Workplaces for Commuters"

The Best Workplaces for Commuters (BWC) is an EPA innovative, voluntary business-government program that distinguishes and provides national recognition to employers offering outstanding commuter benefits such as free or low cost bus passes, strong telework programs, carpool matching, and vanpool subsidies to reduce the number of employees that drive to work in single occupancy vehicles. Joining the BWC requires

participating employers to subsidize at least half of the employee transit cost. Several areas businesses, including Duke Energy, Mecklenburg County Government, the Charlotte Chamber, the Centrolina Council of Governments, and the City of Charlotte are members of BWC.

Clean Air Works!

This employer-focused Pilot Project was begun in 2006 and continued through 2007. Clean Air Works! is a project of the Regional Air Quality Board in collaboration with the City of Charlotte, Mecklenburg County Government, CATS, the Charlotte Chamber, the Centralina Council of Governments, and the Catawba Regional Council of Governments. The purpose of Clean Air Works! is to test what organizational approach and implementation elements and methods will produce quantifiable reductions in ozone-forming pollutants (chiefly nitrogen oxides) above those obtained through current efforts.

Clean Air Works! was successful in recruiting 89 partner companies in the eight county non-attainment region, reaching approximately 71,000 employees, and taking 78,000 trips off the road in 2007. All of this reduced more than 1.5 million miles traveled, and reduced 2,429 pounds of nitrogen oxides.

Clean Air Works! partners organized and hosted more than 150 worksite-based transportation events to encourage and educate employees about commute related alternatives. Additionally, in 2007, many partners offered incentives for their employees to encourage employees to try commuting alternatives. Incentives included coverage of transit/vanpool costs, free lunch for employees not driving to lunch, and guaranteed ride home programs in case of emergency.

In addition to individual efforts to reduce air pollution through smart commuting choices, the quality of our air can also be improved due to energy conservation. My making environmentally-informed purchasing decisions, consumers can now contribute to the effort to reduce air pollution.

Mecklenburg County's Water Quality Program has converted 60 of their 73 automated monitoring stations to solar power. That's more than 82 percent of the stations. These stations have solar panels that keep a car battery charged to run the monitoring station, cell phone and modem. If the car battery didn't wear out, these stations would operate with a neverending, emission-free power supply.

Mecklenburg County's Fleet Management Division maintains 1,149 vehicles. Of these, 20 are hybrids, which means the engine charges a larger battery than most cars have, and the engine operates off that battery for periods of time such as when the car is idling. When non-hybrids idle, that is the time when they emit the most air pollution. The County purchased its first hybrid, a Toyota Prius, for the Air Quality Program in 2001.

Reducing Energy Use

In 1992, EPA introduced ENERGY STAR as a voluntary labeling program designed to identify and promote energy-efficient products to reduce air pollution. The ENERGY STAR label now is on major appliances, office equipment, lighting, home electronics, and more. EPA also has extended the label to cover new homes and commercial and industrial buildings. Businesses, organizations, and consumers saved about $14 billion in 2006 alone by choosing ENERGY STAR-labeled products.

The Change a Light, Change the World Campaign, sponsored by ENERGY STAR, is designed to encourage a switch from incandescent light bulbs to compact fluorescent lighting, which has earned the government's ENERGY STAR label for energy efficiency. Going into its 8th year, individuals are invited to take the online ENERGY STAR Change a Light Pledge, where they can commit to change-out at least one light at home.

Mecklenburg County Air Quality participated in Change a Light Day in 2006 by offering Compact Fluorescent Lights (CFLs) for purchase. The County sold 795 CFLs at this event preventing 40 tons of greenhouse gas pollution. The County has held five Change a Light events in 2007 at various County office locations as well as some Clean Air Works! locations. The results of those efforts are 1,305 CFLs sold and 75 tons of greenhouse gas pollution prevented.

In conclusion, although the past 20 years have seen considerable improvements in industrial air pollution controls, the solution for the next 20 years must include much needed pollution reductions from individual actions.

Groundwater 1987 Recommendations/2007 Results

By Lisa Corbitt, Program Manager
Mecklenburg County Groundwater/Wastewater Service

The 1987 State of the Environment listed this as a major groundwater issue:

"There is an inadequate amount of groundwater data available for the County to accurately assess the status of the groundwater quality."

The SOER contained recommendations to the Board of County Commissioners to protect groundwater. Those recommendations are listed below in italics. Bullet points list the actions taken over the past twenty years in Mecklenburg County to address those 1987 recommendations.

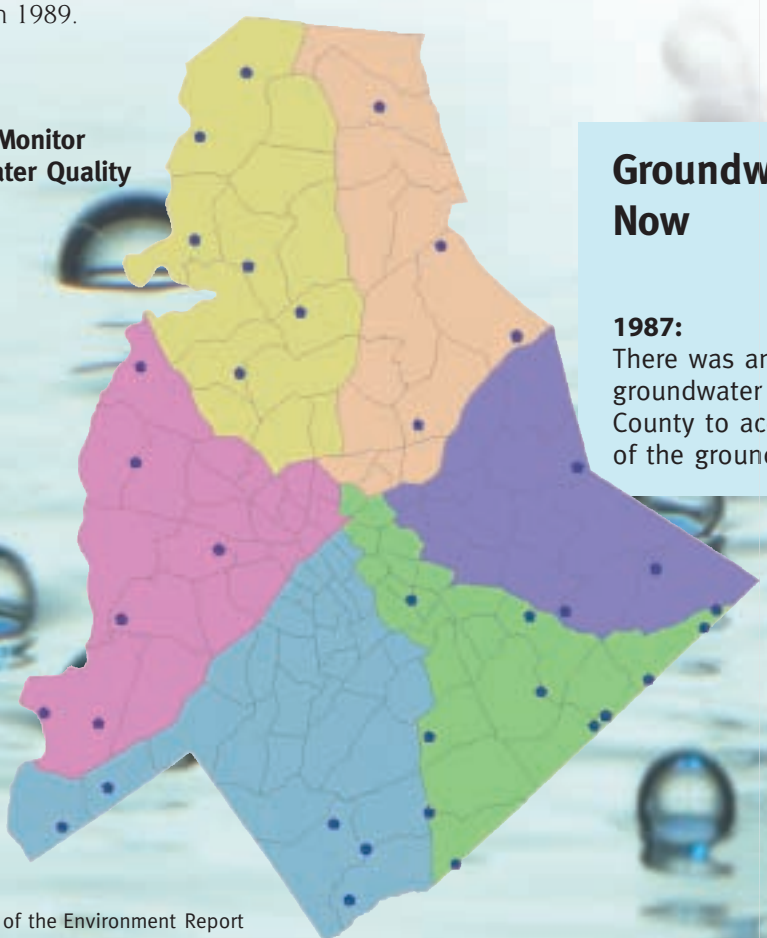
In order to assess the groundwater we recommend: Install and sample a network of monitoring wells to provide background data

- A groundwater pollution potential map was generated through the DRASTIC System starting in 1989.
- In January 1993, an ambient network of wells was established to monitor the quality of the groundwater.
- The Ambient network is made up of private drinking water wells that meet specified construction standards.
- The wells have been sampled annually for the last 15 years.

Place all groundwater monitoring data in a computer-based management system to facilitate retrieval and to allow data analysis.

- Since 1993, Groundwater Services (GWS) has been storing some groundwater data electronically.

Wells to Monitor Groundwater Quality



Groundwater Then and Now

1987:
There was an inadequate amount of groundwater data available for the County to accurately assess the status of the groundwater quality.

- 1995, all groundwater data was stored in EPIC, a Foxpro database.
- In 2001, the Well Information System was established for public access to Groundwater data
- As of 2007, all groundwater data is stored in a Geographical based system called Environmental Database Management System.

Water Festival

In order to educate the public about groundwater, distribute educational materials to explain general groundwater concepts and the role of private citizens in protecting this resource.

- Pamphlets were designed and distributed regarding the following topics:
  - Well head protection
  - Maintaining the well head
- Groundwater Guardian teams were established in 1998 and designated annually for 10 years. The Groundwater Guardian program provided:
  - Training for high school students to lead Aquifer Clubs in local elementary schools
  - A Groundwater educational work book - Drippy's Aquifer Adventure
  - Water Festivals - Hands on Science Groundwater educational events
  - Teacher Kits
  - Training workshops for teachers
  - Town festivals- distribution of pamphlets
  - Science Olympiad Activity and competition
  - Training for well contractors
  - Groundwater Stakeholders Group
  - Groundwater Advisory Board

In order to preserve the groundwater quality, be prepared to adopt and implement local plans and regulations in areas such as recharge area protection, underground storage tanks regulations, private well regulations, land use regulations and regional planning.

- In October 2003, a Groundwater Stakeholder group convened
- In October 2004, the Board of County Commissioners adopted the Groundwater Well Regulations
- The Groundwater Advisory Board was established
- Groundwater Well Regulations were implemented in January 2005
- The Groundwater Well Regulations were amended in March 2006

Use the best technology for constructing and operating landfills by installing liners and installing monitoring wells.

- Foxhole landfill was installed with liners and a monitoring wells network.
- There are 121 monitoring wells located at the open and closed landfills.
- Closed landfills are monitored annually for compliance.

Water Olympics

Groundwater: Findings and Recommendations 2008

By Lisa Corbitt, Program Manager
Mecklenburg County Groundwater/Wastewater Services

Finding: Groundwater remains a viable resource in Mecklenburg County. Approximately 17 percent of the population relies on private groundwater wells, 2.5 percent rely on neighborhood wells and less than one percent of the businesses and facilities rely on groundwater.

Recommendations: Currently groundwater data is available to the public through a geographical web application called the Well Information System. Changes to the well information system are updated monthly. The technology for this system should be updated to offer real time information to the public.

Finding: The County's consistent growth year after year has decreased agricultural uses of groundwater; increased groundwater contamination sites, and created an ongoing need to protect the resource for those residents that do use groundwater for drinking water, household water needs, fire protection and irrigation.

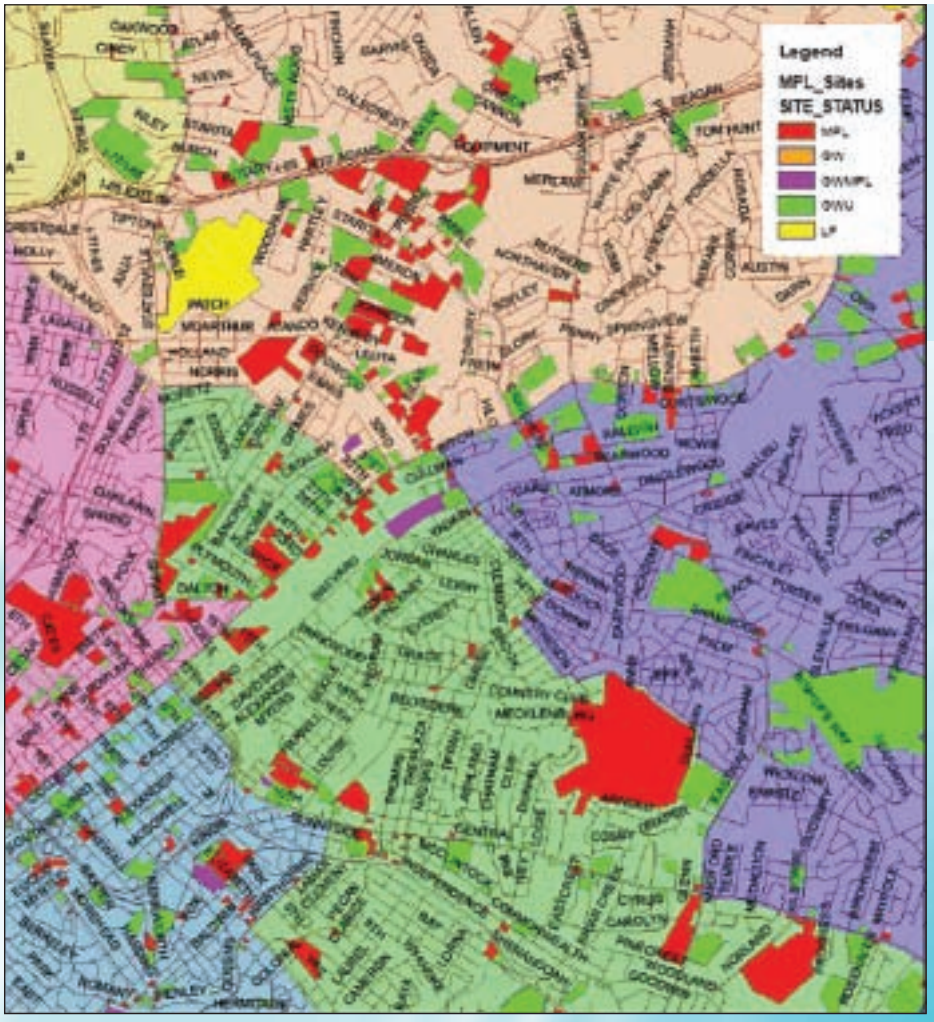
Recommendations: Mecklenburg County Well Regulations were implemented January 2005. North Carolina Department of Environment and Natural Resources (NCDENR) is scheduled to implement groundwater regulations statewide July 2008. The Mecklenburg County regulations need to be amended to reflect changes implemented by NCDENR, while maintaining local rules that address groundwater usage in areas around contamination sites.

Finding: Well construction and well head maintenance is important in eliminating pathways for coliform bacteria. One hundred and six wells tested positive for total coliform bacteria in 2007. Existing wells have consistently had bacteria rates of 20 percent or greater. The presence of total coliform bacteria may not cause illness but it indicates that there is a pathway for other disease causing organisms to enter the groundwater.

Recommendations: Mecklenburg County well regulations have addressed well construction standards for new wells. Existing wells continue to have elevated frequency of total coliform bacteria. Current local rules do not address existing wells unless they are contaminated or undergoing a major repair. It is important to continue to evaluate avenues to address and eliminate the pathways for bacteria in existing wells.

Finding: In 2007 there were 1,130 sites listed in Mecklenburg County with soil and/or groundwater contamination. The groundwater contamination sites include gasoline stations, petroleum pipelines, dry cleaners, old industrial sites, landfills, home heating oil tanks and even residences or businesses with improperly operated septic tanks. Over the last 20 years, there has been a dramatic increase in the number of groundwater contamination sites from 60 sites in 1987 to 1,130 sites in 2007. The Mecklenburg County Priority List program has been very successful in assessing and identifying impacted wells in the areas around the contamination sites.

Mecklenburg County Contamination or "MPL" Sites

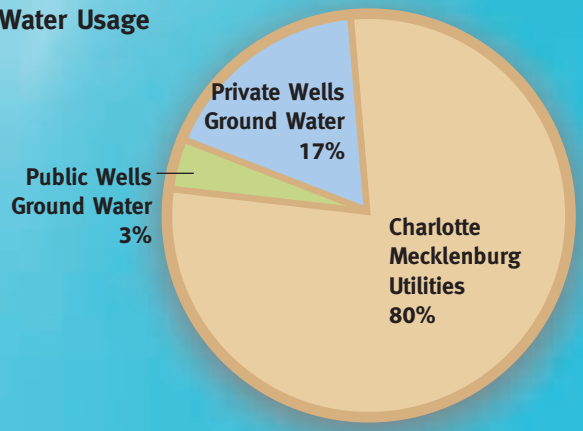


1987:
60 Groundwater Violations in Mecklenburg County

2007:
1,130 Groundwater Violations in Mecklenburg County

Recommendations: In the future, the program should expand to identify options for providing safe alternative sources of drinking water to citizens that have a contaminated well. This should include establishing criteria for treatment of contaminated groundwater, education and financial assistance for private well owners when the responsible party cannot be identified.

Water Usage



1987:
22% of County residents relied on wells for drinking water

2007:
17 % Population on a private well
2.5% Population on a community well
<1% County businesses have a well

Groundwater: Looking Back 20 Years

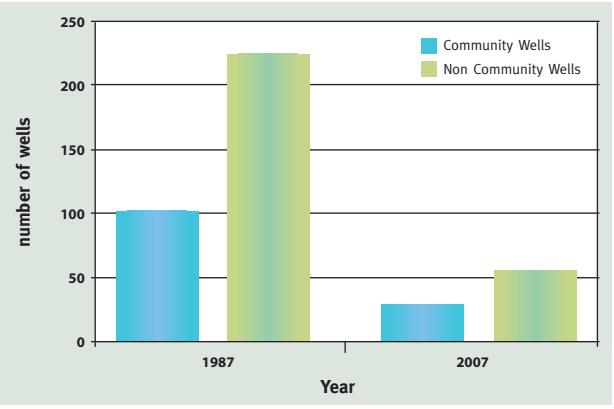
By Lisa Corbitt, Program Manager
Mecklenburg County Groundwater/Wastewater Services

Twenty years ago, the Groundwater Chapter of the State of the Environment Report began with the following statement:

"Groundwater is an abundant natural resource, economically important to agriculture and industry. It also plays a vital role in the daily lives of citizens who depend upon it for their drinking source."

How valid is this statement today? How has the groundwater resource change over the last 20 years? As Mecklenburg County's population grew, the agricultural farms were replaced with suburban neighborhoods. Demands for water and sewer grew at a faster rate than the Charlotte-Mecklenburg Utility infrastructure could supply. In 1987, many neighborhoods trended toward smaller lots with community wells and package plants that served the neighborhood's water and sewer needs. As home sizes increased and regulations on public water and sewer systems strengthened, we saw a trend towards larger lots with private wells and septic systems. Today, an estimated 17 percent of the population relies on private groundwater wells, 2.5 percent rely on neighborhood wells and less than one percent of the businesses and facilities rely on groundwater.

Public Water Supply Wells

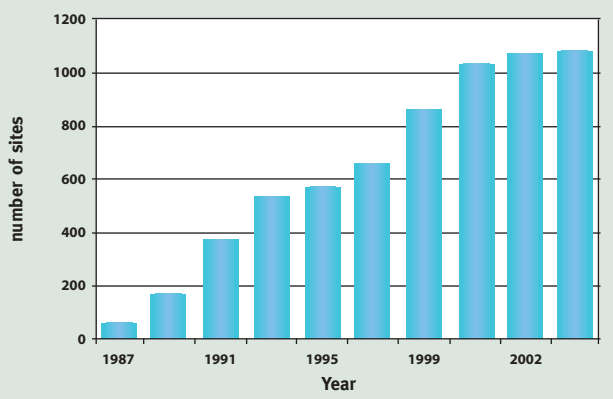


There was a realization in the 1980s that the groundwater system was vulnerable to the current methods of storing chemical products and waste disposal. From the late 1940s until 1987, chemicals were commonly stored in steel underground storage tanks. By the early 1990s, it was clear that many underground storage tanks were leaking. Federal, state and local agencies would later find that tanks underneath many of our corner gas stations had contaminated the groundwater with benzene, lead, gasoline and later MTBE. In addition, home heating oil tanks had often been overlooked and the agencies found fuel oil had contaminated the soil and groundwater near our homes. For the last 20 years Mecklenburg County Groundwater & Wastewater Services (GWS) has been looking for and evaluating the offsite impacts of these small pockets of contamination. The federal and state regulatory agencies have struggled with the cost and method of cleaning up the sites while protecting the public that continues to use the groundwater resource.

By 1990, it was clear that our historical methods for waste disposal were compromising the groundwater system. Prior to 1989, the municipal solid waste (MSW) landfills were unlined and constructed with minimal consideration to the impact the waste disposal site would have on the groundwater system. According to the Department of Environment and Natural Resources, approximately 90 percent of closed unlined MSW landfills have had an impact to the groundwater quality. Currently there are six closed unlined landfills and two open lined landfills in Mecklenburg County. Today, Subtitle D requires that MSW landfills have liners and groundwater monitoring systems. Landfills of newer design operating under proper permits are not considered to have the same potential for contaminating the groundwater as the landfills prior to 1989. Today, in addition to the more secure containment systems, landfills have early detection monitoring and more stringent operational requirements.

Over the last 20 years, there has been a dramatic increase in the number of groundwater contamination sites: from 60 sites in 1987 to 1,130 sites in 2007. At first glance, a casual reader may think we have done a poor job in protecting our groundwater resource. It may appear that more and more groundwater is becoming contaminated each year. The last paragraph of the 1987 SOER chapter about groundwater stated what we were soon to discover: "The impact we have had on this resource over the past years is only beginning to be recognized."

Groundwater Contamination Sites



Over the next 20 years, the more we looked, the more contamination we found. This was a time to identify the degradation to the groundwater, determine how to mitigate the contamination, assess offsite impacts, and identify new technology to minimize future impact to the groundwater system. Through the Mecklenburg Priority List (MPL) program, a local effort has been made since 1989 to aggressively search for existing contaminated sites and identifying wells that may have been impacted. Many of these sites are a result of leaking underground storage tanks or the improper disposal of waste products. There are several state and federal agencies that regulate and oversee the cleanup of groundwater contamination. The MPL program does not duplicate the cleanup effort. Instead, it focuses on potential wells around the contamination and determines if the wells are affected.

A groundwater stakeholder group convened on October 2003. Over the next year, the group identified the primary groundwater issues and the goal of the County's Groundwater Program. The stakeholder group came to consensus on five major issues including private wells, public wells, monitoring wells, contamination sites, and Registration. The Mecklenburg County Groundwater Well Regulations were drafted to address the issues identified during the stakeholder process. The fall of 2004, Mecklenburg County took groundwater protection to the next level with the adoption of the Mecklenburg County Groundwater Well Regulations. The health rules were implemented January 1, 2005 with the primary goal of protecting groundwater as a drinking water source. The rules address the location and construction of private drinking water and irrigation wells. For the first time, if public water is available, a new well cannot be drilled within 1,000 feet of a known contamination site. This protects both the well owner and prevents the potential spread of the contamination plume.

In an effort to provide the public information on well locations and contamination sites, a geographical well information system was established and can be accessed through the GWS Web page (http://groundwater.charmeck.org). Citizens are also encouraged to protect their private wells through well head protection and by registering their existing wells through the web site. Groundwater Guardian teams, including well owners, private professionals, teachers, students, and government staff work to educate the public about protecting private wells. These local efforts have been recognized annually by the National Groundwater Foundation Groundwater Guardian designation since 1998.

Charlotte-Mecklenburg's groundwater system has not changed over the past 20 years. However, how we use the groundwater system, protect the system and our knowledge of the groundwater system has changed. The County's consistent growth year after year has decreased the agricultural uses of groundwater; an increase in groundwater contamination sites and an ongoing need to protect the resource for those residents that use groundwater for drinking water, household water needs, fire protection and irrigation. To protect the groundwater is to protect our public health.

Protecting Groundwater from Contamination: A Vigilant Approach

By Dennis F. Tyndall, P.G. Hydrogeologist
Mecklenburg County Groundwater Services

Groundwater remains a viable and economically important resource in Mecklenburg County. Approximately 145,000 people in individual households, 20,000 people in neighborhoods served by community well and 4,000 people at businesses and institutions rely upon groundwater every day for drinking water, irrigation, and industrial use.

It's important to protect our groundwater from contamination. Likewise, it's important to protect the public and environment from groundwater that is already contaminated. In 2007, there were 1,130 known sites Mecklenburg County with contaminated soil or contaminated groundwater or both. Sites potentially contributing to groundwater contamination include gasoline stations, petroleum pipelines, dry cleaners, old industrial sites, landfills, home heating oil tanks and even residences or businesses with improperly operated septic tanks. Mecklenburg County Groundwater & Wastewater Services (GWS) works to identify affected or at-risk wells around pollution sites. Select water supply wells are sampled to verify groundwater quality based on risk criteria used by the federal Environmental Protection Agency (EPA) and North Carolina Department of Environment and Natural Resources (NCDENR). This effort, known as the Mecklenburg Priority List (MPL) Program, consists of a list of pollution sites compiled from a variety of federal and state listed sites. In 2007, the program investigated 124 MPL sites and then identified six contaminated wells.

Protecting our groundwater resource depends on effective regulation of chemical sources, careful use of groundwater, and increased public awareness of risks to groundwater. No single agency is responsible for regulating all of these aspects of groundwater protection. Numerous divisions of the EPA, NCDENR, and the local fire marshal offices regulate bulk chemical handlers, hazardous waste storage transportation and disposal, and cleanup of spills and releases resulting from those operations. NCDENR regulates the installation and operation of community wells. The regulation of septic systems and private water supply wells are the responsibility of NCDENR and the local health department.

To protect public health and environmental quality, the Mecklenburg County Board of County Commissioners adopted Mecklenburg County Groundwater Well Regulations on October 5, 2004. The health regulations were developed through a stakeholder process in conjunction with NCDENR and GWS staff. The stakeholders group consisted of well contractors, a developer, Realtor, environmental consultant, health professional, regulated

Your Water Supply Well

A water supply well consists of a sanitary conduit constructed from the surface into the groundwater and is intended to provide for the delivery of a clean, safe and reliable drinking water source. Improperly sited, constructed or maintained water supply wells can result in chemical and bacteriological contaminants entering the well system and contamination of the groundwater resource. Damage to the casing or sanitary seal, nearby unused or improperly abandoned wells, and backflow of water from the household plumbing into the well can also result in well water becoming contaminated. Wells installed close to sites where groundwater is already contaminated can cause the contamination to migrate further from the source of the contamination and possibly into that well. The result is a larger area of groundwater contamination with more people exposed to the contaminants.

Well owners can protect their individual wells from these threats. Inspect your well annually and make repairs as needed. Clean out your well house — it isn't a storage bin for your lawn chemicals or paint. Move fertilizers, household chemicals, pesticides and herbicides at least 50 feet from the well. Make sure there is never standing water around the top of the well. Locate and properly abandon unused wells on your property. Install backflow prevention devices.

Test your drinking water well every year for nitrate and bacteria or other contaminates that may have resulted from nearby land uses. The presence of fecal coliform bacteria poses a serious health concern and is indicative of a failed septic system, leaking sewer line or improperly constructed or maintained well. If fecal coliform bacteria are present, the water should not be used for drinking or cooking. Total coliform bacteria in the water indicate that other potential disease causing organisms may be present in the water and is, therefore, a health concern. Nitrates or nitrites in drinking water can be very dangerous or even deadly to infants. These substances can enter the well from wastewater, manure, or fertilizers. Testing for semi-volatile organics and volatile organics is recommended if you have underground storage tanks (UST) on your property for heating oil or other petroleum products, if you live less than 1,500 feet from a business with a UST, or if your well is near a landfill.

industry, public and private well owners. The regulation establishes jurisdiction to govern the location, construction, repair, and abandonment of private water supply wells, non community public water supply wells and groundwater monitoring wells at pollution sites. Additionally the regulations establish areas of regulated groundwater usage (ARGU) within 1,500 feet of pollution sites in which the construction of new water supply wells may be restricted or prohibited.

GWS uses a Geographic Information System-based application to manage new water supply well permit applications for properties within ARGUs. A hydrogeologist knowledgeable in contamination issues is assigned to review the application to determine if a water supply well within the ARGU can be installed without significant risk of human exposure or risk of causing contaminants to migrate further from their source. If the findings show little or no risk, the water supply well is allowed with no additional conditions such as sampling requirements. Sometimes, a water supply well is permitted only with special construction or sampling requirements. In other cases, the risk is too high and the well permit is denied. The County health director may grant a variance from any local construction standard for a new well within an ARGU if it can be shown that the use of the water supply well will not endanger human health or welfare of the groundwater and that construction in accordance with the standards was not technically feasible in such a manner as to afford reasonable water supply at a reasonable cost.

In 2007, GWS permitted and inspected 164 new water supply wells. Fifty-one of these (about 31 percent) were reviewed further due to their proximity to pollution sites. Following review, 18 were approved with additional sampling or construction requirements, two were approved with construction variances, and three

Groundwater Contamination continued on page 58

Groundwater Contamination continued from page 57

were denied because the well could not be installed without significant risk of encountering contaminated groundwater or causing contaminated groundwater to migrate.

Your Septic System

A septic system generally is composed of a collection system that routes wastewater from a home or business into a central holding, or "septic" tank, where solids are deposited and digested by anaerobic bacteria. Grease, oil and fat along with some digested solids float to the top, forming a scum layer. The remaining partially clarified water enters a distribution box where it is routed into a series of distribution lines leading to a drain field where liquids are absorbed into the soil and waste products are further decomposed and transformed by naturally occurring bacteria in the soil.

Disposable diapers, dental floss, tampons and sanitary napkins, condoms, cigarette butts, fat, grease or oils, and household hazardous wastes should not be put into a septic system. These items are not biodegradable and clog the system.

Even under normal usage, septic systems require maintenance and vigilance. A healthy grass cover should be maintained over the drain field to prevent soil erosion. Trees and shrubs should not be planted too close to the drain field to prevent roots from obstructing or damaging the drain lines. Failure to pump and inspect the tank on a regular schedule can also result in the system failing. The effluent filter (installed on systems after 1999) should be removed and cleaned each time the tank is pumped. Reducing wastewater volumes through water conservation is important to extend the life of the drain field.

Conservation measures include using water-saving shower nozzles and appliances, repairing leaky plumbing fixtures, and washing only full loads of dishes and laundry. Wastewater from basement sump pumps and water softeners should not be discharged into the septic system to minimize the hydraulic load. In addition, surface runoff from driveways, roofs, and patios should be directed away from the drain field. The installation of irrigation systems in the septic drain field area is not permitted. Irrigation systems increase the amount of water delivered to the drain field and could potentially lead to a system failure. Building structures, sheds, pools, patios, or paved surfaces over the septic tank or drain field area is a sure way to cause the system to fail.

A potential source of both bacteriological and chemical contamination in the groundwater is improperly operated septic systems. It is estimated there are 32,500 septic systems operating in Mecklenburg County, with most serving private residences. Septic systems are used to treat and dispose of human waste and wastewater resulting from food preparation, laundry, dishwashing and bathing. The minimum distance between a septic system and water supply well is 50 feet. When the septic system is property constructed and operated, that distance provides an adequate buffer to prevent migration of harmful bacteria to a water supply well. GWS permitted and approved 414 new septic installations in 2007. Sixty-one violations were issued for malfunctioning septic systems in 2007. Improperly used or operated septic systems can be a source of groundwater contamination, leading to waterborne disease outbreaks or other adverse health effects. Septic tank systems are neither designed nor intended to treat or dispose of household chemicals such as cleaners and solvents. Household hazardous waste such as leftover paint and non-biodegradable cleaning solutions can pass directly from septic systems into the groundwater, potentially affecting water supply wells.

The primary local government effort to protect groundwater in Mecklenburg County is permitting and inspection of residential water supply wells and septic systems. Well owners can do their part to protect their water supply well by not using pesticides in the well house, not using the well house for storage of chemicals such as fertilizers, paint, gasoline, and by maintaining and protecting their septic system.

Bacteria in Mecklenburg County Drinking Water Wells

By Josh Sellers, Senior Environmental Specialist
Mecklenburg County Groundwater Services

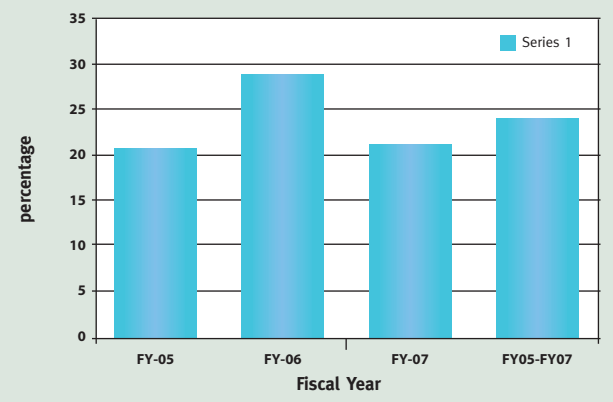
One frequently used measure of groundwater quality is the absence of disease causing bacteria. To assess bacterial quality, a sample is analyzed for total and fecal coliform. Total coliform bacteria are common inhabitants of the soil while fecal coliform bacteria are found in the intestines of warm blooded animals. There are a number of species of fecal coliform bacteria, including *Escherichia coli*, often called *E.coli*.

When a water sample is found to be positive for total coliform bacteria, a fecal coliform test is also conducted. While being positive for total coliform bacteria does not necessarily mean the water will cause illness, it indicates that a pathway exists for other disease-causing organisms to enter the groundwater. Presence of fecal coliform bacteria in a groundwater sample is considered to be a danger to human health.

Two to three percent of private wells in Mecklenburg County test positive each year for fecal coliform

Mecklenburg County's groundwater quality is continually being assessed. A primary bacterial assessment tool is the private well testing program. The private well testing program is a subset of all private wells sampled. These are existing wells that typically were installed before permits were required. Well owners request and pay for the sampling through the form, "Should I have my well tested?" In 2007, Mecklenburg County's Groundwater and Wastewater Services (GWS) program tested 93 private wells.

Percentages of Wells Testing Positive For Total Coliform Fiscal Years 05-07



In fiscal year 2006, almost three of every 10 private wells tested were positive for total coliform bacteria, or 28.9 percent. By comparison, fiscal year 2005 had the lowest bacterial positive rate in recent years. It was two of every 10 wells, or 20.6 percent. The average bacterial positives for the past three fiscal years is 23.7 percent. There are minor fluctuations in positive rates from year to year but most years are reasonably close to the statistical average.

Fecal coliform positive rates are consistently two percent three percent for the last three fiscal years.

Well program personnel with GWS believe many of the bacterial problems in groundwater result from the way wells are constructed and maintained. After gathering information and input from stakeholders in the well community, a local well regulation for Mecklenburg County was adopted October 5, 2004 and took effect January 1, 2005. Mecklenburg County's Groundwater Well Regulations now require inspection for the siting and construction of all potable wells drilled within Mecklenburg County.

Drinking Water continued on page 60

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Sampling well water

GWS staff is currently conducting research to assess how effectively the new regulations are addressing bacterial issues regarding wells within the County. The following process is being used: A group of newly constructed wells that have been in use for at least one year are in the process of being resampled for bacterial quality. Results from this group of wells will then be compared to a second group of wells that were constructed prior to the ordinance adoption. This comparison is being conducted over the same timeframe to eliminate the influence of varying weather conditions on the study results. Preliminary results are promising. However, concrete conclusions about the effectiveness of the County's new well regulations will be compiled in 2008.

Mecklenburg County is becoming increasingly proactive in addressing concerns about bacterial contamination caused by poor well maintenance. Well owners are urged to have their well water sampled yearly. Testing private wells allows the well owner to establish a water quality record over time, assess immediate water quality, and treat private wells if a problem is identified. Sampling can be done by a certified well contractor or by GWS for a fee.

Well owners are also urged to register all private wells with Mecklenburg County's Groundwater and Wastewater Services section. Registration allows GWS to notify known well owners of problems or trends regarding groundwater quality in specific areas of the County. Well owners are also asked to have the well head seals checked annually. A well seal should be fitted tightly into the well opening and there should be no gaps or worn areas allowing water to penetrate the seal. Well heads should also be checked yearly for gaps where the wiring enters the well head. The vent plug should also be checked annually for placement and soundness of construction.

Protect your well water from contamination

1. Have a professional test your well water quality once a year
2. Register your well at groundwater.charmeck.org
3. Inspect well heads, well head seals, and vent plugs annually

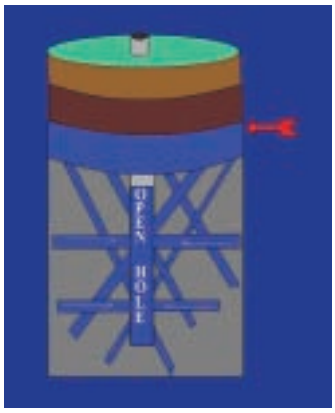
The Mecklenburg Priority List Program and Groundwater Contamination in Mecklenburg County

By Shawna W. Caldwell, P.G., Senior Environmental Specialist
Mecklenburg County Groundwater Services

What is the Mecklenburg Priority List Program?

The Mecklenburg County Priority List (MPL) was established in 1989 to assess areas in Mecklenburg County where the quality of the groundwater has been degraded by pollution and ensure that residents are neither drinking nor exposed to contaminated groundwater. In addition to identifying polluted wells, the program addresses health effects and gives the public information about alternate safe drinking water sources. The program also includes continued monitoring of drinking water not currently affected by pollution, but located within areas of concern.

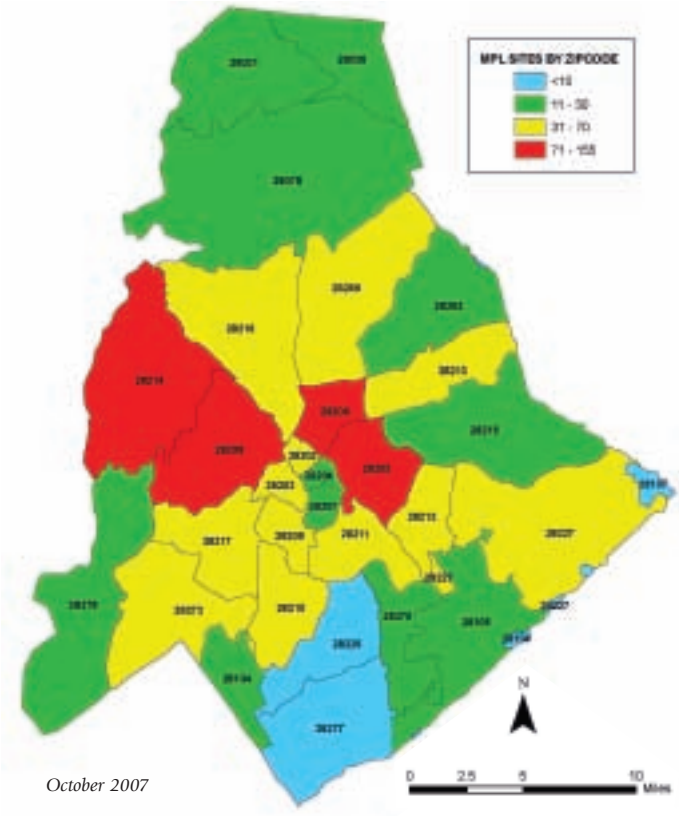
As of October 2007, Mecklenburg County had at least 1,130 MPL sites. Some of the sites have minor soil contamination while the contamination at other sites extends to the groundwater. The number of



MPL sites has more than doubled in the past 15 years. This does not necessarily mean that the number of contaminated sites has increased. Contamination at some sites has existed for decades, but we are now doing at better job of identifying sites with contaminated soils and groundwater. Almost 900 pollution release incident sites have been evaluated for the presence of water supply wells.

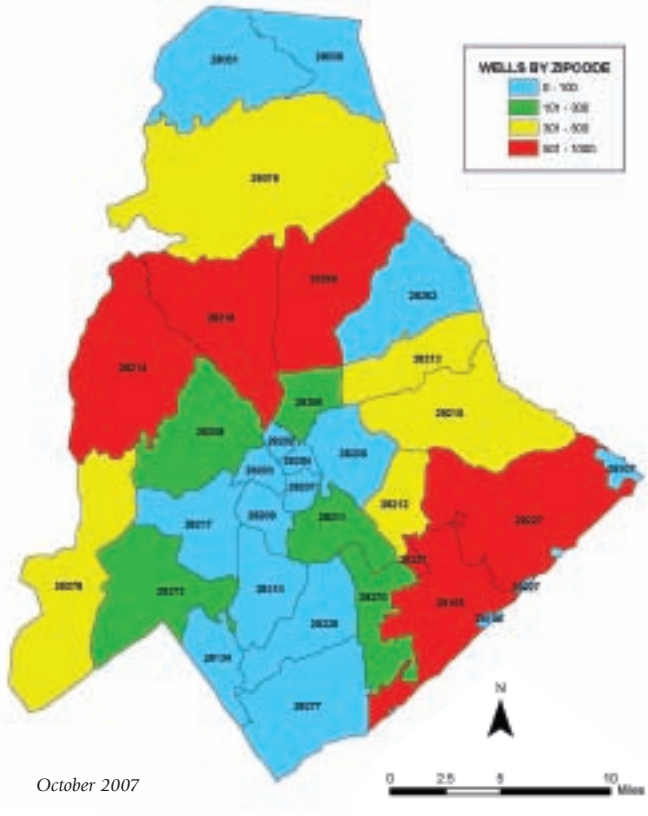
Priority List continued on page 62

Mecklenburg County MPL Sites



October 2007

Mecklenburg County Wells By Zip Code



October 2007

Priority List continued from page 61

How are Mecklenburg County Properties Designated as MPL Program Sites?

A site is added to the MPL when information is provided that reports contamination of soil or groundwater. The MPL is subdivided into active, inactive and unknown sites. Active sites have wells within 1,500 feet of the site, inactive sites do not have wells within 1,500 feet of the site and unknown sites have not been investigated. All of the sites are mapped electronically through a Geographic Information System for public review. New sites are added each year as new pollution incidents occur or are discovered. Some sites are removed each year as clean up of contaminated soils and groundwater is completed.

MPL Sources of Information on Groundwater and Soil Contamination

North Carolina Department of Environment and Natural Resources (NCDENR) Mooresville Regional Office Incident List

North Carolina Department of Environment and Natural Resources (NCDENR) Superfund Section
State Superfund Priority List (SPL)
State Superfund Priority Pending List

Mecklenburg County Land Use & Environmental Services (LUESA)

US Environmental Protection Agency (EPA) Federal Superfund List (NPL)

Landfills located in Mecklenburg County

How Does the MPL Program Work?

The MPL program is the only program of its kind in the region that actively investigates contaminated sites to ensure that residents are not drinking or at a risk of drinking contaminated groundwater. The program does not duplicate the state's efforts in addressing the clean up of contaminated sites. The MPL program is unique because the focus is to aggressively search for contaminated drinking water wells. When contamination is identified in a drinking water well, there is direct contact with the resident or homeowner to make certain they are aware of the contamination. The staff of Mecklenburg County Groundwater and Wastewater Services (GWS) works with the residents and with local, state and federal agencies to see that all citizens have a safe permanent drinking water source.

Groundwater contamination comes from many sources

When contaminated soil or groundwater is reported, the area in a 1,500-foot radius is assessed to identify drinking water wells. That assessment starts with the production of a map of the site and the surrounding properties. All properties and property owners are identified within 1,500 feet of the MPL site. After the site has been identified and located, existing files are reviewed to identify the type of contamination, contaminant concentration, date of incident, quantity of release, direction of the groundwater flow, proximity of hydrologic features and the presence of free product. These variables determine the type and the extent of contamination and the likelihood that a drinking water well has been affected. Following the review, staff determines the source of the drinking water for properties within 1,500 feet. A field survey is required to identify all the properties that use groundwater.

Wells located within the 1,500-foot radius are selected for sampling based on proximity and the extent and type of contamination. If the well is not contaminated, the owner and resident are notified in writing of the results. The owner and resident are notified verbally and in writing if their well has contamination. In addition, the state toxicologist is asked for a recommendation on the continued use of the water. All of this information is sent to the owner and the resident of the property. Additional wells in the area may be sampled to confirm that all contaminated wells have been identified.

When a responsible party is identified as causing the contamination and the contamination violates the drinking water standard, Mecklenburg County GWS works through the North Carolina Department of Environment and Natural Resources (NCDENR) who can require the responsible party provide drinking water to the resident. When the responsible party is not identified and the contaminant is above the drinking water standard, GWS coordinates with

Mecklenburg Priority List Sites Evaluated July 2006 through June 2007

No. Sites Evaluated	No. of Inactive Sites	Potentially Affected Population	No. of Wells Identified	No. of Wells Sampled	No. of Wells Impacted
124	98	609	203	80	6

local, state and federal agencies to provide a safe drinking water source. In some cases, municipal water is not available in the area and the contaminant or the contamination level does not meet the criteria for state and federal programs. In these cases, it is up to the home owner to obtain their own safe drinking water. Filtering the groundwater may be the only alternative if Charlotte-Mecklenburg Utilities (CMU) water is not available.

Wells within in the area of a MPL site are sampled periodically to determine if previously clean wells or wells below the drinking water standards have become contaminated or increased in pollutant concentration. Wells that were previously found to the meet the drinking water standard are not routinely sampled.

The public can access information on MPLs and wells through the Well Information System (http://maps.co.mecklenburg.nc.us/wells/).

What is the current status of the MPL Program and Groundwater Contamination in Mecklenburg County?

From July 2006 thru June 2007 GWS investigated 123 MPL sites. Twenty-six were active sites where 203 wells were identified within 1,500 feet of the sites. Six hundred and nine people are using groundwater as a drinking water source around these sites. Of 80 wells sampled, six had contamination at a concentration that does not meet the EPA Drinking Water Standard. (See MPL Summary table for 2006/2007 above.)

Sources of groundwater pollution in Mecklenburg County include gasoline stations, petroleum pipelines and bulk storage facilities, home heating oil tanks, dry cleaners, old industrial sites, accidental spills, unlined landfills, septic tanks, and sewer lines. Some of the wells found to be affected as part of the MPL program from July 2006 through June 2007 contained chemicals such as chlorinated solvents, and gasoline additives such as MTBE.

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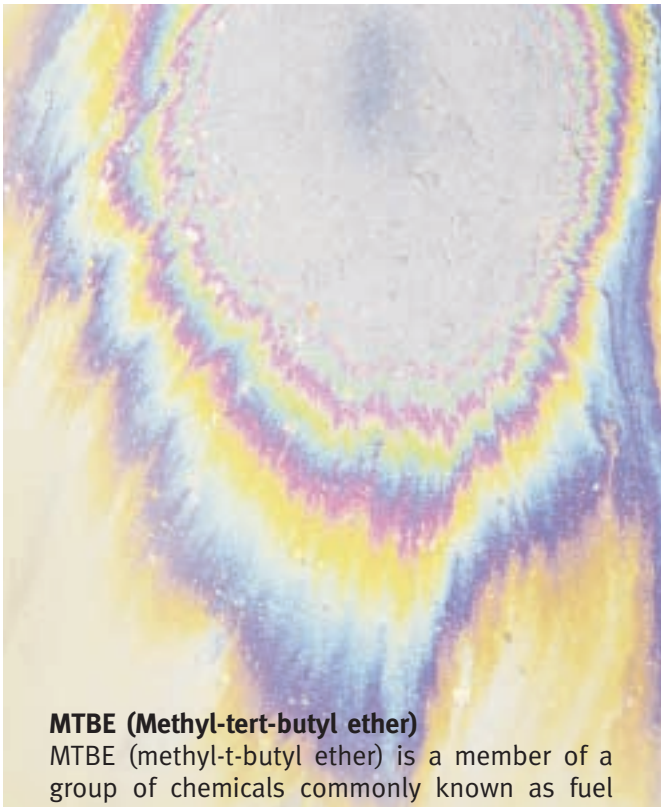

MTBE (Methyl-tert-butyl ether)

MTBE (methyl-t-butyl ether) is a member of a group of chemicals commonly known as fuel oxygenates. Oxygenates are added to fuel to increase its oxygen content. MTBE is used in gasoline throughout the United States to reduce carbon monoxide and ozone levels caused by auto emissions. MTBE replaced the use of lead as an octane enhancer since 1979.

A growing number of studies have detected MTBE in groundwater throughout the country; in some instances these contaminated waters are sources of drinking water. Low levels of MTBE can make drinking water supplies undrinkable due to its offensive taste and odor. The EPA's Office of Water has concluded that available data are not adequate to estimate potential health risks of MTBE at low exposure levels in drinking water but that the data support the conclusion that MTBE is a potential human carcinogen at high doses.

MTBE continued on page 64

MTBE continued from page 63

EPA has not set a national standard for MTBE, although some states have set their own limits. In North Carolina, the maximum contaminant level (MCL) allowed in drinking water for MTBE is 200 parts per billion (ppb).

There are opportunities for MTBE to leak into the environment (and potentially get in drinking water sources) wherever gasoline is stored, and there are opportunities for it to be spilled whenever fuel is transported or transferred. While federal and state programs minimize the potential for leaks and spills, no system is fool proof. Contamination of drinking water sources can occur from leaking underground and above ground fuel storage tanks, pipelines, refueling spills, automobile accidents damaging the fuel tank, consumer disposal of old gasoline, emissions from older marine engines, and to a lesser degree, storm water runoff, and precipitation mixed with MTBE in the air.

Because MTBE dissolves easily in water and does not cling to soil very well, it migrates faster and farther in the ground than other gasoline components, thus making it more likely to contaminate public water systems and private drinking water wells. MTBE does not degrade (break down) easily, and is difficult and costly to remove from groundwater.

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What is the future of the MPL Program in Mecklenburg County?

The MPL program continues to assess new and existing contamination sites in Mecklenburg County. Issues to be addressed include identifying other options for providing safe alternative sources of groundwater to citizens that, through no fault on their part, have a contaminated well and establishing criteria for the best options for treatment of contaminated groundwater. There are wells within the County that are contaminated above the drinking water standard, but do not meet the criteria for an existing state or federal assistance program. Carbon filter systems required to remove chlorinated solvents and petroleum compounds and additives are too expensive for many home owners. Government assistance is needed for well users when their only source of water is deemed a risk to their health, but below the NCDENR and EPA action levels for assistance. Once the treatment criteria are established, an educational program for homeowners and treatment system companies needs to be implemented. If a well user can afford a filter system, it is difficult for them to determine what system on the market will actually be the most effective. There are currently no certification criteria to make sure that the filter systems will adequately remove the contamination from the drinking water.

Surface Water 1987 Recommendations/2007 Results

By Rusty Rozzelle, Program Manager, Mecklenburg County Water Quality
Daryl Hammock, Team Leader, Water Quality
Charlotte-Mecklenburg Storm Water Services

The 1987 State of the Environment Report contained four general surface water quality issues followed by specific recommendations to the Board of County Commissioners on how to address these issues and protect and restore surface water quality.

The following bullet points list the actions taken over the past 20 years in Mecklenburg County to address these recommendations.

1987 In order to coordinate efforts to protect our lake system for drinking water and recreation, we recommend:

- Promoting a regional effort to protect the lakes by coordinating the efforts of local counties as well as efforts of North and South Carolina

  ◦ **January 2004:** Gaston and Mecklenburg counties conduct the Mountain Island Lake Workshop for the purpose of informing elected officials and area residents of the extreme importance of Mountain Island Lake to our growing area, and the need to better coordinate protection efforts for the lake.

  ◦ **August 2004:** The Mountain Island Lake Memorandum of Understanding (MOU) is adopted for the purpose of coordinating efforts to protect water quality conditions in the lake between the following parties: Mecklenburg, Gaston and Lincoln counties; cities of Charlotte, Gastonia, and Mount Holly; towns of Cornelius and Huntersville; Mountain Island Lake Marine Commission; and Centralina Council of Governments.

  ◦ **January 2005:** The handbook titled "Mountain Island Lake Watershed Protection Guidelines" is developed and distributed to the MOU parties.

  ◦ **June 2005:** Web site developed in support of the MOU to facilitate coordination and exchange of information between the MOU parties.

  ◦ **March 2006:** A second workshop is held to explore the possibility of expanding the Mountain Island Lake MOU to include Lake Wylie.

  ◦ **May 2007:** "Green Transformation" conference held to explore ways to expand cooperative efforts to include Lake Wylie.

- Promoting the need for regional wastewater treatment plants that ignore political boundaries in order to reduce the number of point sources discharging into our lakes.

  ◦ **2007:** Charlotte-Mecklenburg Utilities begins work to establish a regional wastewater treatment plant on Lake Wylie working with the town of Mount Holly in Gaston County.

Surface Water continued on page 66

Surface Water continued from page 65

• Reviewing and/or conducting appropriate studies to assess the needs and best uses for further protection of our drinking water sources.

◦ November 1988: Mecklenburg County launches a watershed management study to protect water quality conditions in Mountain Island Lake, resulting in the adoption of a watershed protection ordinance for the lake in March 1993.

◦ July 1993: Two separate stakeholder groups convene to develop watershed protection plans for Lake Norman and Upper Lake Wylie, resulting in the adoption of watershed protection ordinances for the lakes in June 1994.

◦ October 1999: Stakeholder group convenes to develop a watershed protection plan for Lower Lake Wylie, south of the Paw Creek tributary, resulting in the adoption of a watershed protection ordinance for the lake in July 2001.

◦ October 2006: Watershed Management Plan is developed and implemented for the McDowell Creek watershed with the objective of restoring degraded water quality conditions in McDowell Creek and downstream in Mountain Island Lake.

1987 In order to reduce the number of small wastewater treatment plants that have the potential to pollute our streams, we recommend:

• Obtaining increased authority for local government in the permitting and regulation of new and existing wastewater treatment plants and other point sources.

◦ 1988 through 2007: Work Plans are developed and implemented in cooperation with the N.C. Department of Environment and Natural Resources to coordinate efforts for the control of point source discharges in accordance with the Memorandum of Agreement (MOA) entered into between Mecklenburg County and State in August 1986.

• Expanding the municipal water and sewer system, thus limiting the number of point sources.

◦ 1987 through 2007: Charlotte-Mecklenburg Utilities has doubled the size of its municipal water and wastewater systems over the past twenty years resulting in the elimination of 19 private ("package") wastewater treatment plant discharges.

1987 In order to preserve and enhance the usability of our streams for recreation, fishing and aesthetics, we recommend the following:

• Promoting and supporting the Greenway Park System.

◦ In 1987, Mecklenburg County's greenway program was just getting started with seven miles of greenway developed. In 2007, 33 miles of greenway have been developed and 147 miles are planned for development.

• Promoting better control over point and non-point sources of pollution.

Monitoring:

◦ 1987 through 2007: Significant advancements are made to monitoring programs to better identify water quality problems and trends. Water quality indices have been developed to better communicate this data to the public.

Point Sources:

◦ January 1995: City of Charlotte adopts a pollution control ordinance prohibiting illicit discharges to storm drains and surface waters in compliance with Phase I Storm Water Permit requirements.

◦ November 2000 through May 2004: Mecklenburg County and the six towns adopt pollution control ordinances.

Non-Point Sources:

◦ January 1, 1993: Charlotte-Mecklenburg begins the operation of a storm water utility.

◦ March 1993 through July 2001: Water supply watershed protection ordinances go into effect on Lake Norman, Mountain Island Lake and Lake Wylie.

◦ November 1993: City of Charlotte initiates efforts to reduce pollution in storm water runoff in compliance with its Phase I Storm Water Permit.

◦ November 1999 through June 2001: The City of Charlotte, Mecklenburg County and the six towns adopt the S.W.I.M. ordinance for the establishment of stream buffers countywide.

◦ July 2005: Mecklenburg County and the six towns initiate efforts for the reduction of pollution in storm water runoff in compliance with their Phase II Storm Water Permit.

◦ June through November 2007: Post-construction storm water ordinances go into effect in the City of Charlotte and six towns based on a draft ordinance developed by a stakeholder group.

- Conducting educational programs to inform the general public about streams.

◦ June 30, 1986: First volunteer water quality initiative starts with the "Clean Stream Program" that involves citizens walking Charlotte-Mecklenburg streams, identifying and eliminating pollution sources, and removing trash.

◦ July 1994: The Storm Drain Stenciling Program is developed as a second volunteer program as a component of Charlotte's Phase I Storm Water Permit. The Clean Stream Program is enhanced and becomes the "Adopt-A-Stream Program".

◦ July 1998: Part of the S.W.I.M. Program includes the development and implementation of an ad campaign to educate the general public regarding surface water quality protection and to promote volunteerism in the Adopt-A-Stream and Storm Drain Stenciling Programs.

◦ FY2006-2007: A total of 1,640 storm drains are marked by 121 volunteers combining for over 200 volunteer hours.

◦ FY2006-2007: A total of 90 volunteer groups involving 1,106 volunteers and over 2,500 volunteer hours complete 94 stream clean-ups and remove over 22,000 pounds of trash from Charlotte-Mecklenburg streams.

1987 In order to better protect our streams from pollution associated with soil erosion, we recommend the following:

- Strengthen City and County erosion control ordinances by increasing all fines to the maximum allowed level of $100 per day.

◦ September 2000 and May 2002: Charlotte-Mecklenburg erosion control ordinances and program efforts are significantly enhanced resulting in increased enforcement. Maximum fines are set at $5,000 per day, per violation.

◦ March 2005: Charlotte-Mecklenburg Certified Site Inspector (CMCSI) training begins with the goal of training the private sector to inspect their construction projects for proper sedimentation and erosion control to ensure compliance with local and state regulations.

- Hiring and training more inspectors.

◦ Between 1987 and 2007: The number of erosion control inspectors in the City and County has more than doubled to the current total of 14.

- Consolidating ordinance enforcement with existing water quality programs.

◦ July 2002: Erosion control efforts are consolidated under Charlotte-Mecklenburg Storm Water Services' Water Quality Programs.

- Prosecuting ordinance violators more aggressively.

◦ No data is available regarding the number of penalties assessed in 1987. However, during FY2006-2007, Mecklenburg County assessed 38 penalties and collected $133,600 in fines. The City of Charlotte assessed 107 penalties and collected $401,560 in fines. During FY2006-2007, the total number of penalties assessed countywide is 145 for a total of $535,160 in fines collected.

Stream and Lake Water Quality: Then and Now

By Sharon Foote, Public Information Specialist, Mecklenburg County Water and Land Resources
Jeff Price, Environmental Analyst, Mecklenburg County Water Quality Program Storm Water Services

1987: "We are fortunate that surface water quality in our lakes and streams is generally good." The biggest threats to water quality were point source pollution associated with illegal dumping and discharges associated with poorly operated and maintained wastewater treatment plants.

2007: Point source discharges of pollution such as private treatment plants, sanitary sewer overflows and illegal discharges have decreased an estimated 22%. However, it is estimated that since 1987, non-point source pollution in storm water runoff has increased 55%.

Urban-Industrial Streams 1987
- Generally "poor" water quality
- "Subjected to…treated wastewater effluent and leaking sanitary sewer lines"
- "Channelized with their banks lined with rocks"

Urban Streams 2007
- Most urban streams are "impaired" or "partially supporting" their designated use
- Bacterial problems often due to sanitary sewer overflows and animal waste, usually related to grease-clogged sewer lines
- A significant decrease in the number of private wastewater treatment plants and enhanced treatment technology have reduced point sources of pollution.
- The completion of numerous stream restoration projects has returned 50,000 linear feet of streams to a more natural condition

Suburban Streams 1987
- Generally "fair" water quality
- Primary source of pollution is sedimentation from land-disturbing activities

Suburban Streams 2007
- Most suburban streams are "partially supporting" their designated use
- Primary source of pollution is sediment from construction sites and from in-stream channel and stream bank erosion

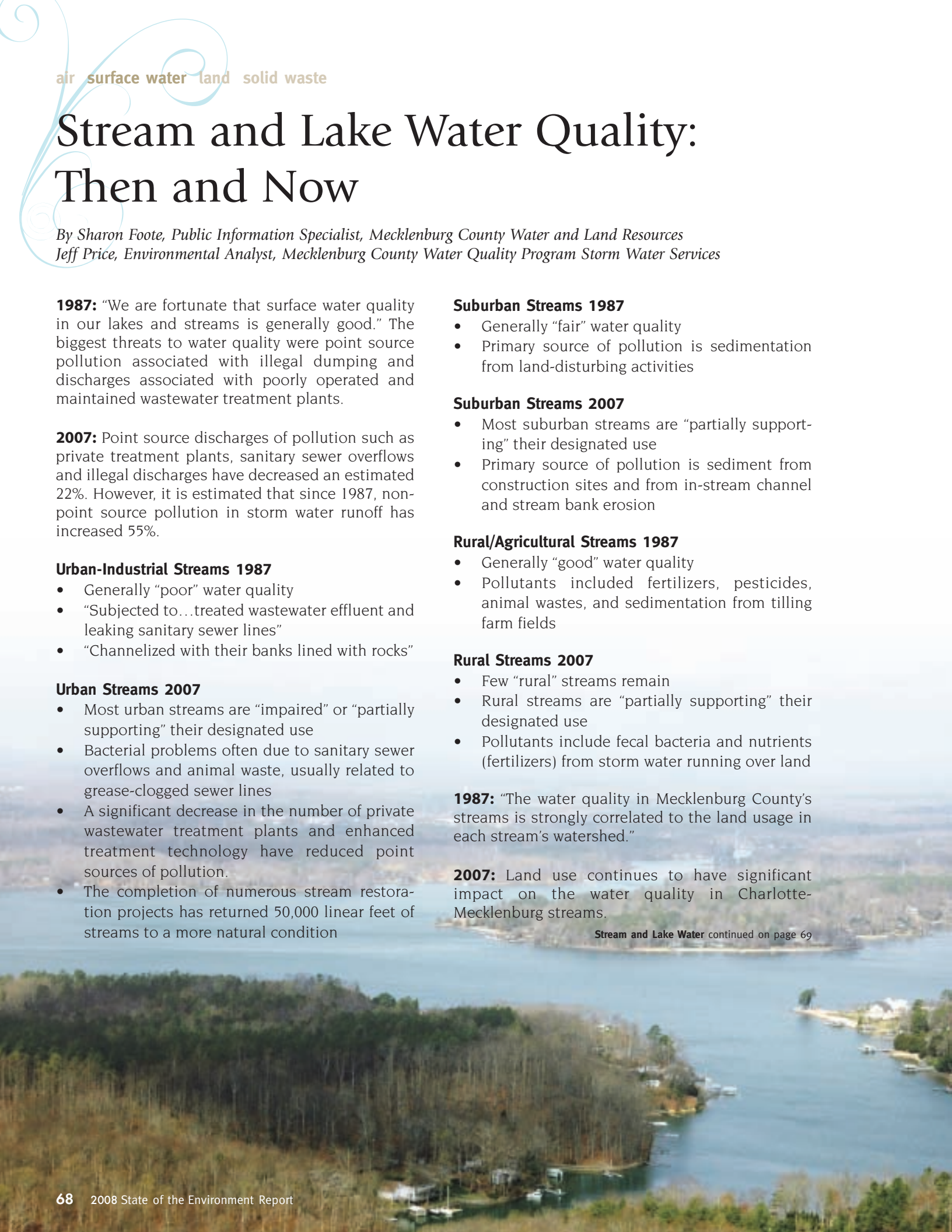
Rural/Agricultural Streams 1987
- Generally "good" water quality
- Pollutants included fertilizers, pesticides, animal wastes, and sedimentation from tilling farm fields

Rural Streams 2007
- Few "rural" streams remain
- Rural streams are "partially supporting" their designated use
- Pollutants include fecal bacteria and nutrients (fertilizers) from storm water running over land

1987: "The water quality in Mecklenburg County's streams is strongly correlated to the land usage in each stream's watershed."

2007: Land use continues to have significant impact on the water quality in Charlotte-Mecklenburg streams.

Stream and Lake Water continued on page 69



	1987 Amount	1987 Percentage	2007 Amount	2007 Percentage
Surface Water Data Comparisons				
Surface Water Use in Mecklenburg County				
Drinking water supplied by CMU	61.941 mgd		113.672 mgd	
Population using CMU drinking water	350,000 people	78%	750,000 people	79.50%
Recreational Use of Lakes				
Fishing licenses sold annually in Mecklenburg County	22,634		25,323	
Registered boats in Mecklenburg County	14,119		17,787	
General Surface Water Discharge Information				
Permitted Surface Water Discharges	80		53	
Amount of non-point source pollution	Unknown		Unknown	
Stream samples collected not meeting standard	125		*	
Lake samples collected not meeting standard	32		20	
Exceedances of permit limits by WWTPs	59		397 violations at 14 facilities	
Surface Water Discharge Volumes				
Point Sources/Permitted Volume Amounts:				
a. Municipal Wastewater Treatment Plants	65.79 mgd		117.6 mgd	
b. Non-Municipal WWTP	2.32 mgd		5.62 mgd	
c. Industrial WWTP	4.23 mgd		3.83 mgd	
d. Other NPDES Discharges	N/A		0.05 mgd	
Non-point Sources:	Unknown		Unknown	
Number of Surface Water Discharge Sources				
Point Sources:				
a. Municipal WWTPs	13**		5	
b. Non-Municipal WWTPs	27**		20	
c. Industrial WWTPs	2**		17	
d. Other NPDES Discharges	38**		10	
Non-point Sources:	Unknown**		Unknown	
Surface Water Quality Standards Exceeded (not met) for Year				
Stream Monitoring:	**1987 Number of samples not meeting standard**	**1987 Percent of samples not meeting standard**	**2007 Number of samples not meeting standard**	**2007 Percent of samples not meeting standard**
Fecal Coliform Bacteria	116	74%	196	47.46%
Dissolved Oxygen	9	5.7%	11	2.27%
Lake Monitoring:				
Lake Norman-Fecal Coliform	6	3.8%	0	
Mountain Island Lake-pH	1	0.60%	0	
Mountain Island Lake-Fecal Coliform	3	2.00%	0	
Lake Wylie-Dissolved Oxygen	1	0.6%	0	
Lake Wylie-pH	1	0.6%	0	
Lake Wylie-Fecal Coliform	20	12.7%	9	
Lake Wylie-Chlorophyll a	Not sampled in 1987		1	
Lake Wylie-Turbidity	Not sampled in 1987		10	
Standards Exceeded for Groups of Known Sources				
a. Municipal WWTPs	17		20	
b. Non-Municipal WWTPs	41		372	
c. Industrial WWTPs	1		1	
d. Other NPDES Discharges	0		4	
Total exceedances of NPDES Permit Limits by WWTPs	59		397	
Surface Water Activity Levels				
Citizen Requests for Service	583		597	
Emergency Response Incidents	39		50	
NOVs issued by County Water Quality Program	31		35	

* 2007's stream sampling methods do not allow for an accurate comparison to stream sampling of 1987
** Due to changes in record-keeping, accuracy of the 1987 numbers cannot be verified

Definitions and Explanations:
mgd: million gallons per day
Non-point Source Pollution: Pollution that cannot be traced to a single point or source because it comes from many places or a widespread area
NPDES: National Pollutant Discharge Elimination System, a component of the federal Clean Water Act
NOV: Notice of Violation of local Water Quality/Storm Water Pollution Ordinances, including Erosion Control and SWIM regulations
Request for Service: Request by a citizen for County Water Quality staff to investigate suspected surface water pollution
Emergency Response: Response by Water Quality staff to site of water pollution that may pose risks to people or the environment
WWTP: Wastewater Treatment Plant

Stream and Lake Water continued from page 68

The statements in the 1987 State of the Environment Report regarding Mecklenburg County streams were based on data analysis, observations, and best professional judgment of that time. However, water quality monitoring has changed significantly since 1987. 2007's assessments are based on different monitoring locations, sampling frequency, water quality parameters of interest, analysis techniques, and State standards. These changes in water quality monitoring practices make specific comparisons over the 20 year period difficult.

Monitoring Water Quality in Individual Watersheds

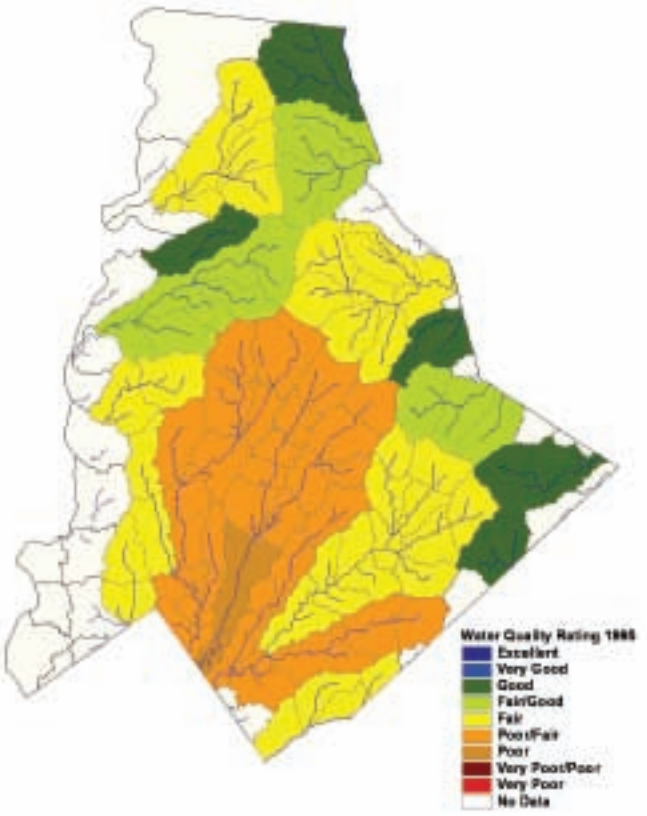
Mecklenburg County began using a Water Quality Index in 1988. Large amounts of lake and stream data was compiled into an easy-to-understand rating system using color-coded maps. Over the years, the index was modified to make it more accurate.

A major change was made in 1995 when benthic macroinvertebrate data was added. In addition to monitoring water chemistry, staff began tracking the types and populations of aquatic life and insects in streams to more accurately reflect in-stream water quality. In 1995, the Water Quality Index became known as the Water Quality Rating. The WQR was used from 1995 until 2007.

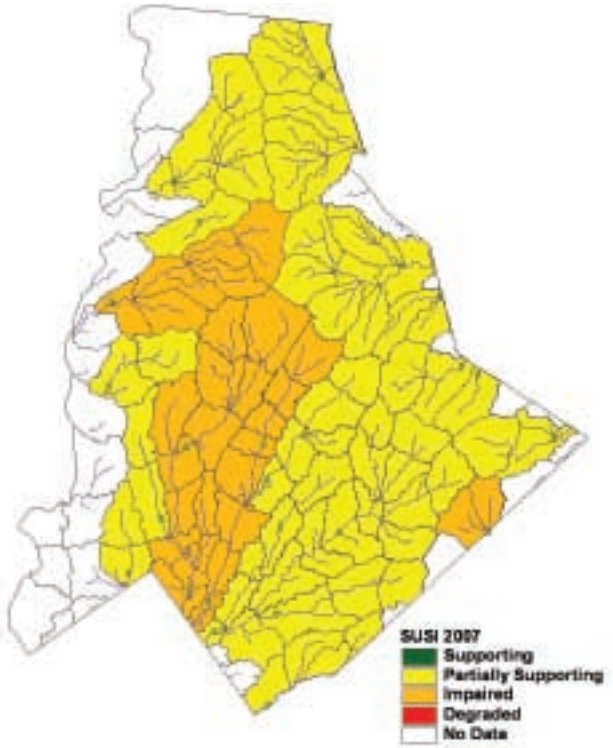
In 2006-2007, Charlotte-Mecklenburg Storm Water Services developed a new reporting tool: the Stream Use-Support Index (SUSI). The goals are to accurately reflect surface water conditions in Charlotte-Mecklenburg and be consistent with State classifications, terminology and water quality assessments. SUSI incorporates water chemistry, dissolved oxygen, temperature, turbidity, aquatic insect diversity and abundance, as well as in-stream habitat assessments. Because of significant differences in how data is collected and reported, SUSI maps cannot be directly compared to Water Quality Index or Water Quality Rating maps of the past.

The 2007 Countywide Overall Designated Use-Support Rating is "partially supporting." This means most sub-basins and watersheds partially support the State's designated uses of the streams for secondary recreation (defined as wading or boating,) fishing, wildlife, and for fish and aquatic life propagation and survival.

Overall Water Quality 1995



Stream Use-Support Index 2007



Lake Water Quality Then and Now

Lake Water Quality Index Comparison

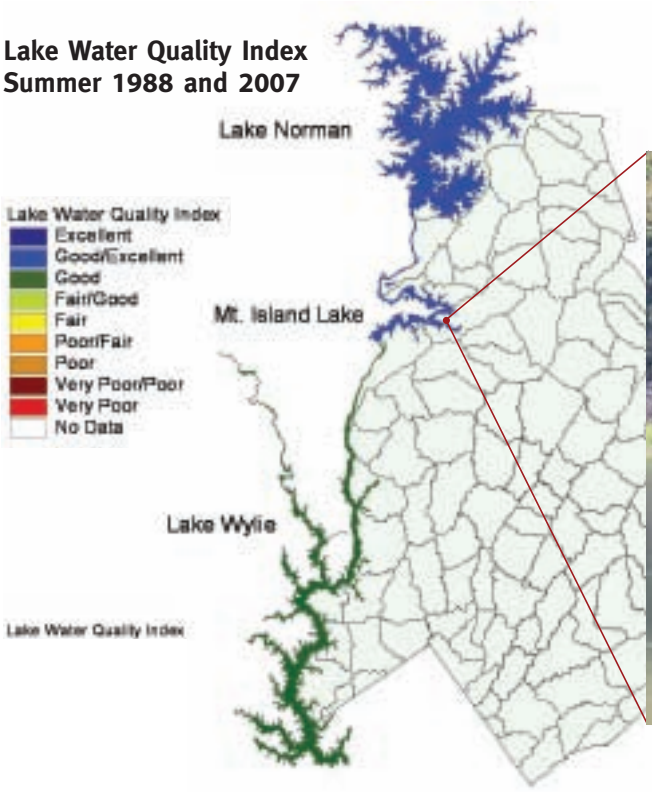
Summer 1988

Lake Norman:	82.5	(Good-Excellent)
Mountain Island Lake:	75.4	(Good-Excellent)
Lake Wylie:	67.8	(Good)
All three combined:	75.23	(Good-Excellent)

Summer 2007

Lake Norman:	84.0	(Good-Excellent)
Mountain Island Lake:	76.6	(Good-Excellent)
Lake Wylie:	72.2	(Good)
All three combined:	77.6	(Good-Excellent)

Lake Water Quality Index Summer 1988 and 2007



Water quality data collected from the three lakes shows improvement since 1988. Lake Wylie continues to have the lowest water quality of the three. A primary reason is pollution in Mecklenburg County creeks that flow into Lake Wylie.

In 1988, Mecklenburg County began reporting lake water quality data utilizing a Lake Water Quality Index (LWQI) that is still used today. The LWQI incorporates nine common water quality parameters: temperature, dissolved oxygen, specific conductivity, Secchi depth (clarity of the water,) pH, total phosphorus, total nitrate, chlorophyll-a (indicator of algae) and alkalinity. The nine sub-index scores are combined to create the overall LWQI score.

Lake Stressors 1988

- Algae blooms and discolored water linked to bacteria from wastewater treatment facility discharges. Some treatment plants discharging into the lake were not in Mecklenburg County
- Water quality affected by sediment from construction projects and stream bank erosion

Lake Stressors 2007

- Mountain Island Lake affected by sediment from McDowell Creek
- Lake Wylie affected by sediment and nutrients (fertilizers) from storm water runoff and wastewater discharges

The most recent Catawba River Basinwide Water Quality Plan identified Lake Wylie as eutrophic, or containing excessive amounts of nutrients. Excess nutrients such as phosphorus can cause algal growth that depletes oxygen. The result can be fish kills and degraded quality of drinking water supplies.

Stream and Lake Water continued on page 72

Stream and Lake Water continued from page 71

Surface Water Quality-Specific Pollutants

Stream sample showing fecal coliform

Fecal Coliform

Mecklenburg County's Water Quality Program has been collecting fecal coliform bacteria samples from local streams and lakes for more than 35 years. The bacteria often come from sanitary sewer overflows and animal waste, affecting the environment and having the potential for human health impacts. When fecal coliform levels do not meet the State standard, the water is considered unsuitable for prolonged human contact.

Comparing 1987 to 2007, the concentration of baseflow fecal coliform bacteria in our streams has improved. In 1987, 52.5 percent of the samples collected met the State standard for a single sample (400 col/100ml). In other words, almost half of stream samples in 1987 did not meet the State's basic health and safety criteria for human contact.

In 2007, 69.5 percent of these samples met the State standard for fecal coliform. This represents a significant increase in the number of samples collected that comply with the State standard.

20 Year Comparison Fecal Coliform by Watershed

Fecal coliform levels vary widely from creek to creek. Mecklenburg County uses maps to track pollution levels in each watershed. Monitoring results are compared to the State standard. For each month that a site complies with that standard, points are awarded and an overall score is developed. The scores are averaged for a 12-month period to determine a final score.

The State has given each creek an "intended use." In Charlotte-Mecklenburg, all streams are expected to be used for recreational purposes. The overall water quality score of a creek is compared with its intended use. Streams that comply with State standards more than 90 percent of the time are considered "Fully Supporting" of that use. Other designations are "Partially Supporting, "Impaired," and "Degraded."

Stream Monitoring

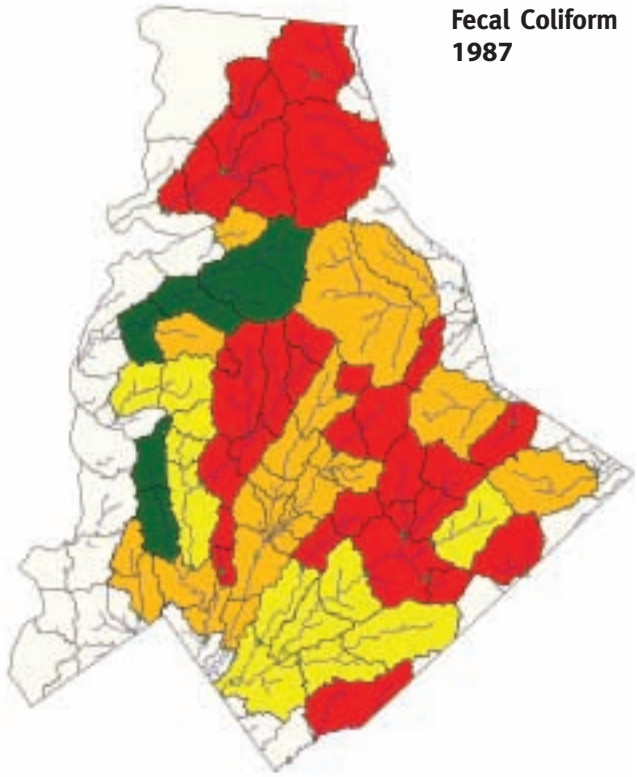
The various categories are color coded on maps illustrated on page 73.

In 1987, Mecklenburg County's overall fecal Coliform index rating was 51.8. That was in the category of "Impaired" for the designated use. The 1987 map shows more watersheds depicted in red and orange than in yellow or green. That indicates higher fecal coliform observations and poorer water quality.

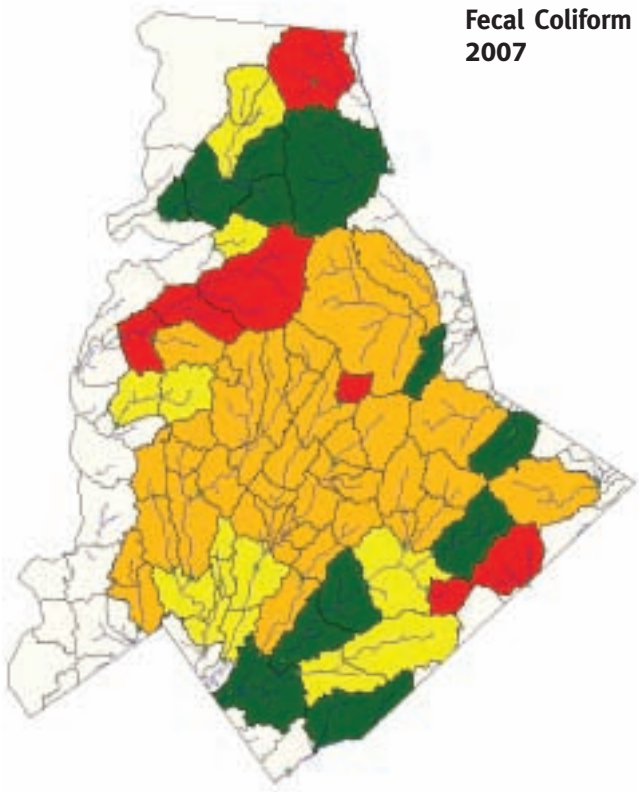
In 2007, the overall fecal coliform index rating improved to 69.5. This number also falls into the general category of "Impaired" for designated-use, but it is now at the upper limit of the category. This indicates a decrease in fecal coliform and an improvement in water quality. As you can see in Map 2, there are fewer watersheds depicted in red. While there still is a fecal coliform problem in baseflow surface water in Mecklenburg County, improvements have been made in the last twenty years.

Two decades ago, many of the reported sewage overflows spilling into creeks came from non-municipal wastewater treatment plants. As municipal sewer services have been extended into more of the County, there are fewer non-municipal treatment plants and more sophisticated wastewater treatment.

Compared with 1987, watersheds located downstream of wastewater treatment plants showed significantly lower fecal coliform levels in 2007.



Fecal Coliform 1987



Fecal Coliform 2007

20 Year Comparison Fecal Coliform in Lakes

1987 Fecal Coliform Violations in Lakes	
Lake Norman:	6
Mountain Island Lake:	3
Lake Wylie:	20
Total:	29

2007 Fecal Coliform Violations in Lakes	
Lake Norman:	0
Mountain Island Lake:	0
Lake Wylie:	6
Total:	6

20 Year Comparison Other Pollutants in Streams

Sediment

Quote from 1987 SOER:
"Severe erosion and sedimentation problems exist in areas under construction … The quantity and velocity of stormwater runoff … contributes to urban stream bank erosion while increasing the frequency and magnitude of flooding."

The struggle against sediment in our surface water has intensified over the past two decades. Eroded soil in our streams and lakes reduces water quality and damages aquatic habitat. The problem goes far beyond muddy water. Surges in storm water runoff overwhelm our creeks, causing erosion, bank instability, and degradation. The damage to stream channels is widespread and significant. Repairing that damage could cost over $1 billion. We also must prevent future damage to stream channels and the resulting sediment pollution.

Fish Monitoring

Stream and Lake Water continued on page 74

Stream and Lake Water continued from page 73

Nutrients

Quote from 1987 SOER:
"Many treatment plants dump treated wastewater still high in nutrients into Sugar, Little Sugar and McAlpine creeks. The water color has turned to dark gray-green … and these streams are no longer suitable for recreational activities such as fishing and other uses such as irrigation. Aquatic organisms such as fish and their food organisms are stressed under these conditions."

Wastewater treatment plants still discharge effluent to our streams containing nitrogen and phosphorus. Indicators show nutrient levels in many streams have decreased in the past 20 years. Charlotte-Mecklenburg Utilities has completed major treatment plant improvements to reduce nutrients, and upcoming plant projects will further reduce this point source pollution.

In 1987, Water Quality staff did not do extensive stream monitoring of nutrient levels. Now, staff analyzes monthly stream and lake water samples for fecal coliform, total phosphorus, turbidity, dissolved oxygen, pH, temperature, copper, chromium, lead, and zinc. Streams are monitored to determine aquatic habitat and the numbers and types of aquatic life living in the water. In 1987 as well as in 2007, there is relatively wide variation in water quality from creek to creek, and watershed to watershed. While there is not precise data from the 1980s, measurements such as dissolved oxygen, pH, temperature and metals show water quality has generally improved in the past two decades. Because data collection in 1987 was not as extensive as it is today, we are not able to create a 20 year comparison of those measures of water quality.

Wastewater Treatment: Successes and Challenges in the Last 20 Years

By Erin Culbert, Environmental Outreach Coordinator, Charlotte-Mecklenburg Utilities

Wastewater treatment is vital in protecting health, water quality and quality of life. Expanding services, improvements in technology and more stringent permit limits for treatment plants have marked some of the most prominent changes in the past two decades.

As the consolidation of municipal water and wastewater systems continued through the 1980s, Charlotte-Mecklenburg Utilities entered into operating agreements with the six towns in Mecklenburg County. This action decreased the number of municipal wastewater treatment plants to its current number of five. Additionally, as wastewater services extended throughout the growing county, the number of privately operated treatment plants also decreased.

As important as wastewater treatment is to health and safety, it also has significant implications for the environment. Charlotte-Mecklenburg Utilities annually receives performance awards for treatment plant permit compliance. Its Mallard Creek Water Reclamation Facility also received the prestigious ISO 14001 certification in 2007, which demonstrates environmental commitment and pollution prevention.

One of the biggest challenges in operating its 3,800-mile wastewater system continues to be sanitary sewer overflows. Utilities is taking a multifaceted approach in addressing this problem by increasing system cleaning, improving infrastructure and educating residents on proper wastewater disposal. About $10 million is invested each year to repair or replace older sewer lines, and several large sewer projects are under way along Long, Irwin, Briar and McAlpine creeks to add wastewater collection line capacity and prevent overflows.

We need the community's help to protect our waterways. When disposing of cooking grease and oils, be sure to pour them into a lidded container and dispose of it in the trash. Grease poured down drains is the leading cause of overflows throughout the Charlotte-Mecklenburg area. Staying grease-free will reduce the risk of sewer backups in public or private plumbing, while protecting our water quality.

Main CMU drinking water intake on Mountain Island Lake

Findings and Recommendations 2008

By Rusty Rozzelle, Program Manager, Mecklenburg County Water Quality
Daryl Hammock, Team Leader, Water Quality
Charlotte-Mecklenburg Storm Water Services

Findings

- Mecklenburg County has more than 3,000 miles of streams with year-round flow.
- A major river drainage divide separates Mecklenburg County with one-third of the County draining to the east into the Yadkin-Pee Dee River Basin and two-thirds draining to the west into the Catawba River Basin.
- Mecklenburg County has more than 190 miles of shoreline along Lake Norman, Mountain Island Lake, and Lake Wylie. These lakes provide a raw drinking water source to more than one million residents in Mecklenburg, Lincoln and Gaston counties.
- Water pollution can be grouped into two categories: point and non-point sources. Point sources of pollution come from a fixed location such as a pipe. Non-point sources usually originate in storm water runoff.
- As has been the case for the past 20 years, the most common pollutants in our surface water are sediment and fecal coliform bacteria from both point and non-point sources.
- Twenty years of comprehensive efforts to protect and improve water quality conditions in Mecklenburg County have resulted in a 22 percent decrease in point sources of pollution such as private treatment plants, sanitary sewer overflows and illegal discharges. Since the implementation of the S.W.I.M. Program in 1997, the number of stream miles suitable for human contact has increased by 15 percentage points. Sixty-two percent of streams now meet this benchmark, up from 47 percent. This is measured when it is not raining and streams are not subject to non-point source pollution from storm water flow.
- Although point sources of pollution in Mecklenburg County have decreased in the past 20 years, rapid growth has tripled the amount of developed land. This has resulted in an estimated 55 percent increase in non-point source pollution contained in storm water runoff from developed areas.
- Over the past 20 years, Mecklenburg County has experienced a 70 percent decrease in treed and naturally vegetated groundcover, which serves to filter storm water pollution and protect water quality.
- Population growth has led to a significant increase in the amount of pavement and other impervious surfaces. This results in a decrease in storm water absorption into the soil and a corresponding increase in the volume and velocity of storm water runoff entering creeks and lakes. Stream channels in Mecklenburg County have been significantly eroded by this increased amount of rapidly moving storm water, resulting in the destruction of aquatic habitats and discharge of mud and other pollutants downstream.
- More than 73 percent of major stream miles in Mecklenburg County have been designated by the EPA as impaired or not meeting their designated uses. The EPA lists the primary source of impairment as "increased land development activities."

Key Findings continued on page 76

Key Findings continued from page 75

- State agency review of stream and wetland impacts is limited to environmental impacts and does not consider whether the proposed drainage system modifications are designed according to local standards or practices. These modifications, such as the installation of culverts become part of the Storm Water Services' maintenance responsibility, even though they may not have been designed or installed properly.

- State agency review fails to consider the cumulative environmental impacts to local waters. Stream and wetland restoration projects that are intended to compensate for these impacts are being built outside of Mecklenburg County due to cost, which reduces Mecklenburg County's ability to meet state water quality standards.

- Enforcement is severely limited by state agency staffing and budget. The agency representative for Mecklenburg County oversees the regulatory program for eight counties in addition to Mecklenburg. Many violations are considered minor or insignificant and penalties are not adequate enough to encourage compliance.

Recommendations

1. Implement the Post-Construction Storm Water ordinances adopted by the City of Charlotte, towns and County. Fund and support ordinance implementation adequately, including reviews, inspections, enforcement, and maintenance activities, so that the intent and goals of the post-construction ordinances are met. Evaluate these ordinances and the accompanying design manual on a regular basis to determine their effectiveness, and modify as necessary to ensure that established water quality goals are met.

2. Develop and fund implementation of watershed management plans to restore those watersheds that have been identified as impaired or not meeting their designated uses and to protect those that have remained fully supporting of their uses.

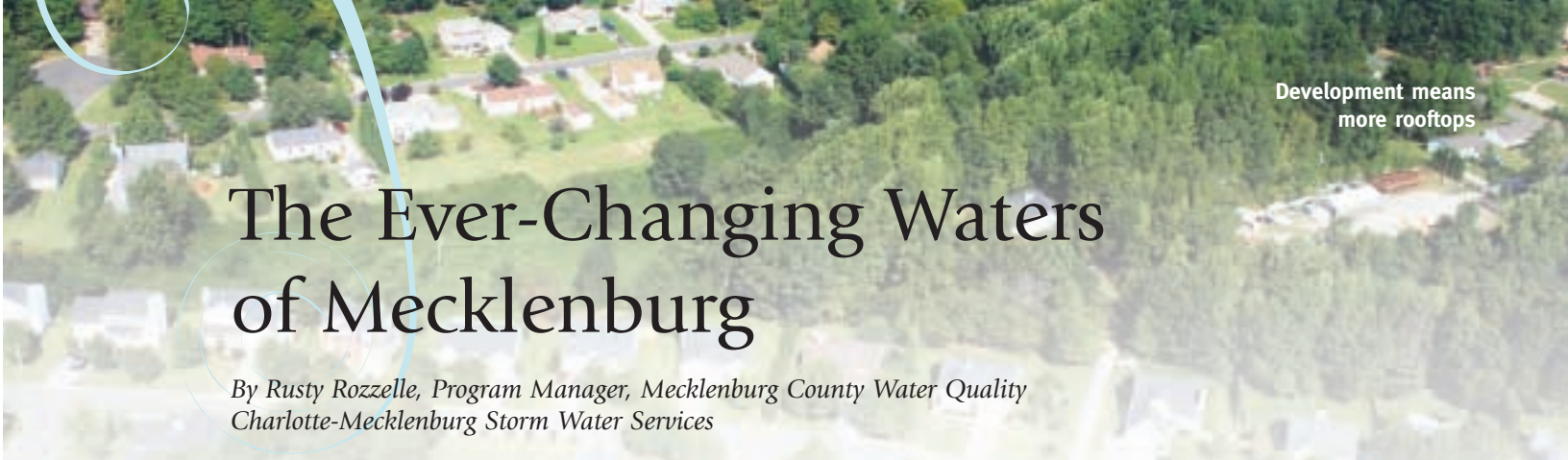
3. Expand efforts to acquire open space, which is becoming increasingly scarce as the community continues to grow. Target the purchase of this open space where it will have the greatest benefit to water quality such as areas where best management practices can be installed to achieve the pollutant removal targets specified in the watershed management plans described in #2 above.

4. Increase water quality monitoring activities as well as data analysis and response to provide increased protection of our lakes from pollution, particularly sediment, which is becoming an increasing threat as the areas around the lakes continue to experience rapid development.

5. Develop and implement efforts to increase volunteerism in protecting and restoring water quality conditions. Encourage and offer incentives for "green development." Promote environmental stewardship on a countywide level by recognizing and rewarding the good work and accomplishments of both the public and private sectors.

6. Support the expansion of educational efforts by providing the schools special programs and resources that encourage students to be proactive in the protection of the environment. Continue to raise awareness through volunteer programs, educational presentations, and media campaigns so that residents adopt behaviors that protect water quality.

7. State and federal agencies are charged with stream and wetland protection. Regulations at the state and federal levels are often not adequate to protect streams and wetlands found locally. Severe state and federal budget constraints as well as urban development pressures often result in damage to or loss of wetlands and natural stream corridors and adjoining floodplains. These resources are being lost forever with state and federal approval, adversely affecting water quality, habitat, and quality of life of our citizens, and at local public expense. Additionally, the loss of wetlands, and piping or modification of streams increases the strain on our local storm water program. Local stream and wetland protection measures are recommended, as well as support for adequate staffing at the state and federal levels.



Development means more rooftops

The Ever-Changing Waters of Mecklenburg

By Rusty Rozzelle, Program Manager, Mecklenburg County Water Quality
Charlotte-Mecklenburg Storm Water Services

Since 1987, the population in Mecklenburg County has nearly doubled from 437,760 to 857,379. This population increase has resulted in a tripling of the amount of developed land in the County from approximately 54,000 to over 154,000 acres. On average, 9.86 acres, which equates to nine football fields, is converted daily from undeveloped to developed land uses in Mecklenburg County. The increase in developed land has resulted in an increase in the pollution discharged to our lakes and streams in storm water runoff such as oil, antifreeze, metals from tire and brake pad wear, pesticides, fertilizers and a variety of other chemicals. These are called non-point source pollutants. The cumulative impact of these pollutants on Mecklenburg County's surface water quality is significant. Over the past 20 years, the pollution generated from developed areas of the County has increased by an estimated 55 percent. The effect of this increased pollution is compounded by the fact that Mecklenburg County has experienced a 70 percent decrease in treed and naturally vegetated groundcover, which serves to filter storm water pollution and protect water quality.

Increased land development and urbanization also results in an increase in the volume and velocity of storm water runoff entering surface waters. In Mecklenburg County, even with our relatively impermeable clay soils, an inch of rainfall on an acre of forest does not generate any storm water runoff. Instead, the rainwater is absorbed into the soil and taken up by plants or provides recharge to groundwater. If the trees are removed and replaced with an acre of impervious asphalt, a total of 27,000 gallons of storm water runoff is generated from the same inch of rainfall. In addition, this runoff typically enters surface waters through the piped storm drainage system instead of flowing over the land. As the amount of storm water increases, it flows faster. This increased volume and velocity of storm water runoff entering streams causes their banks to erode. The sediment and silt degrades water quality and destroys aquatic habitat. In Mecklenburg County, streams degraded in such a manner are commonplace in urbanizing areas.

The combined effects of increased non-point source pollution, decreased natural ground cover, and increased stream channel erosion has resulted in significant degradation of surface water resources in Mecklenburg County. Over 73 percent of the major stream miles in the County have been designated by EPA as impaired or not meeting their designated uses. Increased land development activities are listed as the primary source of this impairment.

Mecklenburg County's population growth has also increased demand for clean, usable surface water resources. Charlotte-Mecklenburg Utilities (CMU) currently supplies an average of 113 million gallons of drinking water a day to 750,000 customers from surface water intakes located on Lake Norman and Mountain Island Lake. In 1987, CMU operated only one intake, which was on Mountain Island Lake, and supplied an average of 62 million gallons of drinking water a day to approximately 350,000 customers in Mecklenburg County. Over the past twenty years, CMU's customers have doubled and their water withdrawal from the lakes has increased by 77 percent.

In addition, the demand on our water resources for recreational uses has significantly increased over the past twenty years. Duke Power recreational use studies indicate that over 10 million people visit the Catawba River reservoirs annually. This number is expected to increase by approximately 11 percent per decade through 2050. The primary recreational use along Mecklenburg County's streams is the greenway system. In 1987, Mecklenburg County had just begun its greenway development program. By 2007, a total of 33 greenway miles had been developed and 147 miles were planned. The increased demand on our drinking water supply and increased recreational uses accentuate the importance of clean surface water resources for sustaining a livable community in Mecklenburg County.

Ever-Changing Waters continued on page 78

Ever-Changing Waters continued from page 77

Over the past 20 years, Mecklenburg County has made significant strides in the development of plans and ordinances to control increased pollution from land development activities and meet the demands of our growing population mainly through input from stakeholder groups, including the development community and environmental interest groups. Some of these accomplishments include:

1. November 1988: Mecklenburg County launches a watershed management study to protect water quality conditions in Mountain Island Lake from non-point source pollution associated with increased land development activities. CH2M Hill, an environmental consulting firm in Charlotte, is hired by the County to perform a watershed study of Mountain Island Lake, completed in May 1991.

2. December 1991: Stakeholder group convenes to develop a watershed protection plan for Mountain Island Lake using the information collected in the watershed study discussed in #1 above. Consensus is reached regarding the plan in May 1992.

3. January 1, 1993: Charlotte-Mecklenburg begins the operation of a storm water utility, which is funded with a separate storm water fee based on a property's impervious surface. This utility provides the foundation for future efforts aimed at the control of storm water quality and quantity.

4. March 1993: Watershed protection ordinance goes into effect on Mountain Island Lake based upon the plan developed by the stakeholder group described in #2 above.

5. July 1993: Two separate stakeholder groups convene to develop watershed protection plans for Lake Norman and Upper Lake Wylie, north of the Paw Creek tributary. Consensus is reached on the Lake Wylie plan in December 1993 and on the Lake Norman plan in January 1994.

6. November 1993: City of Charlotte initiates efforts for the reduction of pollution in storm water runoff in compliance with its Phase I Storm Water Permit.

7. June 1994: Watershed protection ordinances go into effect on Lake Norman and Upper Lake Wylie based upon the plans developed by the stakeholders groups described in #5.

8. October 1996: Mecklenburg County Board of Commissioners (Board) adopts the community's first Creek Use Policy calling for all surface waters to be *"... suitable for prolonged human contact and recreational opportunities and supportive of varied species of aquatic life."*

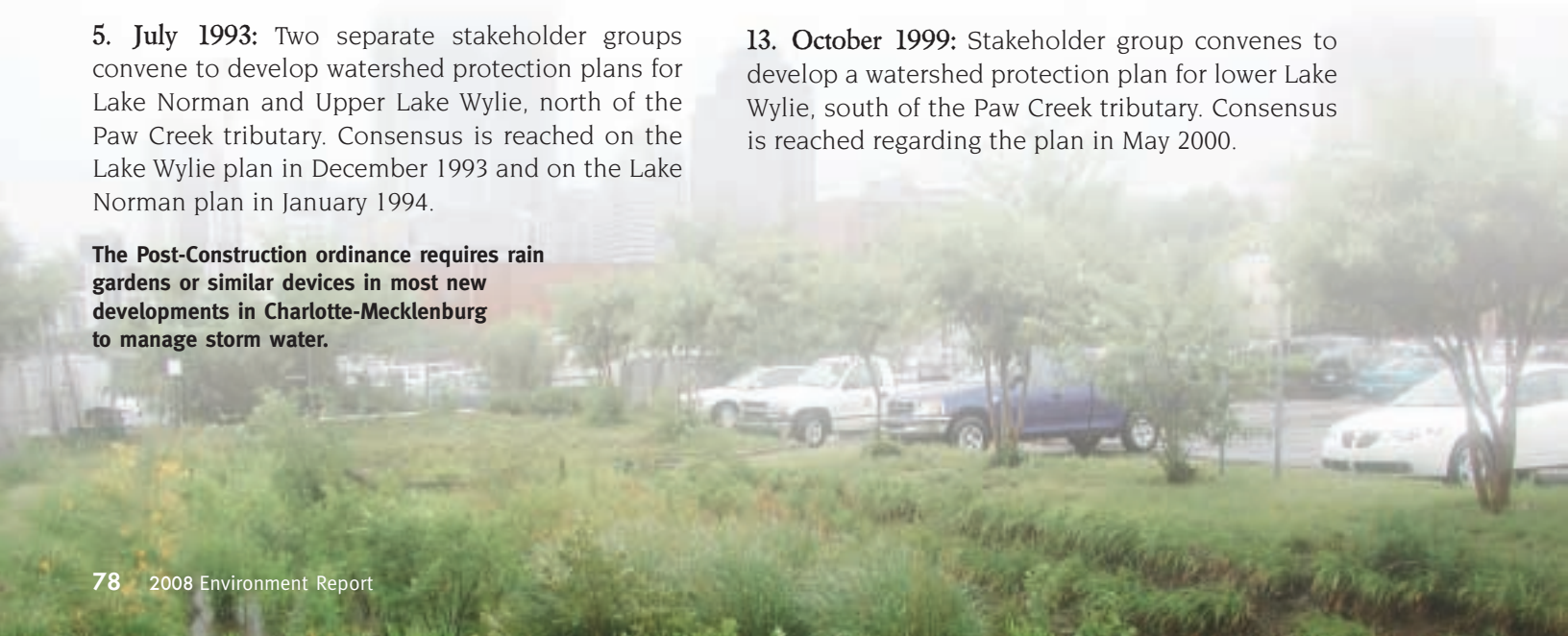
9. February 1997: Stakeholder group convenes to develop a strategy for fulfilling the Board's newly adopted Creek Use Policy, which is termed Surface Water Improvement and Management or S.W.I.M. The new initiative focuses considerable effort on addressing non-point source pollution.

10. April 1998: Three-phased S.W.I.M. approach for fulfilling the Creek Use Policy is developed by the stakeholder group and adopted by the Board.

11. June 1998: S.W.I.M. stakeholder group begins deliberations toward developing a countywide stream buffer ordinance for the control of non-point source pollution. Consensus is reached in January 1999.

12. July 1998: S.W.I.M. initiative begins based upon the approach outlined by the stakeholder group discussed in #9 above.

13. October 1999: Stakeholder group convenes to develop a watershed protection plan for lower Lake Wylie, south of the Paw Creek tributary. Consensus is reached regarding the plan in May 2000.



The Post-Construction ordinance requires rain gardens or similar devices in most new developments in Charlotte-Mecklenburg to manage storm water.

20 Years of Protecting Mecklenburg's Water Quality

Creation of a fee-funded storm water utility

Watershed Protection Ordinances for Mountain Island Lake, Lake Norman and Upper Lake Wylie

Mecklenburg County Creek Use Policy

Surface Water Improvement & Management (S.W.I.M.) Ordinances

Watershed Management Plan for McDowell Creek

Huntersville Low Impact Development Ordinance

Post-Construction Storm Water Ordinances

14. September 2000 and May 2002: Charlotte-Mecklenburg erosion control ordinances and program efforts are significantly enhanced resulting in increased enforcement.

15. July 2001: Watershed protection ordinance goes into effect on Lower Lake Wylie based upon the plan developed by the stakeholder group described in #13 above.

16. October 1999 through June 2001: Mecklenburg County, City of Charlotte and the towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill and Pineville adopt the S.W.I.M. ordinance for the establishment of stream buffers countywide.

17. June 2000: Mecklenburg County contracts with Tetra Tech, an environmental consulting firm, to complete a water quality model for McDowell Creek for the purpose of developing a strategy to control non-point source pollution associated with development activities and restore degraded water quality conditions.

18. February 2003: Town of Huntersville adopts a Low Impact Development (LID) Ordinance for the control of non-point source pollutants in McDowell Creek and the rest of its jurisdiction in response to modeling results provided by Tetra Tech as described in #17 above.

19. April 2004: Stakeholder group convenes to develop a countywide post-construction storm water ordinance for the control of non-point source pollutants. Consensus reached regarding ordinance language in September 2005.

20. March 2005: Charlotte-Mecklenburg Certified Site Inspector (CMCSI) Training begins with the goal of training the private sector to inspect their construction projects for proper sedimentation and erosion control to ensure compliance with local and state regulations.

21. July 2005: Mecklenburg County and the towns of Davidson, Cornelius, Huntersville, Matthews, Mint Hill and Pineville initiate efforts for the reduction of pollution in storm water runoff in compliance with their Phase II Storm Water Permit.

22. October 2006: Watershed Management Plan is developed and implemented for the McDowell Creek watershed based upon the modeling work completed by Tetra Tech described in #17 above. The objective of this plan is to reduce non-point source pollutants in McDowell Creek and Cove and restore water quality conditions.

23. June 2007: Post-Construction Storm Water ordinances go into effect in the towns based on the ordinance developed by the stakeholder group described in #19.

24. November 2007: Charlotte City Council adopts the Post-Construction Storm Water ordinance developed by the stakeholder group.

Moving forward, our focus must be on the effective and efficient implementation of these plans and ordinances but alone this will not be enough. We must also work to fix the water quality problems we have created in the past. As a community, we must dedicate ourselves to retrofitting water quality enhancement measures in all areas of Charlotte-Mecklenburg that were developed before plans and ordinances to protect surface water were put in place. This will require the significant expenditure of both public and private funds; however, this is the only way we can ensure that our community can grow and maintain a clean, usable supply of surface water. In the midst of the worst drought in North Carolina history, we have all learned a significant lesson that we cannot take our water resources for granted. They are finite and must be protected. Maintaining this precious resource is costly and difficult but the consequences of failing to do so is unconscionable.

Mecklenburg County's Surface Water Improvement and Management (S.W.I.M.) Program

By Rusty Rozzelle, Program Manager, Mecklenburg County Water Quality
Charlotte-Mecklenburg Storm Water Services

By 1996, the majority of the creeks in Mecklenburg County had become polluted by rapidly spreading urbanization, and were being underused as a community resource. On October 15, 1996, the Mecklenburg County Board of Commissioners (Board) took a stand in support of clean, usable surface waters through the adoption of the community's first "Creek Use Policy." It called for all Mecklenburg County surface waters to be *"...suitable for prolonged human contact and recreational opportunities and supportive of varied species of aquatic life."* At that time only about 15 percent of Mecklenburg County's 3,000 miles of creeks met this standard. Creeks with poorer water quality needed to be restored. Cleaner creeks needed to be protected. The effort to protect and restore water quality conditions in Mecklenburg County to meet the newly adopted "Creek Use Policy" was called Surface Water Improvement and Management or S.W.I.M.


S.W.I.M. logo — 1996

Beginning in February 1997, a panel of stakeholders including representatives from development and environmental interest groups (S.W.I.M. Panel) began working diligently with City and County staff to develop a comprehensive strategy aimed at fulfilling the Board's policy statement. In January 1998, the S.W.I.M. Panel reported back to the Board with a three-phased approach for achieving its "Creek Use Policy."

The APPROACH prioritized creek basins and tasks using the philosophy of:

- preventing further degradation
- preserving the best waters
- improving the good and
- remediating the worst waters.

The following PRINCIPLES were identified to guide S.W.I.M. efforts:

- use of a holistic approach in addressing water quality, quantity and green space issues
- basin level community involvement and support
- basin specific analysis using modeling and stream assessment and
- use of proven watershed management techniques.

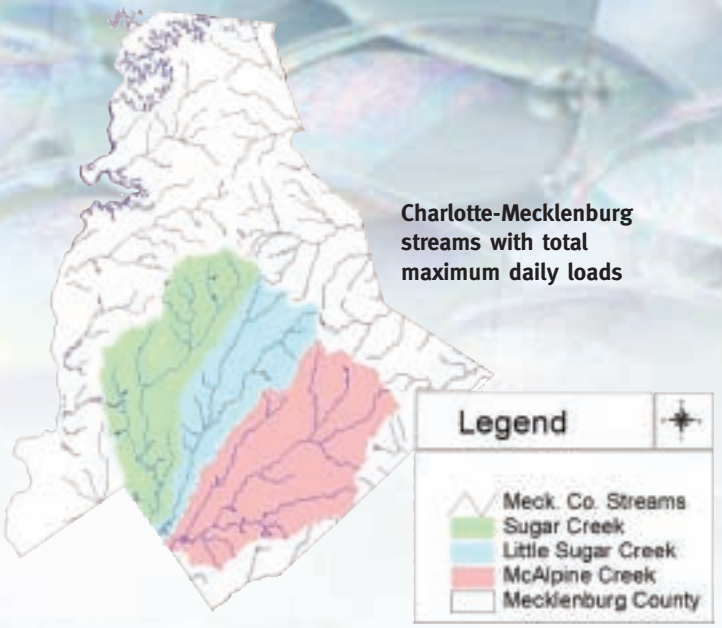
PHASE I focused on the basic steps necessary to address the worst polluters in Mecklenburg County and prevent further water quality degradation. S.W.I.M. Phase I received full funding by the Board beginning in Fiscal Year 1998-1999 and continuing through Fiscal Year 2004-2005. The S.W.I.M. Phase I made significant progress toward improving water quality conditions in Mecklenburg County and fulfilling the Board's Creek Use Policy. For example, significant efforts focused on the development and implementation of watershed-specific control measures to reduce the two major pollutants in Mecklenburg County: bacteria and sediment. As a result, water quality monitoring data has revealed an overall decrease in bacteria and sediment concentrations in our most polluted streams. This phase of S.W.I.M. also significantly enhanced efforts to protect Mecklenburg County's drinking water supplies in its western lakes. A riparian buffer program was developed in 1999 and incorporated into local ordinances through S.W.I.M. Phase I to ensure the protection of Mecklenburg's streams. The implementation of S.W.I.M. Phase I also resulted in the establishment of a comprehensive water quality modeling program supported by

enhanced stream assessments and water quality monitoring activities. Knowing the types and levels of water pollution throughout the County was essential to develop watershed-based management programs as part of Phases II and III. S.W.I.M. Phase I also led to increased coordination between governmental agencies involved in creek construction and restoration activities resulting in the establishment of a holistic creek management effort in Mecklenburg County. Possibly the most significant achievement of S.W.I.M. Phase I was the 40 percent increase in citizen involvement in voluntary creek improvement projects such as:

- Adopt-a-Stream
- Big Sweep
- Donated easements
- Stream buffer replacement.

Read more about the success of volunteer initiatives on p. 82. ("How We Can Prevent Pollution in Creeks and Lakes.")

PHASE II focused on using the tools developed in Phase I to develop a comprehensive watershed-based management program to focus on specific point and non-point source water quality problems in identified special-interest basins. Included are watersheds with impaired surface water quality that have been identified by the Environmental Protection Agency (EPA) for development of Total Maximum Daily Loads (TMDLs). A TMDL is a calculation of the maximum amount of a pollutant that a stream can receive and still meet water quality standards. As a result of S.W.I.M Phase II, TMDLs were developed by Charlotte and Mecklenburg County and approved by the EPA for Sugar, Little Sugar, and McAlpine creeks to reduce fecal coliform levels. Phase II also led to watershed management plans for the McDowell Creek basin and Gar Creek basin. McDowell Creek, upstream of Mecklenburg County's drinking water intake, has suffered considerable water quality degradation since 2000 and is in need of restoration. Gar Creek, which according to data collected by Charlotte-Mecklenburg Storm Water Services, is the healthiest stream in the County and is in need of preservation. Low Impact Development (LID) regulations implemented in the Town of Huntersville as part of S.W.I.M. Phase II have established effective measures for protecting these important surface water resources.



Charlotte-Mecklenburg streams with total maximum daily loads

PHASE III focuses on using the watershed-based managed tools perfected in Phase II to address water quality degradation in all those basins not addressed in previous phases of S.W.I.M. and ensure that all the waters in Mecklenburg County comply with the Board's Creek Use Policy. The focus of Phase III has been in the McDowell and Goose Creek watersheds. In October 2006, a comprehensive watershed management plan was developed and implemented for McDowell Creek. Restoration efforts are identified and prioritized in this plan and to date over $1.7 million in grants have been received and matched locally with over $1.5 million for implementation of the plan. A watershed management plan is currently under development to restore water quality conditions in Goose Creek. This plan will be completed and implemented by July 1, 2008. The implementation of S.W.I.M. Phase III continues through Mecklenburg County Storm Water Services' Capital Improvement Program (CIP).

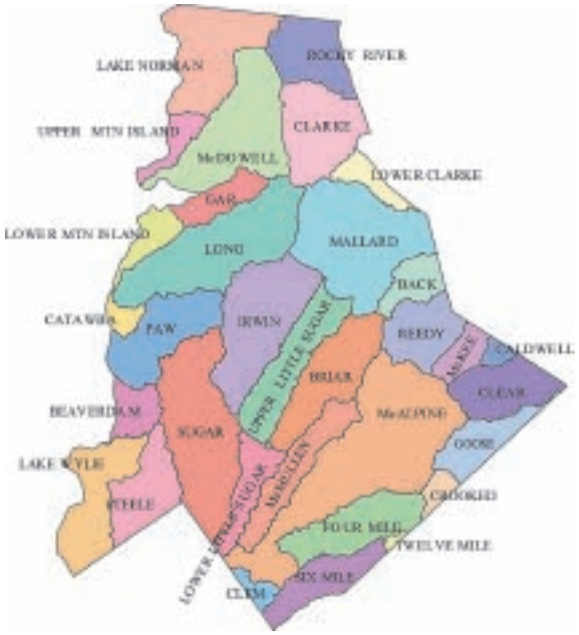
The overall goal of S.W.I.M. is to fulfill the Board's Creek Use Policy by 2015. As of September 30, 2007, 62 percent of the surface waters in the county were determined to be suitable for human contact based on bacteria levels, which represents a 47-percent increase in the 10 years since the implementation of S.W.I.M. in 1997. Although progress has been made, much work remains to be done to fulfill the goal.

How Can We Prevent Pollution in Creeks and Lakes - and Does it Really Matter?

By Erin Oliverio, Mecklenburg County Water Quality Educator
Charlotte-Mecklenburg Storm Water Services, Water Quality Program

Water is our most precious natural resource. The water that exists on Earth today is the same water that was here millions of years ago. It is a finite resource, and as our community deals with the impact of unprecedented drought, it is more important than ever that the citizens of Mecklenburg take pride in the streams, creeks, and lakes that crisscross our community.

To understand how easily we can affect our water, it is helpful to understand how water collects. Water runs downhill and drains into streams, lakes, and rivers. The area of land that all drains to one point is known as a watershed. We all live in one.



Everyone lives in a watershed. Find out your watershed address at http://stormwater.charmeck.org

What does your watershed have to do with you? It means stopping pollution before it begins in your own backyard. How could what you do in your yard affect water quality? At any point along its journey, rain or runoff can be tainted by things like illegal dumping, or the overuse of pesticides. That is why it is important to know what you can do to help prevent pollution.

Learning your watershed address will help you to better appreciate how your lifestyle influences your local waterways. Consider your daily habits:

- How do you maintain your lawn and garden?
- How do you care for your car?
- How often do you dispose of cooking grease?
- What kind of detergents and household cleaners do you use?
- How do you dispose of common and toxic household wastes?
- How many pets do you have and where is their waste deposited?

If you were the only person making these everyday decisions, the effects would be minimal. But you are one of more than 850,000 people in Mecklenburg County whose everyday choices — both positive and negative — add up quickly. The following stories are a few ways local residents are making positive differences in their watersheds.

From left: **Tyler Butts, Zayne Laubach, Robby Stroud, Rachel Sheppard, Danny Stroud, Matthew Stroud** (front)**, and Steven Sheppard get ready to clean a tributary that runs through Auten Nature Preserve.**

Neighborhood Kids Adopt a Stream

In May 2006, the Stroud family contacted Charlotte-Mecklenburg Storm Water Services about adopting the stream running through the nature preserve behind their house. In speaking with them, it was discovered that illegal dumping was going on

in the nature preserve. Storm Water Services, Mecklenburg County Park and Recreation, and the Strouds worked to remove all the large items including tires, mattresses, rusted barrels and other debris. Since that initial clean-up, the Strouds along with other neighborhood children who play in the nature preserve and tributary to McDowell Creek have continued to be "watch dogs" for the area, cleaning up the waterway, and reporting illegal dumping. Without these kids taking ownership of a natural area, the land, water and wildlife would have suffered. Instead, they help keep it a pristine wilderness area to be enjoyed.

Water Watchers Report Fish Kill in Little Sugar Creek

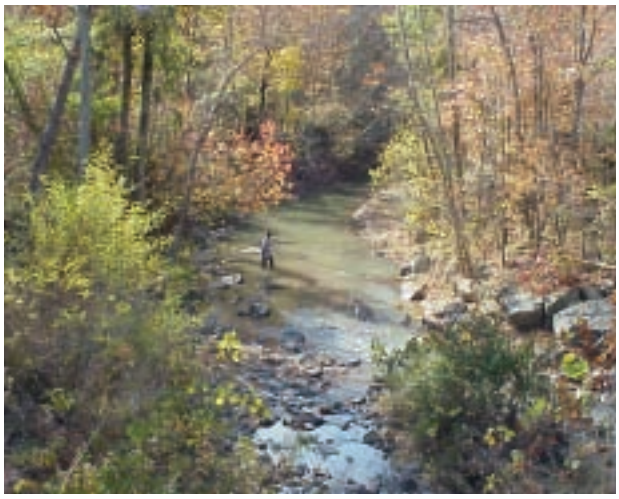
Storm Water Services relies on citizens to alert staff of unusual conditions in our creeks and lakes. On Saturday, September 1, 2007, early morning users of the Little Sugar Creek Greenway noticed many dead fish in the creek. They correctly called 911 to report the incident. A pressure washing company had used a chemical to wash the parking lot of a nearby business. The chemical and water mixture flowed into a nearby storm drain and emptied directly into Little Sugar Creek. The cleaning chemical lowered the pH of the water enough to kill all aquatic life in its path. Without the concerned citizens that called to report the incident, the company might never have known what had happened. Instead, Storm Water Services responded, tracked the chemical to its source, and got the company to stop its activity. The company at fault had to remove all dead fish from the creek, was issued a State Notice of Violation, and could face fines up to $10,000.

Volunteers Remove Over 8 Tons of Trash from Local Waterways

Something's missing from Charlotte-Mecklenburg creeks and lake shorelines: about 16,000 pounds of trash. More than 600 volunteers took part in 2007's "Big Sweep" in Mecklenburg County. The annual event, coordinated by Charlotte-Mecklenburg Storm Water Services, is part of a statewide cleanup of waterways.

Farrell O'Quinn (far right) **brings students from Covenant Day School to participate in Big Sweep 2007.**

Volunteers were invited to gather at one of eight Big Sweep sites around Mecklenburg County or clean up a creek or lake shoreline near their home and report their individual results on line. The most commonly found items were bottles and cans. Among the more unusual finds were three refrigerators, an engine block, a TV, the back seat from a new car, and an artificial Christmas tree. The number of pounds of trash collected was up more than 40 percent from 2006. Just four hours of time on a Saturday was enough to remove more than eight tons of trash from local waterways.



Citizen involvement is an integral part of our program; one Storm Water Services could not do without. With nearly 3,000 miles of streams and 167 miles of lake shoreline in Mecklenburg County, staff relies on citizens to be our eyes in the field. Whether you make a long-term commitment to your neighborhood creek, volunteer a couple of hours a year, or make a phone call to report unusual stream conditions, you are helping to protect our region's most valuable natural resource.

Sediment has created this sand bar in Torrence Creek in Huntersville. The stream banks are badly eroded, exposing tree roots and threatening bank stability.

The Dirt on Muddy Creeks: Why Mecklenburg County Works So Hard To Stop Erosion

By Corey Priddy, Environmental Specialist, Mecklenburg County Water Quality
Charlotte-Mecklenburg Storm Water Services

Sediment is the most prevalent pollutant in Mecklenburg County lakes and streams. Simply put, sediment is dirt. The particles get into the water through soil erosion. Erosion can occur within the stream channel itself or it can occur away from the stream and the dirt particles are carried into the stream by storm water runoff. When excess sediment enters into a lake or stream, it immediately starts to damage the water body. It covers the natural substrate located on the bottom of the lakes and streams, it transports other pollutants with it, and it can build up within the waterways blocking the flow of the water. Federal studies [1] indicate sediment pollution causes $16 billion in environmental damage in North America each year.

Sediment washes down storm drains and flows directly into streams

Excess sediment can cover streambeds, destroying the habitat where the smallest aquatic organisms live. The organisms can be plants or animals. Sediment deposits fill in the naturally occurring space between the natural sand and gravel bottoms of the streams. This interstitial space is where many macroinvertebrates live and reproduce. As this interstitial space becomes filled with

Carolina Heelsplitter

[1] *Osterkamp, W. R., P. Heilman, and L. J. Lane. 1998. Economic Considerations of Continental Sediment-Monitoring Program. International Journal of Sediment Research*

Badly eroded stream bank

sediment, habitat loss occurs for a multitude of benthic plants and animals. This diminishes the biodiversity of the stream and can disrupt the entire food chain. The most notable benthic organism in our area is the Carolina heelsplitter, a mussel on the federal Endangered Species list. For years, sediment deposits are thought to have been a leading cause of of habitat destruction for the Carolina heelsplitter.

Sediment also transports other pollutants along with it. Phosphorous and nitrogen, two of the main nutrients in fertilizer, easily attach themselves to dirt particles. Storm water runoff carries sediment and nutrients from the land into the storm drainage system, which flows untreated to streams and lakes. Phosphorus and nitrogen can be dangerous to aquatic systems. Algae blooms can occur when nutrient levels become too high. The algae blooms use up the dissolved oxygen in the water and can lead to large fish kills or make swimmers sick.

One source of excess phosphorous and nitrogen in our water is runoff from construction sites. Around the County, farmland is being converted to commercial or residential uses. This land usually contains higher levels of phosphorous and nitrogen. If sediment from these sites is allowed to enter into our streams and lakes, excessive amounts of nutrients will be transported along with it.

Sediment accumulation can also clog our streams and rivers, and fill in our lakes. The weight of sediment causes it to eventually sink to the bottom and collect in areas of slower moving water. The deposited sediment often forms sand bars. As the sand bars grow, they can begin to impede the flow of water during high flow events, possibly leading to localized flooding.

The two most common sources for excessive sediment are eroding stream and riverbanks, and construction site runoff. The Environmental Protection Agency estimates that stream bank erosion produces 30 percent of the total sediment in the United States. Accelerated erosion from human use of land accounts for the other 70 percent.

As Mecklenburg County becomes more developed, there is an increase of impervious area and a decrease of pervious area. Rain that used to fall on forested land now flows off rooftops and parking lots, down storm drains and directly into our streams. As a result, more water from a rain event enters the stream faster, creating a greater peak runoff. This large volume of water moving through the stream channel is more than the channel can handle. The channel starts eroding to make the path of the stream larger. The channel will continue eroding with each rain event until it reaches a size that will handle the larger peak volumes of water.

As additional upstream areas are developed, the peak runoff will continue to increase. This creates

Erosion continued on page 86

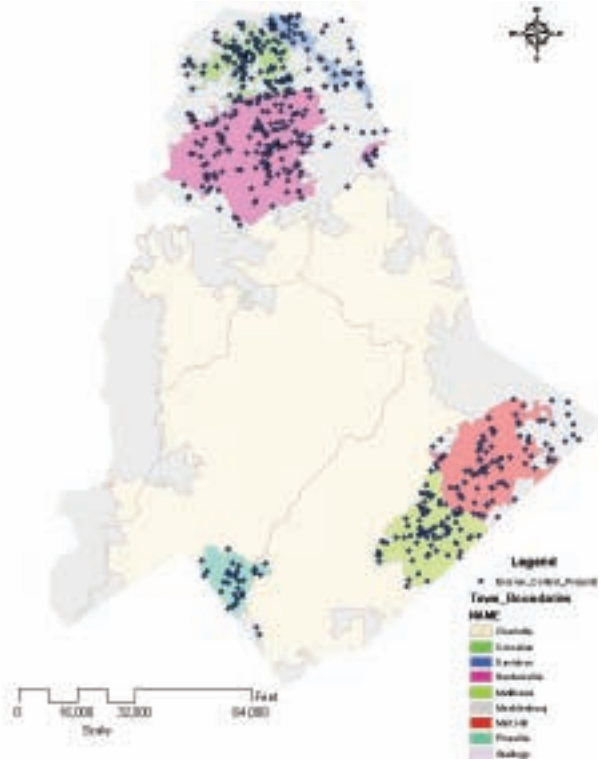
Years of stream bank erosion cause trees to tumble, making banks more unstable

Erosion continued from page 85

cycles of stream bank erosion. The scouring of the stream banks places a significant amount of excess sediment into the stream channel. To slow the rate of stream bank erosion, the peak runoff entering into the streams must be decreased. The Post-Construction Ordinance described in detail on p. 88 contains provisions to reduce the amount the peak runoff entering local stream channels. One goal of this recently adopted ordinance is to temporarily capture a majority of the runoff from newly constructed sites and gradually release it into streams in a slower manner that mimics the natural hydrology of the area. Detaining the runoff for a period of time helps to prevent future increases in the peak runoff and breaks the cycle of continual stream bank erosion.

Some local creeks have unstable banks or even bank collapses due to years of severe stream bank erosion cycles. Mecklenburg County partners with the City of Charlotte, leveraging local storm water fees to obtain grants to restore degraded streams. During stream restoration, the stream channel is rebuilt and often reshaped. The banks are stabilized to help prevent future scour and channel erosion. Where possible, detention devices are added to the surrounding floodplain to reduce flooding risks that might occur in high water flows. Stream restoration does not prevent streams from flooding, but can reduce the amount of bank erosion during flood events.

Mecklenburg County Erosion Control Projects



The second source of excessive sediment in our surface water is from construction activities. As sites are cleared for mass grading, the land is left exposed. The absence of ground cover makes it very easy for water to transport sediment from the construction site into the storm drainage system, eventually ending up in our lakes and streams. Reducing erosion from construction sites is a joint effort between Mecklenburg County Land Development and Charlotte-Mecklenburg Storm Water Services.

Currently there are 554 active projects within Mecklenburg County. The County staff inspect all active construction sites approximately every two weeks, and any site located within a sensitive area (adjacent to a creek or wetland, or located with a Critical Watershed) is inspected weekly. All of the erosion and sedimentation control measures are inspected as well as where the storm drainage system leaves the site. If deficiencies are found or sediment has left the site, the Environmental Specialist may issue a Notice of Violation, which could carry a penalty of up to $5,000 per day until the violation is corrected.

Flattened silt fences at construction sites could lead to fines

Stricter measures to control erosion and sedimentation are required in areas designated as "Critical Watersheds." Mecklenburg County has identified three environmentally sensitive areas as Critical Watersheds: McDowell Creek and Gar Creek in western Cornelius and Huntersville, and Goose Creek in Mint Hill. McDowell and Gar Creeks are close to Charlotte-Mecklenburg Utility's (CMU)

Where McDowell Creek empties into Mountain Island Lake, sediment clogs McDowell Creek Cove

drinking water intakes and Goose Creek is home to an endangered species.

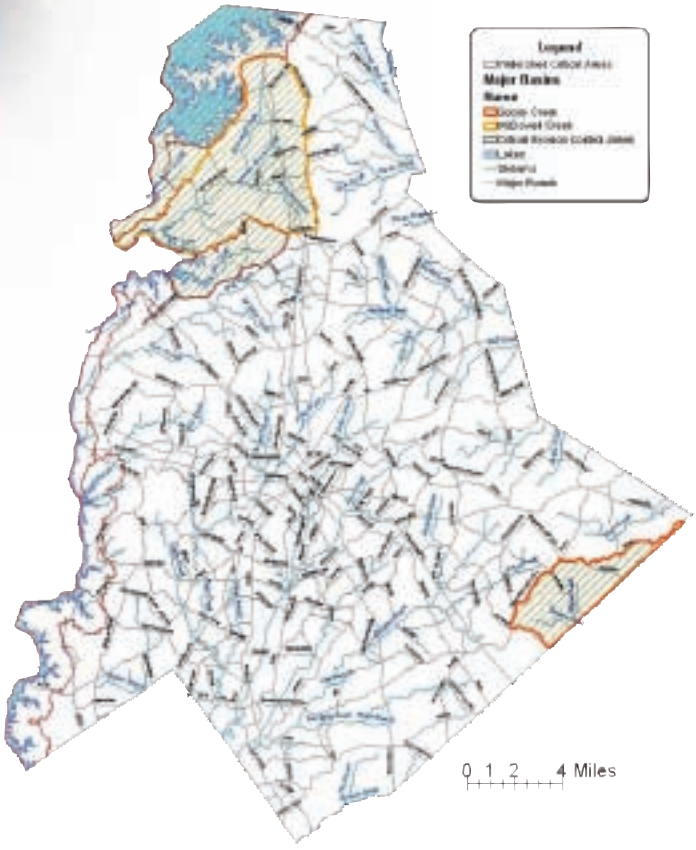
McDowell Creek and McDowell Creek Cove in Mountain Island Lake have shown a significant decline in water quality conditions over the past two decades. According to the North Carolina Department of Water Quality (DWQ), McDowell Creek is impaired due to biological integrity. DWQ reports that the impairment is due to land development. Gar Creek also empties into Mountain Island Lake, immediately upstream of the CMU water intake. Currently Gar Creek is one of the cleanest streams in the County. Goose Creek is an impaired stream and DWQ has listed one of the potential sources of the impairment to Goose Creek as construction.

It is Mecklenburg County's desire to maintain the water quality of Gar Creek and improve the water quality of McDowell Creek and Goose Creek. One tool is imposing additional erosion control measures when land is developed or re-developed in these vulnerable watersheds.

Extra rows of silt fences are required during construction in Critical Watersheds

Mecklenburg County uses a combination of regulations, restoration projects, and education to stop soil erosion of stream banks and from construction sites. This effort comes from a desire to help prevent the detrimental effects of sediment in our lakes and streams. As the County's population continues to grow, so will the need to protect our surface water from excessive sediment pollution.

Critical Watersheds



Post-Construction Controls: The Next Big Thing In Water Quality

By Don Ceccarelli, P.E., Project Manager, Mecklenburg County Water Quality Program
Charlotte-Mecklenburg Storm Water Services

Most citizens within Mecklenburg County would not consider themselves polluters of our creeks, lakes, or drinking water, and most would not intentionally contaminate our waterways by dumping oil or chemicals down a storm drain or discharging raw sewage into our streams. However, by living or working in Mecklenburg County, we contribute pollution to our surface waters through increased storm water runoff.

While we must be willing to accept some level of pollution to have a community, we must also do our part to reduce our impact on the environment. To promote environmental stewardship at Grand Canyon National Park in Arizona, there is a common saying among the local community to remind visitors to "leave only footprints." As our community grows, we may leave more than footprints but we must continually do our part to practice environmental stewardship as well. In Mecklenburg County, the City of Charlotte and the incorporated towns, elected officials have done their part to protect water quality by enacting one of the most significant pieces of water quality legislation on record, the Post-Construction Storm Water Ordinance.

On June 30, 2007, Mecklenburg County and the incorporated towns implemented Post-Construction Storm Water Ordinances designed to reduce the effect of development by providing long-term protection our streams and lakes from pollution and to protect our homes and roads from flooding. The Charlotte City Council adopted the Post-Construction ordinance in November 2007 to take effect July 1, 2008.

As part of the federal Clean Water Act and related Phase II Storm Water Rules, the North Carolina Environmental Management Commission promulgated rules requiring urbanized areas (of which Mecklenburg County is one) to control storm water runoff and discharges. Mecklenburg County and the incorporated towns were issued a joint Phase II permit in July 2005 that required implementation of a Post-Construction Site Controls Program. The purpose of the Post-Construction program is to address pollution contained in storm water runoff from new development and redevelopment projects. The state minimum requirements for this element include:

- Issuing a storm water permit
- Prohibiting built-upon area along certain streams
- Recording deed restrictions related to storm water control
- Controlling storm water runoff volume
- Installing and maintaining structural storm water treatment systems to remove pollutants

While the Post-Construction Storm Water ordinance will not restore the environmental effects from existing development, the ordinance will provide long-term reduction of pollution from new development and redeveloped areas of the County.

The Vision for Water Quality Protection

Elected officials in Mecklenburg County and the incorporated towns cast their vision for environmental stewardship by adopting ordinances that not only meet the state-minimum Post-Construction requirements, but go even further to protect the environment.

Why did elected officials take a stance of going beyond what was required while other surrounding communities elected just to meet the state minimum requirements? As part of the Mecklenburg County's Environmental Leadership Policy statement, the future and existing resources of the County should be used "wisely for the benefit of the citizens." Rather than developing ordinances to meet only the minimum state requirements, other surface water quality needs in the community were evaluated to determine if multiple goals could be met through development of a Post-Construction program. City, County and town staffs developed the following goals:

- Meet the requirements of the Phase II storm water permit.
- Address cumulative and secondary impacts to aquatic life and water quality in watersheds with listed endangered species. This goal was added to meet the guidelines of the U.S. Fish and Wildlife to gain support to expand water and sewer services to areas of the County that contain threatened or endangered species.
- Minimize additional impaired stream listings (303(d) listed streams) which are streams classified by the EPA as not meeting their intended uses. Currently, 73 percent of all streams in Mecklenburg County are not meeting their intended uses.
- Address detention for control of storm water volume and peaks. This goal was added to address growing flooding issues in our County.

Since all these goals have an impact on future development and the environment, elected officials supported the development of a stakeholders' group with the purpose of developing a storm water ordinance that met all four goals.

Stakeholders were selected from the leading environmental, development, community, and scientific groups in Mecklenburg County, the City of Charlotte and the towns and deliberated for 18 months to develop a model Post-Construction Storm Water ordinance. Mecklenburg County and the towns made minor revisions to the model ordinance prior to adoption, and the resulting ordinances took effect on June 30, 2007. The City of Charlotte's version of the ordinance takes effect July 1, 2008.

How Will The Post Construction Ordinance Protect Water Quality?

The Post-Construction Ordinance contains four main criteria that protect water quality:

- Installation of Structural Best Management Practices (BMPs)
- Increase in Stream buffers
- Installation of Storm Water Detention Structures
- Preservation of Undisturbed Open Space

Structural BMPs

Storm water treatment structures or Best Management Practices (BMPs) are required to control pollutant loading to our streams and lakes that come from overland flow (or runoff) from rain events. (Read more about BMPs on p. 92.) The BMPs are designed to remove two of the main pollutants in runoff: total suspended solids (TSS) such as sediment and total phosphorus (TP) which often comes from excess fertilizer and atmospheric deposition on paved surfaces. The BMPs are designed such that for every 100 pounds of TSS pollution in storm water runoff that enters a BMP, only 15 pounds of pollution leaves and flows into our streams and lakes. Requiring BMPs complies with minimum state standards, helps reduce pollutant

Post-Construction continued on page 90

Post-Construction continued from page 89

loading to our streams, and helps maintain habitat for threatened and endangered species within our streams. In some areas of the County, BMPs are also required to remove 70 percent of TP, which provides enhanced removal of pollution from storm water.

Stream Buffers

Stream buffers serve an important function in meeting multiple goals. Stream buffers soak up rainfall which reduces runoff, absorb certain pollutants (such as nitrogen and total phosphorus) via plant update, shade creeks which reduces stream temperature (or thermal pollution), and provides food and habitat for threatened and endangered species. Under the ordinance, buffers range from 30 feet in width on either side of the stream up to 200 feet depending on the stream size, classification, and level of protection required.

Detention

Historically, detention (the slowing down of storm water runoff) has been required for industrial and commercial developments. Under the new Post-Construction Ordinance, detention is required for residential development as well. Increased storm water runoff from developed areas is a major contributor to flash flooding of buildings and roads. As development occurs, more storm water runs into our streams and the water flows faster. As storm water volume and velocity increase, the stream channel cannot hold the all of the water results in flooding, or the stream banks erode causing sediment pollution to our surface waters. By detaining storm water runoff, the flow of storm water into our streams can be controlled to reduce the risk of flash flooding and stream bank erosion. Detention helps protect our roadways, dwellings, and critical habitat areas of our streams.

Undisturbed Open Space

The amount of undisturbed open space required by the ordinance varies from 10 to 25 percent of developed area depending on the amount of hard surfaces (built-upon area) of a development. The requirement for maintaining undisturbed vegetated open space for new developments helps protect water quality by reducing the impervious area of developments. The water quality benefits of undisturbed open space can be illustrated by evaluating a one inch rainfall event under two different conditions. In Mecklenburg County, 90 percent of all rainfall events are one-inch or less, and a one-acre parcel of wooded land will absorb a one-inch rainfall event and produce virtually no runoff to the downstream creek. However, if the trees on that same one-acre parcel of wooded land are cut down and replaced with a paved parking lot, the downstream creek will receive more than 27,000 gallons of storm water from each one-inch rainfall. To accommodate this additional runoff, the stream will flood and its banks will erode. This stream bank erosion then causes sediment pollution in our streams and lakes. By requiring undisturbed open space, the Post-Construction Ordinance will help reduce runoff from new development.

Historically, our community was founded, in part, because of our water resources. As our community continues to grow, the Post-Construction Ordinance will help protect that resource for the benefit our current and future citizens.

Challenges of Meeting Water Quality Standards in an Urban Environment

By Jeff Hieronymus, Water Quality Modeler, City Water Quality Team
Charlotte-Mecklenburg Storm Water Services

Newspaper articles that appeared in the local media the late 1960s painted a bleak picture of water quality conditions in Charlotte area streams. Headlines such as "Catch Any Fish In Sugar? You Can Forget About It" and "The Creek Is Simply A Sewer" were an indication of the level of pollution impacting the environment within our community. When Congress passed the Clean Water Act (CWA) in 1972, it forced states and local municipalities to enact regulations aimed at reversing the environmental degradation that, until that critical point in our nation's history, had largely gone unchecked. The CWA was initially focused on controlling sources of pollution coming from a point source that discharged directly into a stream. The most common point sources were wastewater treatment plants, industries, and livestock operations that discharged waste including harmful contaminants into waterways without treating it. While the nation's streams are arguably in better shape than they were before the CWA took effect, we now find another source of pollution is impairing our streams' ecosystems: non-point sources.

Non-Point Source Pollution

Non-point source pollution is another term for polluted storm water runoff. This type of pollution results when precipitation falls and the runoff flows across land, picking up and transporting pollutants as the rainwater flows to storm drains, through pipes, and directly to streams. Pollutants on land surfaces include sediment, bacteria, nutrients, oils, metals, litter, pesticides, and herbicides.

The pollution carried by storm water is one threat to the health of streams; the amount of storm water is another. As impervious areas such as roads, parking lots and driveways increase so does the amount of runoff generated when it rains. Instead of being absorbed into the ground, precipitation runs off impervious surfaces at an increased rate. The change in flow and velocities can cause streambank erosion and stream degradation. The results can be devastating to aquatic life.

Addressing non-point pollution is challenging because of the nature of the source. The pollution in storm water runoff is generated over a large area and is transferred to streams through a complex pipe network. End-of-pipe treatments that are a common solution to point sources of pollution are not an option to address non-point sources. No matter how big the challenge is to address non-point sources of pollution, recent changes to interpretations of the CWA require state and local governments to address these pollution sources.

Mechanisms to Address Non-Point Source Pollution

There are various methods to remove many non-point source pollutants from storm water runoff before the contaminants reach our streams. Storm water treatment devices such as wet ponds and constructed wetlands control the quality and amount of runoff. The devices are designed so that the rate of runoff leaving a new development is equal or less to the rate of runoff from the same site before development. These devices also are designed to decrease the amount of pollution in runoff from the site. Other provisions to address non-point sources of pollution

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Urban Environment continued from page 91

include adequate stream buffers and setting aside "no-build" zones to maintain a percentage of natural area on a planned development. The measures, commonly referred to as best management practices (BMPs), are constructed at individual development sites as a way to minimize the overall costs of protecting surface waters from pollution as runoff travels to streams, rivers, and lakes.

What is a BMP?

The Environmental Protection Agency defines a Storm Water Best Management Practice as:

"technique, measure or structural control that is used for a given set of conditions to manage the quantity and improve the quality of storm water runoff in the most cost-effective manner."

Storm Water BMPs include:

- Rain gardens
- Wetlands
- Green roofs
- Retention ponds

A structural BMP is a storm water management system based on nature's best designs. These systems are built into the ground. BMPs can be constructed near pollution sources such as parking lots, large buildings, or residential developments. BMPs are also effective along streams or other bodies of water.

By their design, many BMPs remove selected pollutants. That prevents the contaminants from being carried by flowing water into creeks or lakes. Some BMPs absorb or temporarily retain excess storm water runoff, reducing flood risks.

Different BMPs have different purposes. Choosing the right BMP depends on the amount of storm water runoff, types of pollutants in the runoff, and land features such as slope, soil type, and development density.

Costs of Not Implementing Non-Point Source Controls

Many storm water management studies indicate that the most cost-effective approach is to plan and design for the minimization of pollutants in storm water discharges. In looking at the costs to retrofit degraded streams, the choice becomes obvious. A recent analysis conducted by Charlotte-Mecklenburg Storm Water Services (SWS) was designed to identify the gap between current conditions and water quality standards. Water quality data was analyzed from four urbanized watersheds to determine an order-of-magnitude cost to SWS to remove the excess pounds of sediment to meet the water quality standard. According to data in our most developed watersheds, it could cost on an order of $1 billion to meet water quality standards in those four basins alone. This dollar figure does not include the costs to fix flooding problems.

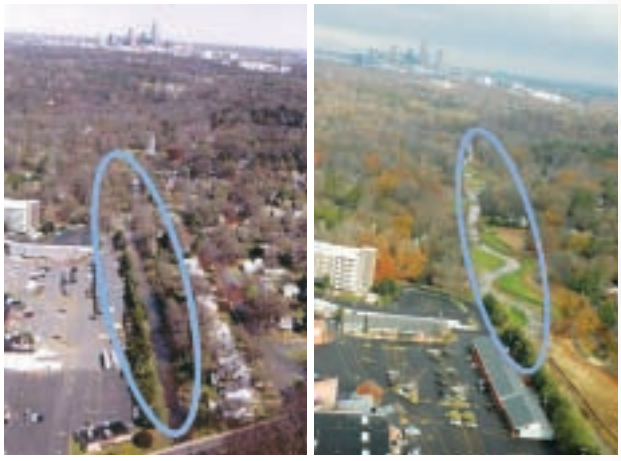
The cost to retrofit and restore a degraded stream to meet its designated use is high. According to data from the SWS BMP Pilot Program, it costs on average $10,000 per acre of drainage area to design and construct a water quality retrofit BMP. This cost *does not* include the cost of land to build the BMP as, until this point, the land for these pilot projects was obtained by SWS through donated easements.

The costs to retrofit a degraded stream in an urban setting are significant. The storm water utility spends an average of $450 per linear foot of stream to design, construct, and restore a degraded stream reach to a more natural condition. When these costs are aggregated to the watershed scale, one can begin to see how reversing degraded stream conditions can become very

BMP Retrofit - Rain gardens were added to this shopping mall parking lot on Freedom Drive

expensive. SWS recently completed a watershed retrofit project of the Edwards Branch Watershed, which is a tributary of Briar Creek. The costs to design and construct various BMPs and perform stream restoration in this one square mile watershed were over $3 million. Other recent stream restoration projects completed by Storm Water Services include:

- Little Sugar Creek near Westfield Road at a cost of $2.4 million (not including $12 million to acquire floodplain land)
- Little Sugar Creek at Hidden Valley at a cost of $3.1 million (not including an additional $1.3 million to acquire floodplain land)
- Bruns Avenue Wetland at a cost of $500,000
- Shade Valley Pond Retrofit at a cost of $228,000.

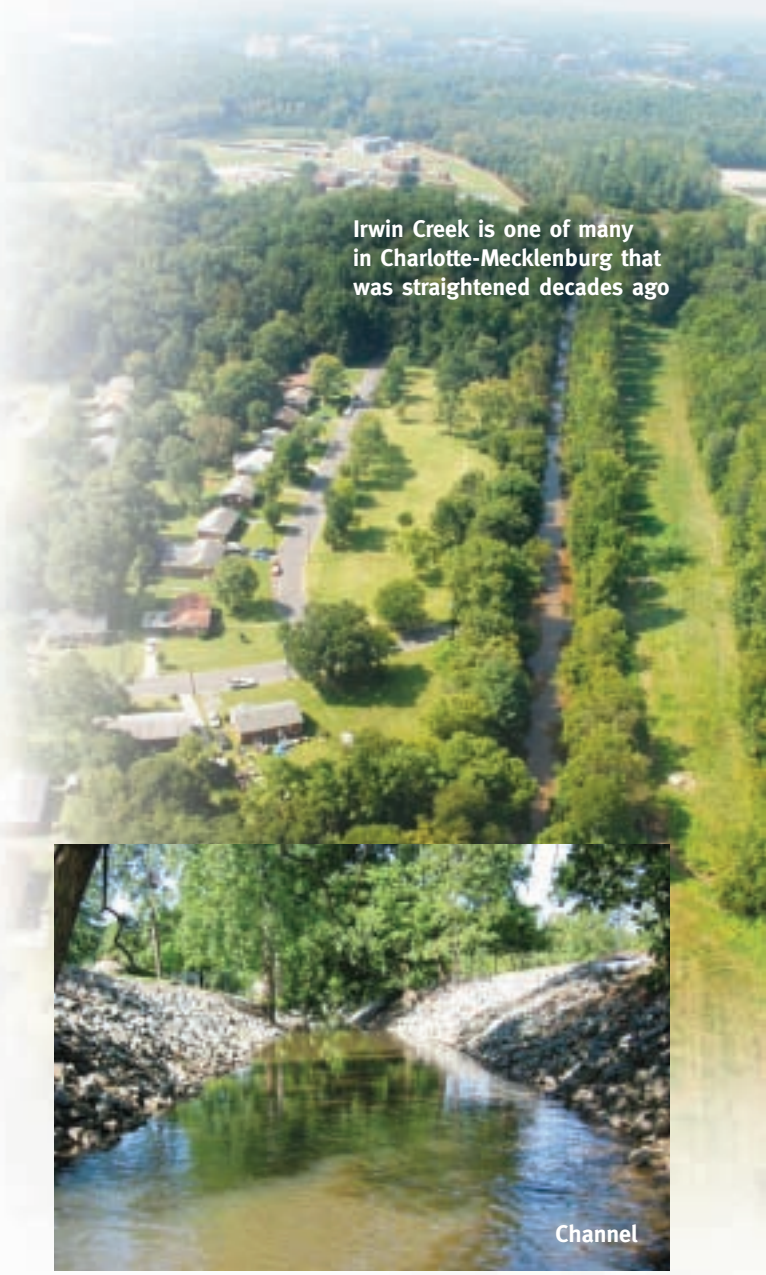


Stream restoration on Little Sugar Creek

Many similar projects must be built before our community begins to see a reversal in our degraded stream conditions.

Challenges in an Urban Environment

It is particularly challenging to manage storm water in a rapidly urbanizing environment. Because density is often a goal, land planners try to get the most yield out of a parcel of property. As natural areas are converted to rooftops and parking lots, there is more storm water to manage. When the stream has more water than it can handle and cannot spill the excess into a natural floodplain, the result is streambank erosion. Another challenge is dealing with historical land development practices. Until the late 1970s, development inside local floodplains was not restricted. Until 1998, local stream buffers were not protected. Local streams with the highest pollution levels and highest risk of flooding are those without buffers and where buildings were constructed in the floodplain.



Irwin Creek is one of many in Charlotte-Mecklenburg that was straightened decades ago

Channel

Altered stream channels also create storm water management problems today. The paradigm for dealing with storm water in the past was to send the water downstream as fast as possible. In the mid-20th century, the Army Corps of Engineers straightened local streams to move water quickly. The technique did not stop flooding. Instead, it removed the naturally occurring twists and turns that are indicative of a healthy stream. Without meanders and access to a floodplain, the amount of water in a stream during storm events can rise very high, sometimes to the point where the water becomes destructive. Severe streambank erosion and downcutting are commonly seen in streams that have been altered from their natural condition.

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Uncapping and restoring Little Sugar Creek near uptown will cost more than $4 million, not including the cost of acquiring land and building a greenway

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Regulatory Environment

Despite these challenges, the regulatory climate suggests local governments must take a proactive approach to meet water quality standards and avoid restoration mandates. As our community continues to grow, there is a need to provide necessary regulatory mechanisms to ensure that growth takes place in an environmentally sustainable fashion. If the regulatory measures are not in place, it could jeopardize the ability of municipalities to annex new areas or redevelop areas that are already urbanized. State officials look to see if adequate ordinances are in place before issuing permits for utility expansion in suburban areas or expanding capacity of utilities within the urbanized area of the community.

Quality of Life

Irrespective of the consequences of meeting regulatory requirements, there are many quality of life issues that should be considered with regards to water quality management. Who is affected by a degraded environment? What is the value of clean streams and lakes? When does the level of environmental impairment start to affect economic development? How should towns, cities and counties address environmental issues? These are some of the questions that should be considered when determining the level of environmental protection that is appropriate for an urbanizing area.

Anecdotal evidence, backed up by scientific studies, suggests citizens want to live in environmentally sustainable communities. A recent analysis completed by the City of Charlotte found that "Increasing numbers of people are concerned about the natural environment ... A healthy environment, rather than viewed as an added bonus, is now seen as one of an area's prime economic assets." The study also identified the value capture of open space and stream buffers to economic development and property values. Ordinance provisions such as open space and stream buffer protection "... provide an opportunity to leverage environmental protection into an additional value creation from the perspective of project cost." With regards to attracting talented workers, communities are "... competing for the best people, and if you don't have the quality of life and quality of place, you won't get talented people. Skilled talent calls the shots in where and how they want to work."

Public Costs

Every year, SWS receives thousands of requests for service regarding erosion, flooding, stream blockages, and pollution. The costs to address these problems are shared by the entire community. We have choices of whether to be proactive or reactive concerning flooding and sustainability. We have made a progress since the Clean Water Act of the 1970s and since the first State of the Environment Report in 1987. However, we still face significant challenges to meet water quality standards. These challenges and choices must be carefully considered as elected officials make decisions about our development practices and how our region supports sustainable growth.

1987 To Today: More Mecklenburg Growth Than Ever Before

By Vicki Bott, Land Use and Environmental Planning Division Director
University of North Carolina Charlotte Urban Institute

The 20-year period from 1987 to 2007 has been remarkable for two things that have had significant effects on Mecklenburg County's and the 14-county region's environment: unprecedented population growth and rate of land development[1].

Population Growth

From 1987 to 2007, Mecklenburg County has seen population growth that outstripped anything in its prior history: The County grew from 473,760 residents in 1987 to an estimated 857,379 in 2007, an 81 percent increase (383,619 people). This is roughly the equivalent of a city the size of St. Louis moving to the County[2]. In fact, the rate of population growth has been accelerating since 1970: it was 14 percent from 1970 to 1980, 26 percent from 1980 to 1990, and 36 percent from 1990 to 2000. Estimates from the NC State Demographer's Office for 2007 suggest that the County population has grown 39 percent from 1997 to 2007.

The region has not been far behind Mecklenburg County in increasing rates of population growth: from 1987 to 2007, the 14-county region grew by 55 percent (from 1.5 million to 2.4 million residents.) The regional population growth rate held relatively steady in the 15-16 percent range from 1970 to 1980 and again from 1980 to 1990, and then accelerated to 26 percent from 1990 to 2000. Based on 2007 data from the two states' demographers' offices, the region's 10-year growth rate (1997 to 2007) remains at about 26 percent.

Population in Mecklenburg County and the 14-county Region

	Mecklenburg	Region
1970	354,656	1,215,422
1977	383,800	1,329,300
1980	404,270	1,400,247
1987	473,760	1,545,331
1990	511,433	1,620,075
1997	617,328	1,903,712
2000	695,454	2,038,719
2007	857,379	2,392,474

Note: Population estimates are from the U.S. Census, except for 2007 data, which are from the NC and State Demographers offices

Population Growth by County 1987 to 2007

Mecklenburg Growth continued on page 96

Mecklenburg Growth continued from page 95

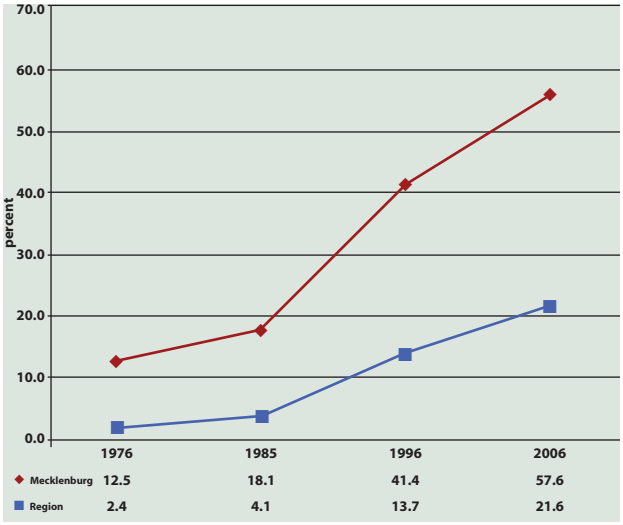
Changes in Land Development

Mecklenburg County has roughly 334,000 acres of land area (337,000 prior to the 1990 change in the County's boundaries transferring the Lake Norman "Meck Neck" to Iredell County.) Given the accelerating rate of population growth over the last 20 years, it is not surprising that the extent of developed land in the County has also increased dramatically.

A recent study by UNC Charlotte's Center for Applied Geographic Information Science (CAGIS) and the UNC Charlotte Urban Institute provides an analysis of developed land area for Mecklenburg County and the 14-county region. The CAGIS study, funded by the Open Space Protection Collaborative through a grant from the John S. and James L. Knight Foundation, used satellite imagery to assess the amount of developed land at four points in time, roughly 10 years apart, from 1976 to 2006[3]. Developed land includes areas in which a statistically significant portion (typically 15-25 percent) of land cover is impervious surfaces, such as buildings, roads, and parking lots, or is non-agricultural bare earth[4].

According to the CAGIS study, developed acres in Mecklenburg County have gone from 12.5 to 57.6 percent of total acres from 1976 to 2006, a span of 30 years. During the same time period, the 14-county region went from 2.4 percent developed to 21.6 percent developed, reflecting the more rural nature of much of the region outside Mecklenburg County. From 1985 to 2006, a time period roughly comparable to the SOER's 20-year perspective, the County has seen an increase in developed land of over 200 percent (from 18 percent to 57.6 percent.) The increase for the 14-county region has been even more dramatic: over 400 percent. For both the County and the 14-county region, the biggest change occurred between 1985 and 1996.

Developed Acres As A Percent of Total Acres



Developed Acres

Mecklenburg

	# Acres	percent of Total	percent Change
1976	42,247	12.5	
1985	60,790	18.1	44
1996	138,217	41.4	129
2006	192,424	57.6	39

Region

	# Acres	percent of Total	percent Change
1976	105,727	2.4	
1985	178,473	4.1	68
1996	605,755	13.7	238
2006	948,892	21.6	58

From 1985 through 2006, the County's rate of land development averaged 17.2 acres per day, and the region's, 100.5 acres per day. Based on U.S. Census population estimates, the study's results

Developed/Undeveloped Land for the 14 County Region

suggest that in 1985, the County had 0.14 developed acres per person; in 1996, it had 0.22 developed acres per person, and in 2006, it had 0.23 developed acres per person. By comparison, the 14-county region averaged 0.12 developed acres per person in 1985 and 0.41 developed acres per person in 2006.

Mecklenburg County's 10-year rates of land development from 1985 to 2006 have far outpaced the 10-year rates of population growth over the comparable time period (1987 to 2007.) In basic terms, we are taking up more "space" per person in our development patterns than we used to. The good news is that the number of developed acres per person did not increase between 1996 and 2006, perhaps reflecting the recent trend toward in-fill and compact, walkable development.

For the 14-county region as well, the 10- and 20-year rates of land development have far exceeded the population growth rates: the region experienced a 55 percent increase in population from 1985 to 2006, with a 433 percent increase in developed land area. Between 1985 and 2006, the region as a whole has gone from having about the same number of developed acres per person as Mecklenburg County, to having almost twice as many developed acres per person as Mecklenburg County. The number of developed acres per person in the region has increased every decade, including from 1996 to 2006 when Mecklenburg remained steady, according to the CAGIS study.

Land Use Implications

Undeveloped land provides ecological services, many of which are missing from or are compromised on, developed land: Natural vegetation prevents soil erosion and conditions the soil, slows rainfall, helps the soil absorb and filter runoff, moderates summertime air temperatures and provides shade, and provides habitat for native plant and animal species. Undeveloped land is also used by people for recreation, and increasingly, as an element in tourism.

Developed land is rarely converted back to undeveloped uses and so development is considered a permanent state. Unless development is planned such that it accommodates a community's ecological, recreational, and economic needs for undeveloped land, a county growing as rapidly as Mecklenburg, and indeed, a region growing as rapidly as this one, will eventually find that its environmental quality of life is seriously compromised.

Mecklenburg County has been a leader in the Region in policies that aim to both preserve adequate amounts of undeveloped land and mitigate the potential negative effects of developed land. Among these are land banking and the use of bond money to purchase land for nature preserves and parks, early adoption of County-wide zoning and adoption of land use plans that embrace land use planning best practices. These and others are the subjects of more detailed articles elsewhere in the report.

[1] *The 14-county region includes Mecklenburg and 13 surrounding counties in NC and SC: Anson, Cabarrus, Catawba, Chester, Cleveland, Gaston, Iredell, Lancaster, Lincoln, Rowan, Stanly, Union (NC), and York*
[2] *In 1990, St. Louis's population was 396,685, according to www.citypopulation.de*
[3] *Note that satellite imagery for 1985 was used in place of 1986 due to high percentages of cloud cover in the 1986 imagery making evaluation of conditions on the land infeasible. Imagery for 2007 was not yet available at the start of the study, so the years 1976-2006 were chosen as the study's time period.*
[4] *Based on 30-meter-square pixels in the satellite imagery, roughly 0.22 acres each.*

Land: 1987 and Now

By Julie Clark, Park Planner; Michael Kirschman, Branch Manager; and Don Seriff, Natural Resources Manager
Mecklenburg County Park and Recreation

The relationship between population growth and the environment is undeniable. The Mecklenburg County Park and Recreation Department emphasizes development of active parks, but also the preservation of biodiversity and natural areas.

Municipalities in the County struggle to balance population growth with water quality, air quality, and waste management through daily land use decisions. We continue to feel the effects related to the form and distribution of growth, even with the many environmental initiatives that have been established.

Since 1980s, Mecklenburg County has been losing open space at the rate of 17.2 acres per day, and lost more than 22 percent of its tree cover between 1984 and 2001.

Discussion of land-use issues with regard to the environment was not presented in the 1987 State of the Environment Report. In 1987, land use was considered to be a "quality of life" issue, thus making it difficult to define as related to the environment. Data comparison is provided here as it was available from a suite of documents developed 20 years ago. Land use decisions in 2007 are beginning to incorporate consideration of the environment as more information has allowed for clearer connection between these two complicated topics. Land use is presented here to provide a baseline evaluation for future use and comparison.

Then and Now

1987: Expected growth is expected to approach 575,000, an almost 27 percent increase, within less than twenty years (source: 1987 SOER).
2007: Expected growth significantly exceeded earlier estimates as the current population is 857,379, an increase equivalent to 55 percent of the population in 1987.

1987:
- Population: 473,760
- Interstate, US, and State Highways: 11
- Miles of Road: 2,866
- Certified Sustainably Designed Projects (e.g., LEED): 0

2007:
- Population: 857,379*
- nterstate, US, and State Highways: 17
- Miles of Road: 4,830
- Certified Sustainably Designed Projects (e.g., LEED): 4

*Population estimate from **http://demog.state.nc.us**, County/State Projections: Annual County Populations 2000 - 2009.

Park Land and Open Space:
1989: Total parkland per 1,000 residents was 11.3 acres.*
2007: Total parkland per 1,000 residents is 21.3 acres.**

Currently, average acres per 1,000 residents of parkland in cities with similar populations is 30.5 acres. Furthermore, if parkland is compared to other urban areas as a percent of land, currently 5.2 percent of Mecklenburg County land is designated as parkland. The average amount of land set aside for parks in cities with comparable populations is 8.8 percent, and the average for all cities, regardless of population, is 9.8 percent. Based on this data, Mecklenburg County/Charlotte currently has a deficit of 7,825 acres based on population and/or 16,311 acres based on percent of land.[1]

* Based on 1990 population of 511,433 and 5,784 acres of parkland ** Based on 2006 population of 850,178 and 18,105 acres of parkland [1] Center for City Park Excellent. Trust for Public Lands. 2007

Greenways:
1987: No planned greenway system existed.
2007: The County currently operates 11 greenways totaling more than 30 miles of developed trails, with 185 miles planned.

Natural Communities/Biodiversity:
1987: Only sporadic assessments for biological resources had been conducted.
2007: Natural heritage program is well established. Identification of 27 biologically important natural areas was completed in 1998 of which 15 (56 percent) are now protected, 4 (15 percent) have been lost, and 8 (29 percent) are still in need of protection. A 2008 update of the natural heritage survey will count Mecklenburg County as one of the three counties in North Carolina having completed such an update.

Land Findings and 2008 Recommendations

Findings

- The citizens of Mecklenburg County have supported a total of $245,910,000 of park land acquisition bond referendums that have purchased a total of 17,553.45 acres.

- With the recent passage of the 2007 Park Land Bond, additional watershed protection properties will be protected in the mountain Island Lake watershed. It is anticipated that Mecklenburg County's population growth will not cease in the coming decades. The 2008 Comprehensive Park and Program Master Plan will include development, identification and strategies for natural resources protection consideration.

- Green building design principles are being incorporated throughout the County in both new and renovated projects to meet LEED certification requirements. Waterless urinals, light motion sensors, electronic door and gate locks, porous pavement applications and other building friendly materials are explored on a regular basis to support low impact development and sustainable design standards for all new construction.

Recommendations

- To protect natural areas and biological assets, remaining large parcels of undeveloped land and smaller quality natural areas should be targeted for acquisition and preservation. Additional cost sharing partnerships with state and federal programs should be investigated and conservation easements with private land owners, businesses, industries, and local land trusts, and other land protection partnerships should be pursued.

- Conservation development principles as identified through local planning efforts (such as the Charlotte-Mecklenburg Planning Commission's General Development Policies) should be applied and strengthened during the development process.

- Continue to pursue joint-use easements with other County agencies and utilities as well as land dedications through the subdivision and rezoning process.

- Continue to build onto existing greenway trails and focus on connections to parks, schools, neighborhoods, points of interest, and transit corridors.

- A focus on linking together regional natural assets and existing preserves should be a priority for each of the county governments in this region and as such, partnering with allied state and federal agencies to pool resources and leverage assets is required.

- Create conservation action plans and statements (CAPS) to document conservation status and monitor existing status toward long-term sustainability of local species.

- Provide support for and implement initiatives that work to eliminate the threat of invasive alien species.

- Protect our natural heritage by actively striving for no net loss of species. This will require systematic inventories in additional natural areas and continued use of scientifically based inventory and monitoring data to identify conservation priorities and direct conservation initiatives and natural resource management throughout Mecklenburg County.

- Continue to partner with allied state and federal agencies to pool resources and leverage assets. This will provide the best research and management opportunities available for natural resources in this urban area (e.g., continuing to partner with the NC Wildlife Resources Commission to implement urban wildlife management strategies as part of the NC Wildlife Action Plan).


Little Sugar Creek Greenway

Mecklenburg County Parkland and Open Space

By Blaine Gregory, Senior Park Planner
Mecklenburg County Park and Recreation

Parkland acquisition and capital development oversight for the County primarily resides in the Capital Planning and Alliance Development Division of the Mecklenburg County Park and Recreation Department. Because park planning cannot occur independent of its surroundings, due consideration must be given to external forces and trends that influence demand of recreation programs, services, and land needs. Certain trends in Mecklenburg County are integral to addressing this need for future park and greenway amenities as a foundation for land planning. These include:

- Population Dynamics
- Household Composition
- Age Shifting
- Land Use
- Environmental Issues
- Equity and Access to Open Space

Population Growth

Population growth, on any scale, typically begets increased consumption of natural resources. Perhaps the most detrimental and wide-ranging is the consumption of land. Unlike many of the natural resources derived from it, land itself is a finite commodity of which many of its uses have no substitutive entity. The preservation of land is critical to ensuring the many benefits that are derived from open space.

Mecklenburg County has experienced continued growth since 1960, more than tripling in population in that time. See pages 95-97 for detailed information on population growth.

Most alarming, perhaps, is the population growth that has occurred within the individual municipalities, lending credence to the theory that the County is experiencing rapid *suburbanization*, coupled with years of *decentralization* of the city of Charlotte. The town of Huntersville population increased 825 percent in the 1990s. The town of Matthews has experienced a 2,260 percent increase in population since 1980. Figures indicate that this trend of intense local population growth is not expected to falter any time soon. By 2010, Mecklenburg County population will be approaching the million-person threshold with 990,525 inhabitants. This figure will represent an alarming 42 percent increase from 2000, suggesting that this decade will yield the most stress upon our natural resources that we have yet experienced. Population growth is expected to continue past this decade as well. By 2015, Mecklenburg County will be home to 1,182,128 residents[1].


Nevin Park Picnic and Water Park

Mecklenburg County Park and Recreation Land	Developed Acreage	Undeveloped Acreage	Total Acreage
1 Nature Preserves	3,312.89	2,500.92	**5,813.81**
2 Community Parks	903.08	106.75	**1,009.83**
3 District Parks	1,519.08	2,650.01	**4,169.09**
4 Neighborhood Parks	1,238.25	335.14	**1,573.39**
5 Golf Courses	1,216.50	0	**1216.5**
6 Greenway Land	0	2,875.85	**2,875.85**
7 Recreation Centers (Stand Alone)	37.35	0	**37.35**
8 Special Facilities	431.84	425.79	**857.63**
Total Properties	**8,658.99**	**8,894.46**	**17,553.45**

Mecklenburg County's Biodiversity

By Don Seriff, Natural Resources Manager
Mecklenburg County Park and Recreation

Biodiversity is more than just a buzz word. A contraction of the term "biological diversity," biodiversity is a single word that characterizes the sum of all life within an area. Mecklenburg County's biodiversity is made up of literally thousands of species of plants, animals, insects, fungi, and bacteria. Many of these plants and animals are common, some are rare, and a handful are threatened or endangered.

Plant diversity ranges from delicate ferns and strikingly beautiful wildflowers, to valuable fruit producing shrubs and vines, to massive "treasure trees," champion-sized trees for this area. Animal diversity ranges from furry mammals like otters, tiny shrews, bats, and bobcats, to scaly snakes and lizards, slimy salamanders and frogs, a diversity of colorful birds, fish, and hundreds of insect species. Most of the plant and animal species found here are native (indigenous) to Mecklenburg County, but in recent years many invasive alien species have expanded into this area. Much of what we know about the biodiversity of Mecklenburg County has been learned within the past 20 years. During this period of unbridled development, it has become vitally important to understand what was here, what is here, and what we are in danger of losing.

Natural Heritage Program

Prior to 1992, only sporadic assessments of biological resources had been conducted within the county. In 1992, the Mecklenburg County Park and Recreation Department partnered with the North Carolina Natural Heritage Program to conduct the County's first formal inventory of its natural areas. During the inventory, the department worked with the public and consulting biologists to identify areas throughout the county that contained natural areas rich with biodiversity. The initial survey was completed by 1995, and a report was published in 1998 identifying 27 biologically important natural areas. Each of these natural heritage sites was ranked as being of national, state, regional, or county significance and they were targeted for protection. Of the initial 27 sites identified, 15 (56 percent) are now protected, four (15 percent) have been lost, and eight (29 percent) are still in need of protection.

The natural heritage survey also provided data documenting the presence of various types of natural communities within Mecklenburg County (table 1). Natural communities are defined as distinct, reoccurring groups of plant and animal species that occur together in defined areas. The Park and Recreation Department's natural resource management program is based on managing natural communities in lieu of managing for individual species. This allows for the protection of countless other species that would otherwise not be specifically targeted for conservation. The overall management goals are to: 1) manage for natural communities, 2) preserve and restore habitats for the rare, threatened, and endangered species, and 3) to keep common species common.

Biodiversity continued on page 102

Biodiversity continued from page 101

Table 1

Natural Communities in Mecklenburg County

Upland Forests
Dry-Mesic Forest
Dry Oak-Hickory Forest
Basic Oak-Hickory Forest
Xeric Hardpan Forest
Mesic Forests
Mesic Mixed Hardwood Forest
Basic Mesic Forest
Floodplain Forests
Piedmont Levee Forest
Piedmont Bottomland Forest
Piedmont Alluvial Forest
Piedmont Semi-permanent Impoundment
Rock Outcrops
Piedmont Acidic Cliff
Isolated Wetlands
Upland Depression Swamp Forest
Low Elevation Seep
Early Successional Habitats
Piedmont Prairie

Evergreen Nature Preserve

A comprehensive review and update of the original natural heritage survey was conducted between 2001 and 2007, and was needed due to the dramatic development and corresponding habitat loss that has occurred here over the past 10 years. The survey revisited existing sites and added new sites. The state and county are currently working to rank the revised natural heritage site list. The new site list, maps, and state rankings will be available by the end of 2008. Mecklenburg County is one of only three counties in North Carolina to have completed an update of its natural heritage survey.

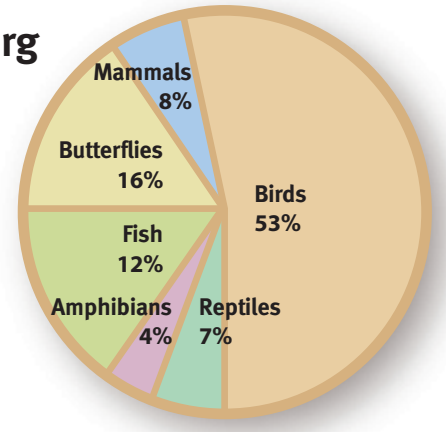
Plants and Animals

In 1997, the Park and Recreation Department began to compile and update existing plant and animal records for Mecklenburg County and the surrounding region. This was the first systematic attempt to compile this information for Mecklenburg County. In addition, numerous plant and animal inventory projects started in nature preserves, greenways, and other natural areas throughout the county. Data from these studies has been invaluable in providing a current understanding of the presence and distribution of plants and animals here. In 2003, a database was developed to house all records and staff have georeferenced the data for use in GIS analysis. Thousands of records have been added over the past several years and currently over 35,000 records of animals and over 40,000 records of plants are contained in the database. As a result of this work, we are now in a better position to make informed, science-based decisions regarding local conservation of wildlife and native plants.

The following two charts highlight the diversity of animal and plant species documented within Mecklenburg County.

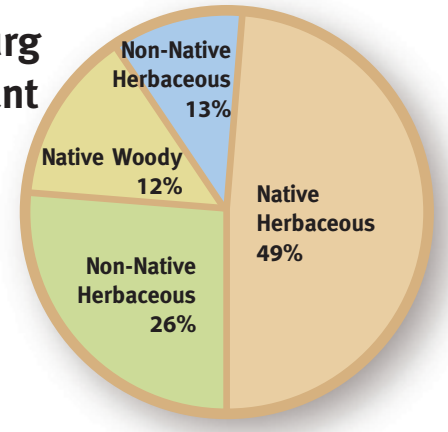
42	species of mammals
298	species of birds
40	species of reptiles
24	species of amphibians
70	species of fish
92	species of butterflie

Mecklenburg County Animal Diversity



819	species of native herbaceous plants
420	species of non-native herbaceous plants
201	species of native woody plants
207	species of non-native woody plants

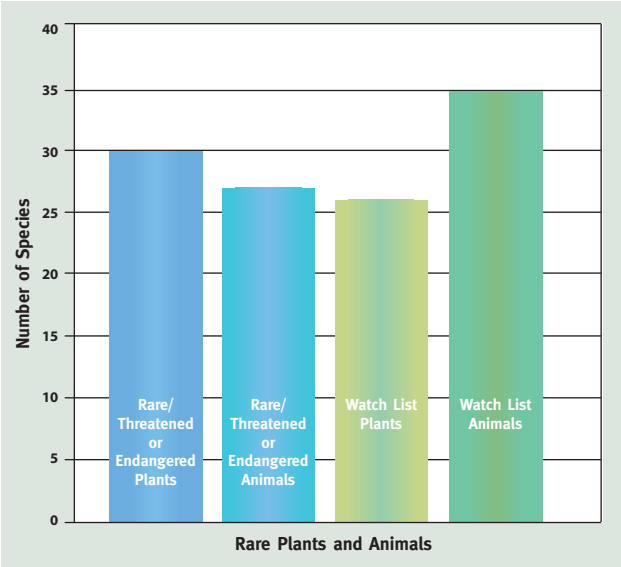
Mecklenburg County Plant Diversity



Rare Plants and Animals of Mecklenburg County

Several species of plants and animals native to Mecklenburg County are now listed as rare, threatened, or endangered by the state of North Carolina and/or the U.S. Fish and Wildlife Service. Among the most rare are Schweinitz's sunflower, smooth coneflower, Georgia aster, the Carolina darter (fish), American eel, and two mussels: Carolina heelsplitter and Carolina creekshell. Many more are on state or federal "watch lists," meaning that they are species whose status may soon warrant formal legal listing as rare, threatened, or endangered throughout their range. In addition, Park and Recreation biological inventory data provides evidence that many additional species should now be considered of conservation concern at the county level. These species may be extirpated (permanently lost) from the County if conservation measures are not taken to ensure their long-term survival.

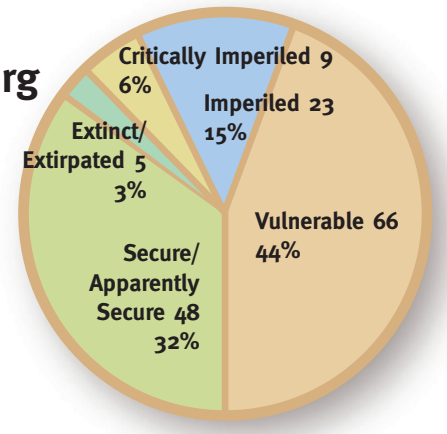
The following table highlights the number of rare species documented within Mecklenburg County as of the end of 2007.



Rare Animal Case Study: Birds

Data from bird inventory and monitoring projects conducted during the past 10 years was used to develop a County level conservation status assessment of birds. The results of this detailed review are presented below. Habitat loss due to development is the primary factor influencing the conservation status of most bird species in the County.

Conservation Status of Birds in Mecklenburg County



Biodiversity continued on page 104

Biodiversity continued from page 103

Critically Imperiled Breeding Bird Species in Mecklenburg County
(layout by Marek Smith)

Threats to Our Biodiversity

As of 2008, the diversity of native plants and wildlife species remains rich in Mecklenburg County, but numbers of viable populations of many species have been reduced and there are numerous threats to their long-term survival. Data shows that while some of our native plant and animal species have adapted to the manmade environment and are able to thrive, most are struggling and are considered "vulnerable" to extirpation. Habitat loss, largely due to development, remains the primary threat to the continuing prosperity of our native species. Habitat fragmentation is the second most serious threat, as severely fragmented habitat is of poor quality for all but the most common and adaptable species. Habitat degradation due to the influx of invasive alien species or impacts from pollution is the third key factor in local species loss.

Threat Case Study: Invasive Plants

Invasive alien species of plants and animals are considered one of the most important threats to our native plant and animal diversity. These aggressive species often out-compete native species or they can directly kill other species. Examples of this include fire ant predation of ground nesting birds and reptiles, and kudzu's effect on canopy trees. Invasive plants have become a major problem in Mecklenburg County and throughout the country. Their negative impact on our economy and on our native biodiversity is now well-documented and many agencies have developed invasive plant control plans at the federal, state, and local levels. In Mecklenburg County, 38 percent of the documented plant species are not native. The top 25 most invasive of these can be found at www.charmeck.org/Departments/StormWater/StormDrain/Invasive+Plants.htm. These and other species are being targeted for eradication by the local Invasive Species Task Force. They should not be planted anywhere in the county.

Cone Flower

Nature Preserves: Islands of Nature in a Sea of Urban Sprawl

By Don Seriff, Natural Resources Manager
Mecklenburg County Park and Recreation Department

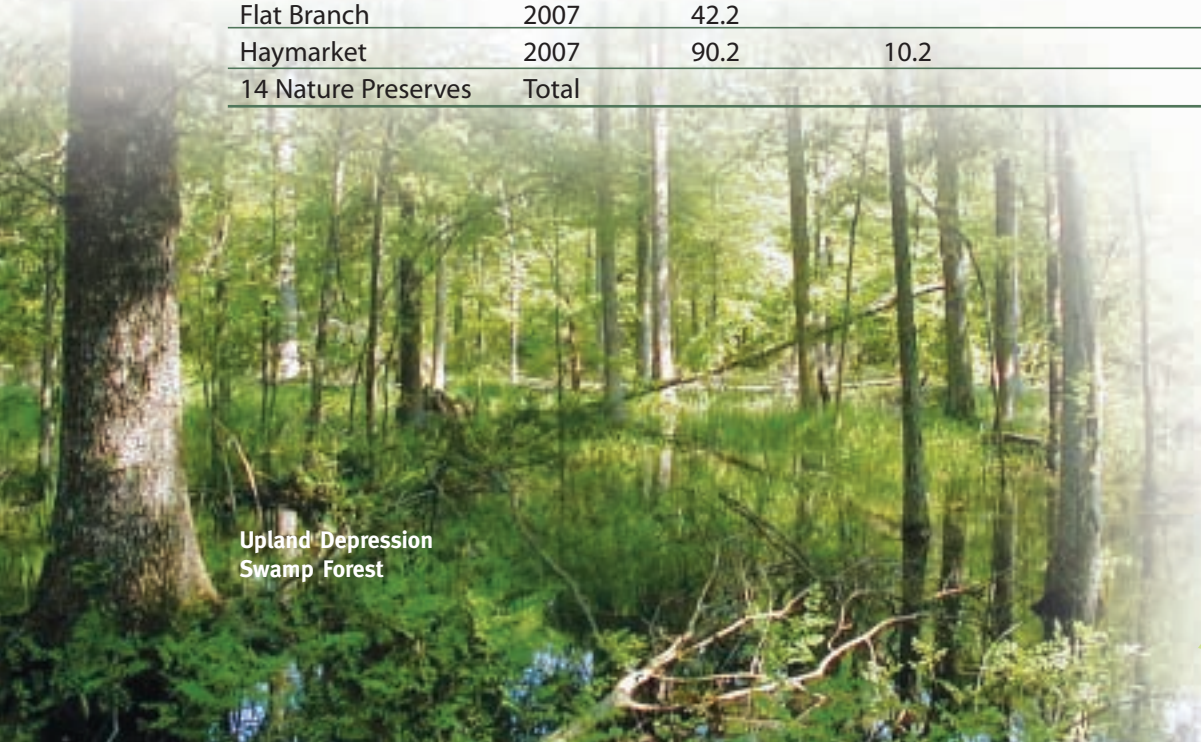
For more than 30 years, Mecklenburg County's citizens and elected officials have been working to protect our unique ***natural heritage***, our diverse wealth of wild plant and animal species and the natural communities in which they live. Since 1976, approximately 5,800 acres have been designated as ***nature preserve*** in Mecklenburg County. Approximately 65 percent of this total nature preserve acreage has been purchased in the past 20 years. In addition to protecting natural communities and native wildlife and plants, these natural areas provide opportunities for passive recreation, watershed and water quality protection, air quality benefits, soil conservation benefits, and educational opportunities. Our citizens can be proud of their achievement in protecting these priceless lands.

Mecklenburg County Nature Preserve System: 1976-2007

Nature Preserve	Year Opened / Added	Land Use in Acres				Total Acres
		Forest	Grassland	Developed*	Water	
McDowell	1976	892.1	160.8	54.7		1107.6
Latta Plantation	1981	1141.3	63.5	134.6		1339.4
Reedy Creek	1983	719.8	9.3	6.7	0.5	736.3
Cowan's Ford	1992	477.8	181.9	0.4		660.1
Rural Hill	1992	375.9	106.0	6.5	0.4	488.8
Stephen's Road	1992	340.1		3.2		343.3
Auten	1994	268.8				268.8
Gar Creek	2000	315.9	37.1			353.0
Shuffletown Prairie	2001	13.8	4.3			18.1
Brackett Bluff	2002	59.1	2.0			61.1
Evergreen	2002	77.4				77.4
RibbonWalk	2005	177.4	7.2		2.3	186.9
Flat Branch	2007	42.2				42.2
Haymarket	2007	90.2	10.2			100.4
14 Nature Preserves	Total					5783.4

*Developed = nature centers, historic centers, park offices, picnic areas, restrooms, etc.

Nature Preserves continued on page 106



Upland Depression Swamp Forest

Nature Preserves continued from page 105

Most of our natural areas were purchased through "fee-simple" land purchases using money from voter-approved bonds. Over the years, a large percentage of these local bond dollars were leveraged with matching grants from the state's Clean Water Trust Fund and the federal government's Land and Water Conservation Fund. To obtain these matching grants, Mecklenburg County agreed to either conservation easement deed restrictions or specific requirements to provide environmental "stewardship" and natural resource management of these properties, in perpetuity. As a result of these land purchases and agreements, Mecklenburg County established the ***nature preserve system*** within the Park and Recreation Department, and actively manages nature preserves and the valuable natural assets within them.

In 2007, staff calculated an estimate of the yearly economic ***value*** of the nature preserve system to our community based on numerous environmental, economic, and societal research studies (table 2). This data highlights the tremendous importance of Mecklenburg County's 30 year investment in nature preserves. These natural areas are critically important to the future of our county's natural heritage and the quality of life of our citizens. Successful management of these natural assets, like the county's manmade assets, requires long-term planning and constant oversight.

The Yearly or Annual Economic "Value" of Mecklenburg County Nature Preserves - *Michael Kirschman, 2007*

Environmental Value		
Air Quality Benefit	Carbon sequestration / air pollution removal	$ 2,210,000
Economic Value		
Tax Benefit	Proximity effect / increased property values of adjacent land owners	$ 1,181,878
Tourism Benefit	Revenue - nature based and heritage tourism	$ 1,083,333
Direct Revenue Benefit	Nature preserve program and facility revenue	$ 181,000
Societal Value		
Health Benefit	Nature reduces stress (>100 peer reviewed studies) Nature play burns more calories than org. sports Time in nature is therapy for ADHD	Priceless
Education Benefit	Environmental education outperforms in-class results	Priceless
Quality of Life Benefit	Enriches lives, spirit, community	Priceless
		$4,656,211+

The Future of Natural Areas

Natural areas and the biological assets that they protect are a finite resource that, once lost, cannot be replaced. Natural areas remaining within the county are being developed at an alarming rate. According to an American Forests Urban Ecosystem Analysis (*Mecklenburg County, N.C. March 2003*), between 1984 and 2003 the County lost over 35 percent of its tree cover and 36 percent of its open space, while impervious surfaces increased by 127 percent and have now become the dominant land feature in the County. This rate of habitat loss has increased since 2003 due to increased suburbanization fueled by dramatic population growth of an estimated 42 percent during this decade. Based on this rate of growth, it is believed that the county may be essentially "built out" within the next several years.

As of 2008, the total acreage of land designated as nature preserve represents less than 1.6 percent of all land in Mecklenburg County. Recent nationwide benchmarking results indicate "Mecklenburg County is lagging far behind other urbanizing counties in acquiring and protecting nature preserve lands strictly for passive recreation and natural resource protection." According to biological data, habitat for several species of wildlife and native plants is critically imperiled within the county. Therefore, there is still an ***extraordinary need*** for the protection of additional natural areas within Mecklenburg County to ensure that both our natural heritage and quality of life are preserved.

The principles of "conservation development" must be applied during the development process to protect quality habitat, provide corridors of connectivity between patches, and to protect additional small patches of functional habitat from being lost within the County. Nature preserves are essentially "islands of habitat" within an ever-growing sea of urban sprawl. Without habitat connectivity, over time, these isolated habitats will gradually decline in quality, in terms of both the number of native plant and animal species, and the viability of their populations. Acquisition plans for protecting properties, corridors, and habitat patches should incorporate the Park and Recreation Department's bio-planning "natural area needs assessment," and Mecklenburg County LUESA's "best management practice" needs for protecting water quality. This will help ensure biological resources are protected.

Regional connectivity of habitat between counties is vital to the environmental health of the entire region. The distribution of wildlife and plant species and important habitats does not correspond to arbitrary political boundaries like county lines. Projects such as the Carolina Thread Trail have an important secondary benefit of protecting habitat by linking together nature preserves, while their primary focus is on acquiring land and easements for regional recreational purposes.

Reedy Creek Nature Preserve

Greenways: A 42-Year-Old Concept Takes Shape

By Julie Clark, Park Planner
Mecklenburg County Park and Recreation

Greenway Master Plan Map

In Mecklenburg County, "greenways" are defined as linear parks that connect people and places. They are natural area corridors with multi-use trails that offer visitors opportunities to enjoy natural areas and provide alternative ways to move through our city, suburbs and towns. Greenways act as buffers which absorb flood waters and filter pollutants from storm water before it enters our creeks and streams and they provide habitat for wildlife and native plant communities. The greenway trail system is composed of a variety of surface types ranging from paved and concrete trails to crushed stone and boardwalk. The County currently operates 11 greenways totaling more than 30 miles of developed trails.

Mecklenburg County Park and Recreation
The Natural Place To Be...

Background

The concept of greenways in Mecklenburg County is not a new one. In 1966, the Charlotte-Mecklenburg master plan for recreation recommended greenways "as logical natural elements useful in creating a sense of physical form and order within the city." The plan proposed that greenways preserve the open space of urban residential areas while providing both active and passive recreation areas.

Although part of the planning fabric for several years, it was not until 1980 that an official greenway master plan was developed. The 1980 greenway master plan called for a 73-mile network of trails along 14 creek corridors. The plan envisioned a "green necklace" of creeks around the County. McAlpine Creek Greenway was Mecklenburg County's first designated greenway. Established in 1979, the park was advertised as "a nature preserve park" and the first gem in the "green necklace." Building on a 1978 bond package which provided $4 million for greenway acquisition, the 1980 greenway master plan identified and prioritized creeks for acquisition and future development. The plan outlined four objectives for the greenway program:

1. the provision of both passive and active recreation for areas of the county with the largest potential needs and the greatest projected population growth;
2. the supplementation of the developing park system; linkage between neighborhoods, commercial centers, parks, schools, and other urban growth areas;
3. open space preservation; and
4. the reduction of reliance upon the automobile for transit within the urban region.

Over the next 10 years, the greenway program focused primarily on land acquisition along the targeted creeks. Limited greenway trail development occurred along Campbell, Mallard, McAlpine and McMullen creeks. In 1999, the County developed and adopted the Greenway Master Plan Update. The update built on the objectives articulated in the 1980 Master Plan. However, the focus of the program was expanded to concentrate more on stream corridor and floodplain protection. The 1999 Master Plan Update proposed an expansion of the original "green necklace" to include 185 miles of trail corridors along 34 creek corridors and nearly 30 miles of overland connectors. Under the new plan, the greenway program was a means of protecting stream corridors and their floodplains from degradation due to land use development and poor land management practices while providing opportunities for passive recreation and non-motorized transportation. The plan recommended an expanded and accelerated development program for greenways. It encouraged that County agencies and the six incorporated towns take an active role in land acquisition and trail development.

Greenways continued on page 110

#	Greenway
1.	Six Mile Creek Greenway
2.	Flat Branch Greenway
3.	Four Mile Creek Greenway
4.	McAlpine Creek Greenway
5.	Irvin Creek Greenway
6.	Campbell Creek Greenway
7.	McMullen Creek Greenway
8.	Edwards Branch Greenway
9.	Briar Creek Greenway
10.	Little Sugar Creek Greenway
11.	Kings Branch Greenway
12.	Coffey Creek Greenway
13.	Walkers Branch Greenway
14.	Steele Creek Greenway
15.	Big Sugar Creek Greenway
16.	Irwin Creek Greenway
17.	Stewart Creek Greenway
18.	Paw Creek Greenway
19.	Gum Branch Greenway
20.	McIntyre Creek Greenway
21.	Torrence Creek Greenway
22.	South Prong Clarke Creek Greenway
23.	Ramah Creek Greenway
24.	Rocky River Greenway
25.	South Prong Rocky River Greenway
26.	Clark's Creek Greenway
27.	Doby Creek Greenway
28.	Toby Creek Greenway
29.	Mallard Creek Greenway
30.	Back Creek Greenway
31.	Reedy Creek Greenway
32.	McDowell Creek Greenway
33.	Long Creek Greenway
34.	Mallard Creek Tributary
35.	Dixon Branch Greenway

Greenways continued from page 109

Greenways Then and Now

Both the 1980 greenway master plan and 1999 update emphasized three primary goals for the greenway program: land acquisition, floodplain protection and water quality improvement, and trail development.

1) Focus land acquisition efforts along identified creek corridors for greenway development and habitat conservation

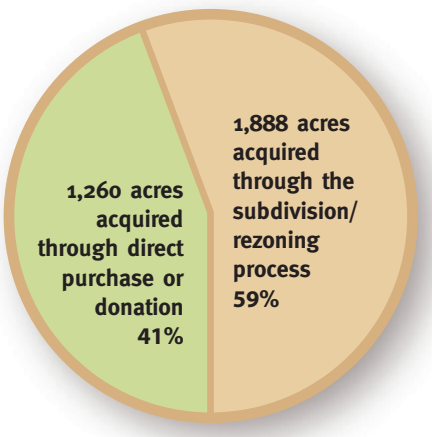
Results

Land acquisition can be a long and laborious process. Unlike a park or nature preserve which may consist of one or two large parcels of land, greenway acquisitions often involve numerous parcels of limited acreage. The number of parcels making up one mile of greenway trail can range from one to ten parcels. Mecklenburg County Park and Recreation has been the recipient of numerous land bonds that have helped secure over 3,100 acres of land along our creek corridors. In addition, Park and Recreation has gained greenway land through various grants and government programs, including Land and Water Conservation funds and the FEMA flood buyout program. The majority of greenway land acquired, however, is the result of requests made during the rezoning and subdivision process.

The 1980 master plan identified and prioritized land acquisition needs along 14 creek corridors. In 2007, some portion of land has been acquired along all 14 original creek corridors; acquisition is 60 percent complete along Little Sugar Creek Greenway. Land acquisition remains a critical component of greenway planning and development. A portion of the land bond passed in November 2007 is targeted for greenway land acquisition and will be focused, in particular, on acquisition along Little Sugar Creek.

Greenway Land Acquisition

Total greenway land acquired: 3,148 acres



2) Protect/conserve floodplain and improve water quality

Results

In addition to the protection of floodplain through acquisition efforts, the greenway program has undertaken trail development in conjunction with stream improvement and restoration initiatives. While stream restoration and floodplain improvement efforts are designed with the primary purpose of improving water quality or reducing flood levels, these same efforts also provide a natural stream-side setting for greenway visitors to enjoy. As part of the 1999 Update, Little Sugar Creek Greenway was selected as the pilot project for a greenway and stream restoration partnership. Led by Mecklenburg County Park and Recreation Department, Charlotte-Mecklenburg Storm Water Services, and the Land Use and Environmental Services Agency, the project transformed a 1.2 mile stretch of Little Sugar Creek from East Boulevard to Brandywine Road. The project included the creation of a linear park and construction of greenway trail that linked County floodplain property purchased through a federal flood buyout program to Freedom Park. Stream improvements included the restoration of over 5,200 linear feet of Little Sugar Creek, resulting in increased aquatic habitat, stabilized stream-banks, and a more natural meandering of the creek itself.

The addition of thousands of native trees and shrubs provided bank stabilization, runoff filtration, and stream-side habitat. These landscaping efforts have a combined effect of improving the health of the stream while providing shade and beauty for the enjoyment of the greenway visitor. The creation of two large wetlands help treat storm water runoff from surrounding neighborhoods, improve water quality and create habitat for wildlife. Walking along the trail, greenway visitors can now stop and learn about the history and restoration of Little Sugar Creek, enjoy a shady spot to stop and listen to the sounds of the rippling waters, and watch a great blue heron stalk its prey.

The success of the Westfield project on Little Sugar Creek Greenway has encouraged greenway planning and Charlotte-Mecklenburg storm water staff to continue to work together on the development of other greenway and stream improvement projects:

Little Sugar Creek Greenway, Westfield

- Little Sugar Creek Greenway: Upstream of Morehead Street. Mecklenburg County Park and Recreation and Charlotte-Mecklenburg Storm Water Services are partnering on a project focusing on trail development and stream restoration along Little Sugar Creek Greenway between 7th Street and Morehead Street. By 2010, the greenway will link its current northern terminus at Belmont Avenue to its southern terminus at Morehead Street.

- McAlpine Creek Greenway: Between Sardis Road and Providence Road, the stream restoration project will include greenway trail design and connect to the existing four miles of McAlpine Creek Greenway.

3) Trail development — connecting people and places

Results

It has always been a goal of the County's greenway system to link residents with popular destinations through the development and operation of a multi-purpose trails system. Between 1987 and 2007, Mecklenburg County added over 20 miles of greenway trail along 10 creek corridors. Six Mile Creek Greenway, a 1.0 mile trail bordering Union County to the south, was constructed by the LUESA's Solid Waste Services and given to Mecklenburg County Park and Recreation to operate and manage. The longest greenway, Mallard Creek Greenway, is over 7 miles long; the shortest greenway, Briar Creek, is just over a quarter mile long. Developed trails are located in eight of the nine park districts. Walker Branch, a 0.5 mile greenway constructed by a private developer, opened in

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October 2006 and was the first greenway in the Southwest Park District. Davidson and Huntersville each have greenway trail developed in their town. In 2007, there are over 15 miles of greenway trail under design and estimated to be constructed by 2010. Nearly five miles of the 15 miles under design will be constructed in the towns of Davidson, Huntersville, Cornelius and Matthews.

Greenway Planning and Development in Surrounding Towns

Town	Greenway Length	Trail Cost	Development Completed	Construction
Cornelius	McDowell Creek Greenway	0.75 miles	$545,000	2008
Davidson	West Branch Rocky River	1.2 miles	$1 million	2009
Huntersville	Torrence Creek Greenway Phase 3	1.3 miles	$1.25 million	2009
	Torrrence Creek Greenway Phase 1 and 2	1.4 miles	$1.2 million	1989, 2003
	Lower McDowell Creek Greenway	2.3 miles	$1.8 million	2009
Matthews	Four Mile Creek Greenway	2.3 miles	$3.1 million	2009

Freedom Greenway

City of Charlotte and the Environment

By Garet Johnson, AICP, Land Use Program Manager
City of Charlotte

Charlotte is fortunate to be at the center of one of the fastest growing regions in the country. In the last 20 years, Mecklenburg County alone has grown from 473,000 to more than 857,000 people, and the city of Charlotte itself is projected to grow by another 300,000 by 2030.

Recognizing that maintaining a healthy environment is a key part of responding to future growth, the *2005 Generalized Land Use Plan* for the City of Charlotte and Mecklenburg County, adopted in 1985, identified several environmental objectives. These objectives guided numerous initiatives over the last two decades to address our most critical environmental concerns. Highlights of these initiatives include the following:

Neighborhood Preservation, Redevelopment and Revitalization

- Following the adoption of the 2005 Plan, district and area planning efforts were launched which provided policy guidance for growth and development for specific areas within Mecklenburg County. In particular, these plans provided the blueprints for preserving, protecting and reinvesting in one of Charlotte's most cherished resources — its neighborhoods. The plans set forth recommendations to guide decisions regarding concerns such as land use, transportation, design, safety, economic development and environment.

- 1988 Transportation Bonds identified the creation of the Business Corridor Revitalization Program to strengthen economic vitality along business corridors, complementing the stabilization efforts in adjacent neighborhoods.

- A zoning overlay district, PED, was created to help re-establish Charlotte's urban fabric by promoting a mixture of uses in a pedestrian-oriented setting of moderate intensity along identified "inner city" roadway corridors. The district encourages the reuse of existing buildings that contribute to the unique character or history of the area. The standards also encourage high quality design, mixed use development, the use of public transit and development which complements adjacent neighborhoods.

Water Quality

- Watershed overlay zoning districts were established which provide development regulations to ensure the protection of public water supplies.

- In 1999, the Surface Water Improvement and Management (SWIM) stream buffers were adopted to ensure that the stream and adjacent lands would fulfill their natural functions.

- The Floodplain Ordinance was revised to create less opportunity for areas within the floodplain to be developed and thus allowing more areas for free flowing floodwaters.

City of Charlotte continued on page 114

City of Charlotte continued from page 113

- Charlotte City Council, in November 2007, adopted a Post Construction Controls Ordinance that establishes requirements for controlling the adverse effects of increased post construction stormwater runoff and non-point source pollution associated with development and redevelopment projects.

Air Quality

- Revisions to the Subdivision Ordinance have expanded considerably the requirements for sidewalks so that new developments must have a minimum of four-foot sidewalks on both sides of residential streets and five-foot sidewalks on arterial roads. In an effort to improve connectivity and reduce vehicle miles of travel, the Subdivision Ordinance was amended to minimize cul-du-sacs and dead-end streets.

- The *2025 Integrated Transit and Land Use Plan* was adopted in 1998, setting the stage for a multi-modal transportation system integrated with land use. The plan identified a five-corridor rapid transit system and an expanded bus system to serve future growth. Light rail began operating in the first of these corridors in November 2007. Work continues on the other four corridors with another light rail line, and possibly a commuter rail line projected to open by 2013. The plan has been recently updated with the *2030 System Plan*.

- Transit-oriented zoning districts were established to create a compact and higher intensity mix of residential, office, retail, institutional and civic uses around rapid transit stations. The development standards of the transit zoning districts help to ensure that the station areas have attractive streetscapes, contain a functional mix of complementary uses, and provide the necessary facilities to support transit use, bicycling and walking.

- The City adopted its first comprehensive transportation plan in 2006. The Transportation Action Plan (TAP) defines policies and implementation strategies for achieving the City's transportation vision, while accommodating a significant increase in travel and protecting our quality of life.

- The City recently (October 2007) adopted new guidelines for designing streets to provide capacity and mobility for motorists, while also being safer and more comfortable for pedestrians, cyclists and neighborhood residents.

Land Development

- Charlotte's tree ordinance requires tree preservation and tree planting on commercial properties and in residential subdivisions. The ordinance is currently being updated.

- Implementation of Mecklenburg County's Greenway Plan has been strengthened by dedications and donations of land through the subdivision and rezoning processes.

- Policies were adopted as part of the General Development Policies in 2003 to ensure that both residential developments and mixed use centers were designed to respect the natural environment. These policies addressed the need for useable open space, preservation of steep slopes along perennial streams and the establishment of tree save areas. Additionally, these policies emphasized the need for redevelopment of existing retail shopping areas.

- In November of 2007, the City adopted a set of broad policies (a.k.a., General Development Policies — Environment Chapter) specifically aimed at minimizing the negative environmental impacts of land use and development. The policies address air, water and land.

These and many other initiatives have helped address environmental concerns since the mid 1980s and will continue to do so in the future. They have allowed us to reap many benefits from the region's strong population and employment growth. However, even with the many environmental initiatives that have been established, we continue to feel the impacts related to the form and distribution of growth. As an example, area residents are driving more than ever. The average work drive time increased from 22.1 minutes in 1990, to 26.0 minutes in 2000. This increase in vehicle travel has contributed to an increased number of air quality violations. Another impact we have experienced is loss of open space and tree canopy. Since 1980, Mecklenburg County has been losing open space at the rate of 5 acres per day, and lost more than 35 percent of its tree cover between 1984 and 2003.

There is no question about whether Charlotte will continue to grow, however, the pattern and form of future development will be critical in determining the city's livability and sustainability in the 21st century. Continuation of our dispersed development pattern could threaten those very qualities that influence people and business to locate in the Charlotte region.

Some of the more recent initiatives, in particular, are focused on encouraging a more compact development pattern. Many of these initiatives were so recently adopted that not enough time has passed yet to measure their success.

One initiative currently underway that specifically addresses Charlotte's development pattern is the update of the overall growth framework, originally developed in the mid 1990s. The framework recognizes that despite Charlotte's generally dispersed development pattern, it has an underlying organizing framework consisting of "centers," "corridors," and "wedges."

• **Activity Centers** are focal points of economic activity typically planned for moderate, and sometimes for high, density concentrations of compact development. They are generally appropriate locations for significant new growth along with enhancements to the supporting infrastructure, particularly the transportation network.

• **Growth Corridors** are the areas where rail lines, planned rapid transit lines, major arterials and interstates/expressways generally run parallel. Corridors can accommodate uses requiring high levels of access, and moderate to higher density residential uses and employment concentrations.

• **Wedges** are the large areas between corridors where residential neighborhoods have developed and continue to grow. The wedges provide a wide range of housing choices, along with residential supportive uses.

This growth framework accommodates greater amounts of development in identified centers and corridors by utilizing existing and planned infrastructure and transportation systems to support that development. Lower density development characterized by neighborhoods and their supportive land uses remains in the wedges. Thus, this framework creates an efficient connection between land uses and the transportation system needed to support them, particularly by organizing land uses in a way that will support the provision of a range of transportation choices, and housing and employment options.

The Centers, Corridors and Wedges Framework also builds upon the work Charlotte has done, especially over the last few decades, to build a viable center city. The Framework recognizes Center City Charlotte as the most significant Activity Center and as the region's office and cultural hub. Continued emphasis on the Center City is vital to our long term sustainability.

While the Centers, Corridors and Wedges Framework has been a good tool to help organize our land use and transportation future, it is also important to our continued sustainability that we are able to refine the framework and to strengthen the guidance it provides. Additionally, it will be important that we become even more diligent about its implementation so that it guides not only land use decisions, but decisions about capital investments, regulatory changes and a host of other municipal activities. Thoughtful implementation of the growth framework, along with the numerous other environmental initiatives will ensure that growth occurs in a way that enhances the community and respects the natural environment.

'Smart Growth' is a Hallmark of Cornelius

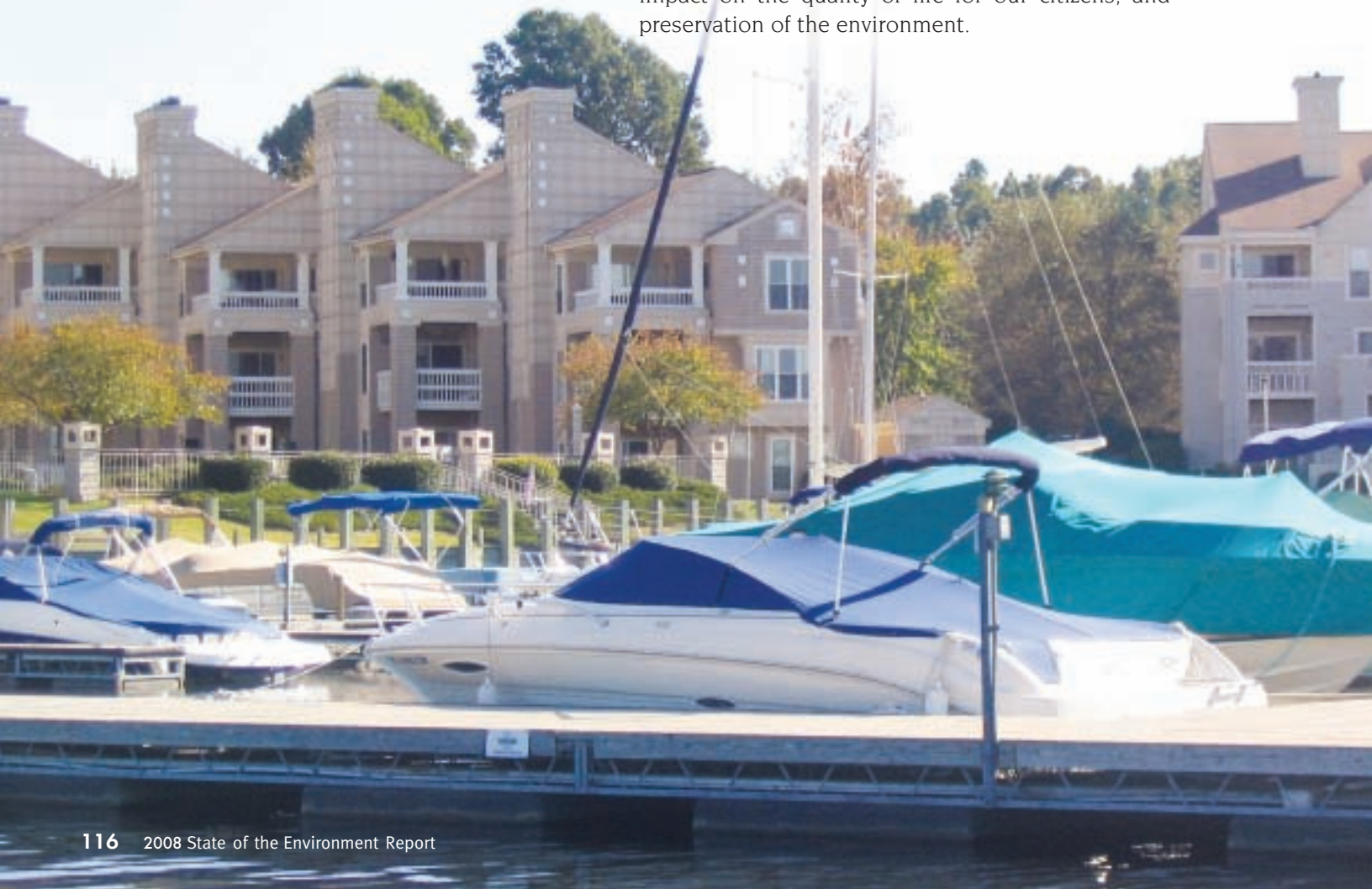
By Karen Floyd, Town Planner, Town of Cornelius

Cornelius experienced a growth surge in the late 1980s that continues today. With the creation of the Cornelius Sphere of Influence in 1984 and the extension of sewer, the town began to expand west of I-77. As development occurred, Cornelius annexed these areas, the old cotton mill closed and the first high-end planned waterfront community in town, The Peninsula, was developed.

As commercial development occurred, the Cornelius Town Board of Commissioners recognized the need to focus on a land use and planning vision, especially as it related to Lake Norman, the area's water source. Therefore, the town implemented state watershed districts in 1993, and an additional district in 2007 that facilitates maintaining water quality.

Cornelius has been proactive through the utilization of zoning and land use regulations to preserve usable open space for our citizens, including zoning a large portion of the town for rural preservation. The Rural Preservation District is coded to accommodate very low-density residential development and agricultural uses, protect natural vistas, and landscape features that define our rural heritage.

This district has been developed to protect the continuance of our rural areas and their customary development patterns and uses to prevent the sacrificing of environmentally sensitive landforms, natural vistas, and scenic features. About 1,585 acres of land has been zoned as Rural Preservation District in Cornelius. The town has also developed multiple parks and greenway systems that have a positive impact on the quality of life for our citizens, and preservation of the environment.

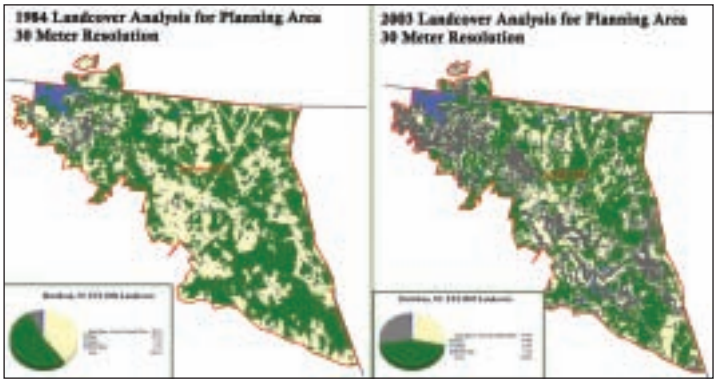


Tree and Open Space Preservation in Davidson

By Lauren Blackburn, Town Planner, Town of Davidson

The quantity and quality of open space and tree canopy is directly related to the health of ecosystems and wildlife habitat. These natural resources are also critical to human health and well-being. In fact, our communities would be unhealthy, unattractive and unsustainable without the preservation of substantial open space and tree cover. So, why do we continue to see the rapid sacrifice of these resources through development?

In 1984, within the Town of Davidson's current Extra Territorial Jurisdiction (ETJ) and incorporated town limits, 40 percent of land cover was undeveloped open space and another 53 percent in tree cover. By 2003, open space dropped to 28 percent and tree cover 44 percent of the planning area.[1]



Residential development was largely responsible for the 43-percent reduction in open space and 20-percent reduction in tree cover over the 20-year span, and continues to challenge environmental sustainability. More specifically, allowed suburban densities and land development policies promote clear-cutting and mass grading, and developers haven't realized the economic benefit to abundant natural resource protection. Local governments need to provide better information to developers regarding open space and tree preservation goals and strengthen policies to protect these natural resources.

The Town of Davidson recognized the benefits of open space when they adopted requirements for open space preservation as part of rural residential development in the rural areas in 2001. Between 40 and 50 percent of a property must remain as undeveloped open space, and homes should be clustered to maximize public enjoyment of protected natural resources.[2] These requirements are considered some of the toughest in the Charlotte region, but they still aren't enough. Important landscapes and habitats are being lost through development because there is no comprehensive plan for open space preservation, connectivity or management. Unbuildable stream beds and slopes are being "preserved," while habitats for threatened species are covered with homes and roads.

Davidson is working with Greenways Incorporated to create a large-scale inventory of important natural assets, called the Davidson Greenprint. Geographic Information Systems (GIS) data is the main source of information showing where wetlands and prime farming soils might be located. Volunteers in the community are also "groundtruthing" properties to verify or discover important natural assets such as north facing slopes, rock outcroppings or significant trees. This information combined with the conservation goals of local stakeholders will create a master plan for natural resource protection and management. The plan will direct public investment in open space, farmland and resource protection, and better inform which parts of properties should be preserved through development. The town expects to complete the Greenprint by the end of 2008.

A related project, the Tree Inventory and Canopy Master Plan, studied mature trees in or near public rights of way and provides recommendations for tree management for purposes of public safety and tree health. Bartlett Tree Experts has completed a draft report for the Tree Inventory, and the town will work on tougher tree preservation ordinances in coming months. Through an aggressive tree maintenance and replanting program, the town will continue to enjoy a healthy canopy and tree-lined streets for many years to come.

[1] Presentation to Davidson Planning Board November 2006 by Rick Roti, American Forests.
[2] See the Rural Planning Area section of the planning ordinance for more information: http://www.ci.davidson.nc.us/units/planning/ordinance/pdfs/Section percent2004 percent20- percent20Planning percent20Areas.pdf

The Town of Huntersville: Nearly 20 Years of Growth

By Whitney Hodges, Town Planner, Town of Huntersville

In 1990, the population of Huntersville was 3,014 people; today, about 40,000 people call Huntersville home. The town has experienced exponential growth in the last 20 years, but has been more aware about the development process on the environment. A development proposal today verses a development proposal 20 years ago must provide tree save areas, adhere to local greenway and bikeway plans, and must meet stringent water quality measures.

Proximity between Charlotte and Lake Norman, lower home prices, less traffic and quiet communities catapulted Huntersville's population to 24,960 in 2000. Increased construction began to affect the land and waterways here as well. In 1996, the town set out to guide its rapid growth by making changes to the zoning ordinance, which — prior to this time — was given little attention in regard to development's potential impact on the environment.

The zoning change allowed for a mixture of uses: residential, retail, office, etc., in one development; allowed for a cluster style of development which concentrated housing; and allowed for larger areas of open space. Overall, the zoning ordinance began a focus on the design of the project. Importance was placed on the public realm — roads, parks, open spaces, sidewalks and connecting people to places in more ways than just via the automobile.

In 2003, in response to the increased growth, Huntersville embarked on the Community Plan, which clearly defines the town's vision, and committed to protecting natural resource, natural terrain, wildlife habitat, endangered species and air quality.

Huntersville also adopted a Water Quality Ordinance in 2003. Stemming from the natural resource goal of the Community Plan, this ordinance seeks to reduce storm water runoff rates and volumes, minimize increases in non-point source pollution, and promote Low Impact Design principles. The ordinance applies to all new development and redevelopment sites within the town's jurisdiction.

The Town of Matthews is Committed to a Healthy Environment for All

By Hazen Blodgett, Town of Matthews

The Town of Matthews recognizes that protecting our environment is an important responsibility to the community.

We addressed this responsibility by creating citizen advisory boards. A Solid Waste Advisory Committee was created in the early 1990s to advise the town on issues such as garbage collection and recycling, and an Environmental Advisory Committee was created to help monitor a medical waste incinerator operating within our borders, as well as other issues bound to develop as the rural community rapidly became more urbanized. In 2001, these committees merged into the current Environmental Advisory Committee, which regularly discusses solid waste and garbage, air quality, storm water, and other physical agents.

Through the actions of these committees, the town required its solid waste contractor to create a yard waste recycling facility, which now is used by other areas that they service. This yard waste collection has helped the town divert more than the state goal of 40 percent of our solid waste from the landfills. We also have held annual household hazardous waste disposal events.

Matthews has been recognized by the State of North Carolina as a leader in public awareness of the area's air quality. We maintain four signs located along major thoroughfares (Pineville-Matthews Road, Monroe Road, Independence Boulevard, and Fullwood Lane) that report the state-predicted daily ozone level. The town also took pollution-reducing energy efficiency into consideration when it designed the Town Hall/Library facility and the Public Works facility. Operationally, the Matthews Public Works facility uses the alternative fuel biodiesel rather than the higher-polluting diesel in their vehicles. In an effort to reduce vehicle emissions due to traffic congestion, the Town of Matthews also modified the solid waste collection schedule during the ozone season so trucks can start earlier and not block thoroughfares during the morning rush hours.

On the water quality side, with the support of the County's Surface Water Quality Program, Matthews approved and enforces a Storm Water Ordinance that has been used as a model for other areas. We also maintain our roads and associated storm drains in an effort to keep the waters of Matthews swimmable. Also in coordination with the County, Matthews has developed a series of greenways, which promote healthy living for our citizens in a walkable community, as well as a noise ordinance.

In 1997, Matthews developed a zoning category of R-VS (or Residential - Varied Styles) to allow greater intensity of housing while retaining the flavor of the residential community. In that same year, Matthews adopted a Downtown Master Plan, which encouraged greater density and intensity of development in an expanded "downtown" boundary.

In the intervening decade, both actions have allowed for increase in population and business activity without spreading impervious surface on as much land area as was the common practice. Growth policies for future transit station locations also direct concentrated development in confined geographic boundaries, with a focus on incorporation of green space within urban centers. In 2007, Matthews adopted new landscaping and tree preservation guidelines for protecting and expanding the town's tree canopy coverage.

Town of Mint Hill Continues Steady Growth

By Dana Goins, Town Planner, Town of Mint Hill

The Town of Mint Hill and extra territorial jurisdiction (ETJ) encompasses approximately 36 square miles in the eastern reaches of Mecklenburg County, bounded to the north by Albemarle Road and Cabarrus County and to the south by Idlewild Road and Union County. Once a small agricultural area, the town has transformed into a burgeoning bedroom community of the greater Charlotte area. With its proximity to uptown Charlotte (approximately 10 miles), a strong sense of community and a sustained affordability, Mint Hill is an attractive location for those seeking the convenience of a large metropolitan area while maintaining a small town atmosphere. Residents in the area also have access to the greater Charlotte region with five Interstate I-485 interchanges located within the town.

Originally founded in 1917 with a population of 2,284, Mint Hill has grown over the years, reaching a population of 14,922 in 2000. The town continued this growth and in 2005 the population was 17,871, a growth average of 3.6 percent per year. Estimates for current and future years put that number even higher as subdivisions continue to be built around the town.

Mint Hill has also seen an increase in commercial development in the recent past. Downtown Mint Hill will continue to flourish as many retail, office and medical developments have been approved. The Clear Creek Business Park is off to a good start with Carolinas Medical Center opening a Medical Campus in December 2007. Along with planned warehouses and office uses, a high school is scheduled to open in the park in 2010. Another exciting addition is the Bridges of Mint Hill, a regional mall planned at the Lawyers Road and I-485 interchange. Grading has begun and completion is expected within upcoming years.

As development continues to occur, local leaders have noticed the physical affects of such growth on our natural environment. In July 2007, the Post Construction Ordinance came into effect, mainly protecting ground water resources. With this ordinance, buffers were mandated that require restrictive development on areas that are adjacent to the headwaters of the Goose Creek River. Downstream live the endangered species, the Carolina heelsplitter, although the dwindling population is fading fast. The aim of these buffers is to protect our streams, therefore protecting the areas where the heelsplitter lives with hopes of repopulating the species. Another protective feature that has been used in recent years in Mint Hill is the Conservation Subdivision. Developers have used this element of Mint Hill Zoning Ordinance to build new subdivisions while conserving valuable natural areas.

Town of Pineville Thrives, Strives to Maintain 'Small Town Charm'

By Kevin Icard, Town Planner, Town of Pineville

The Town of Pineville encompasses approximately five square miles in the southern portion of Mecklenburg County, bordered to the north and east by Interstate 485 and Charlotte and to the south and west by South Carolina.

Pineville is steeped in history. In 1852, the "iron horse" came to the community when the Charlotte, Columbia & Augusta Railway was put in operation, and a passenger and freight station was built at Morrow's Turnout (the current downtown). In this area, there were many large and beautiful pine trees casting their shadows over the community. Thus, when the newly painted sign went up on the railroad depot, the name "Pineville" was displayed.

Once a small agricultural area with a thriving cotton mill, Pineville became an incorporated municipality in 1873. In 1900, the town boasted a population of 585 souls, two bar rooms and 10 stores, and an average sale of 6,000 bales of cotton from the surrounding farms. The town has since transformed into a regional destination for dining, shopping and entertainment, and is an attractive location for those seeking the convenience of a large metropolitan area while maintaining a small town atmosphere.

Pineville has grown over the years, and in the 1980s and 1990s much of that growth came in the form of retail centers. Only in the past 10 years have developers rediscovered the attractiveness for residential development. With 1,300 homes approved and scheduled for development, the town will increase its population from 6,500 to more than 10,000 within the next few years.

The town has also seen an increase in medical/office development in the recent past. The former local Mercy South Hospital has been expanding by leaps and bounds, and was renamed Carolinas Medical Center - Pineville, increasing its capacity to more than 500,000 square feet of space to better serve the community with emergency and specialized care.

Pineville is a thriving place to be, with many conveniences, but aims to preserve its small-town charm and historic Main Street. Town planners look forward to guiding this growth for a bright and sustainable future. One of the ways we are managing this growth is through the July 2007 enactment of the Post Construction Ordinance, protecting surface and ground water resources. With this ordinance, buffers were mandated that require restrictive development on areas that are adjacent to Little Sugar Creek, Sugar Creek and McAlpine Creek among other protective regulations.

Another way the town is managing growth is in the form of new small area plans (currently in development) that include architectural, pedestrian, bicycle, and other amenities to further guide this ongoing growth, reduce our environmental impact and preserve the charm that makes Pineville a great place to live, work, and play.

Environmentally Friendly Buildings and Development

By Mark Hahn, Director and Tom Crow, Senior Project Manager
Mecklenburg County Real Estate Services

The first edition of the Mecklenburg County State of the Environment Report, in 1987, mentioned the need to comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) energy standards. The 1989 report mentioned indoor air quality for the first time. More recently, the 2006 issue of the report identified a new, environmentally sensitive path for building design.

The The Public Library of Charlotte & Mecklenburg County took a step forward with the construction of the new children's library, **ImaginOn: The Joe & Joan Martin Center**. This facility was designed using a high-performance building rating system called LEED (Leadership in Energy and Environmental Design), is a rating system created by the US Green Building Council that allows building owners, designers and contractors to measure how "green," or environmentally friendly, a building is.

ImaginOn: The Joe & Joan Martin Center

Interior sun shades in the reading area

"Green" design and construction practices significantly reduce or eliminate the negative impact of buildings on the environment and the building occupants. A third-party review process grants or denies certification, based on verification that the design and construction meet specific criteria. Points are gained for how a building is sited, its impact on the site, energy usage, water usage, conservation of materials and resources, and indoor environmental quality. Verified point levels result in ratings of Certified, Silver, Gold or Platinum.

Results of constructing "green" buildings include healthier environments for employees, which can improve productivity, as well as reductions in energy usage, which lowers operational expenses. Industry experts generally indicate that LEED rated buildings can be achieved at little to no additional costs over similar non-LEED rated buildings. A zero to two percent first cost premium for a Silver rated building can usually be "paid back" in operational cost savings over a few years or less, depending on the energy efficiency strategies utilized in the design.

In response to the Mecklenburg County Board of Commissioners' adoption of an Environmental Leadership Policy in 2004, the Mecklenburg County Real Estate Services Department initiated an internal policy to pursue LEED certification on all building construction projects with a value over $2 million. Building projects with a lesser value will be designed and constructed using sustainable design principles, but LEED certification is only pursued on a case by case basis. The renovation of Freedom Mall into County offices is the first project to be completed using the LEED rating system. This building incorporates daylighting

Freedom Mall Renovation Project

strategies, an ice storage system to better manage energy usage, an underfloor air distribution system to improve indoor air quality and comfort, and solar (photovoltaic) panels to power some light fixtures. Environmentally friendly building materials and furnishings will allow employees who are sensitive to certain chemicals to move in without the issues normally associated with new construction materials. Other LEED projects currently being managed by the Government Facilities Division of County Real Estate Services include the Jail North Youthful Offender Addition, the new Medical Examiner's Office, and the Revolution Regional Sports and Learning Academy. Each project has a goal of achieving a Silver LEED rating.

Construction of new LEED buildings is only part of achieving continued energy and water savings and overall healthy indoor conditions. Facility maintenance and upkeep must take into consideration environmentally friendly cleaning chemicals and processes. Energy and water savings can also be realized in older existing facilities. Energy audits and life cycle cost analyses are two strategies to identify appropriate system types for replacement. As HVAC and lighting systems are replaced, the most energy efficient equipment that is practical to use is selected. The Buildings & Grounds Division of County Real Estate Services is employing all of these strategies. This division is performing energy audits on numerous buildings to identify energy saving strategies and has implemented a program for the use of "green" cleaning chemicals. Over the past couple of years, this division has also replaced millions of dollars worth of old, worn-out equipment with new energy efficient systems.

Going beyond the use of the LEED rating system for the design of County-owned facilities, Mecklenburg County has also made a priority of encouraging developers and building owners to construct environmentally responsible buildings. Mecklenburg County proposed new legislation that would allow counties to rebate building permit fees to building owners, who construct LEED rated buildings. Senate Bill 581 became Session Law (S.L.) 2007-381 as it was adopted in August 2007. Through S.L. 2007-381, the State of North Carolina promotes sustainable projects as follows:

In order to encourage construction that uses sustainable design principles and to improve energy efficiency in buildings, a county may charge reduced building permit fees or provide partial rebates of building permit fees for buildings that are constructed or renovated using design principles that conform to or exceed one or more of the following certifications or ratings:

❶ Leadership in Energy and Environmental Design (LEED) certification or higher rating under certification standards adopted by the U.S. Green Building Council.

❷ A One Globe or higher rating under the Green Globes program standards adopted by the Green Building Initiative.

❸ A certification or rating by another nationally recognized certification or rating system that is equivalent or greater than those listed in subdivisions (1) and (2) of this subsection.

As local government entities, banks, and developers continue to design and construct more "green" buildings, the process of designing and operating buildings in a sustainable, environmentally friendly manner will simply become the "normal" way of doing business.

Solid Waste: 1987 Recommendations 2007 Results

By Bruce Gledhill, Director
Mecklenburg County Solid Waste

Overview

1987: The County has a solid waste management plan but it is incomplete, failing to address key problems such as demolition waste, illegal dumping or the disposal of infectious waste. Additionally, the municipal/commercial waste disposal capacity is critically low. Generally, the systems and facilities required to implement a comprehensive plan are unavailable.

2007: Today, there is not only a comprehensive County solid waste management plan that addresses residential, commercial and construction and demolition waste, but also the infrastructure to support its implementation. The problems of widespread illegal dumping and infectious waste disposal have been essentially eliminated, not through local planning, but rather through legislation and regulation at the federal and state levels.

Quick Stats

1987:

- Municipal commercial waste disposal capacity was 3 years.
- Municipal commercial waste generated (tons) = 635,000
- Municipal commercial waste recycled (tons) = 4,500 or 1% of total waste stream
- County hazardous waste generation (tons) = estimated at over 8,000

2007:

- Residential/commercial waste disposal capacity in excess of 25 years
- Residential/commercial waste generated (tons) = 1,538,000 (FY 2007)
- Residential waste recycled (tons) = 47,000 or more than 11% of residential waste stream.
- County hazardous waste generation (tons) = 12,500 (2005)

Waste Disposal

1987: Municipal/commercial waste disposal capacity was critically low. The only remaining solid waste landfill in Mecklenburg County, the County's Harrisburg Road landfill, was estimated to only have three years life remaining, and that long only if half of the County solid waste were directed to the BFI Landfill in Cabarrus County.


Foxhole Landfill

2007: The County was able to secure a new permitted municipal solid waste disposal facility, the US 521 Landfill (Foxhole) in 1999, only after 12 years of litigation and permitting related activities. Today, even with the doubling of population and annual waste disposal since the 1987 SOER, the newly available disposal capacity and the County's own Foxhole Landfill coupled with the continued use of the expanded Allied Waste (BFI) Speedway Landfill in Cabarrus County results in more than 25 years of disposal capacity available for the County's residential solid waste. With these landfills, and the several permitted waste transfer stations serving the commercial waste generators in Mecklenburg County providing waste transport to more distant regional landfills, similar commercial disposal capacity exists.

Incineration of municipal solid waste needs to be done with regard for the public health and environmental protection.

1987: With the critical shortage of waste disposal capacity and inadequate handling of infectious waste, waste incineration was seen as the preferred, environmentally sound solution for waste disposal.

2007: The construction of the first, a small municipal waste incinerator in the University City area, was already underway at the writing of the 1987 SOER and a second larger facility was planned in the Arrowood Road vicinity. The University City Resource Recovery Facility commenced operation in 1989 but was decommissioned only five years later as the costs of compliance with environmental regulations increased and the County's ability to direct waste to the facility was impeded by change in Federal law. These same changes caused the plans for the proposed Arrowood facility to be abandoned. With the implementation of new, stricter environmental standards for waste landfills in the 1990's, landfills were no longer seen as an environmentally inferior waste disposal method. Today, in Mecklenburg County, municipal waste incineration is no longer considered a cost effective waste management approach.

Infectious Waste Handling

1987: The proper disposal of infectious or medical waste was considered a major issue in 1987. Inadequate regulation, poor accounting of disposal practices and numerous small on-site incinerators raised the level of concern.

2007: In the 20 years from 1987 to today, these concerns have been all but eliminated. Beginning in 1990, a series of state and federal laws were enacted that significantly tightened the controls on the generation, storage, handling, transportation and disposal of medical wastes. Today, most medical waste is handled by specialized third-party contractors that provide proper containers, secure transportation, and proper disposal of these wastes in off-site facilities. While safe disposal of infectious waste continues to be a concern, the appropriate regulations and

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infrastructure are in place and proper handling of these materials is no longer a problem.

There is a lack of collection, transportation and disposal options readily available and accessible to all County residents for the management of all solid waste.

1987: Although there was already a "Mecklenburg County Solid Waste Management Plan," waste collection systems varied by municipality and in some cases were nonexistent. Those systems that did exist were not integrated in their collection, transportation and disposal approaches.

2007: Today there is not only a comprehensive solid waste management plan but also a comprehensive and integrated collection, transportation and disposal system. Through interlocal agreements with the municipalities the County provides the necessary management options for recyclables, yard waste, and solid waste once collected.

Chronic Illegal Dumping

1987: Chronic illegal dumping of all types of solid waste takes place on public and private property.

2007: The urbanization of the County over the last 20 years has limited the number of locations where illegal dumping could go unnoticed, limiting the opportunity. Similarly, adequate access to permitted disposal sites is now readily available through the County recycling centers and public and private landfills and transfer stations located in and nearby to Mecklenburg County. While there are still isolated instances of illegal waste dumping in Mecklenburg County, they are not the systemic problem reported in 1987.

Poor Management of Construction and Demolition Wastes

1987: The mismanagement of construction and demolition waste was significantly related to the illegal dumping previously described, including the "proliferation of small demolition and construction waste disposal sites."

2007: Significant strides have been made in addressing this issue over the past 20 years, but in part the issue remains. In that time the regulatory approach to these facilities has markedly changed. There are two landfills permitted to receive C&D waste in Mecklenburg County, one being the

County's own Foxhole Landfill. Their capacity, along with the numerous similar sites just outside of Mecklenburg County provides adequate C&D facilities for the foreseeable future.

Inadequate Control of Hazardous Waste

1987: Large industries in the County generate equally large quantities of hazardous waste (see Quick Stats) and nearby disposal capacity is inadequate. There are no proper disposal options for residentially generated household hazardous wastes.

2007: Through the implementation by industry of waste minimization and pollution prevention systems, the quantity of hazardous waste generated has been reduced. In 2005, large industry in Mecklenburg County generated less than 2 percent of the hazardous waste of 20 years ago. For household generators, the County has opened four permanent drop-off sites for household hazardous wastes.

Inadequate Management of Industrial and Special Wastes

1987: There was inadequate disposal capacity for industrial wastes, process sludges and asbestos. That capacity which did exist had inadequate environmental controls.

2007: Again waste minimization and recycling has substantially reduced the quantities of these special wastes generated. Also, the implementation of RCRA Subtitle D standards for municipal waste landfills so improved the environmental controls on new landfills that they now can safely handle most of these special wastes.

Explore mandatory recycling programs for specific materials at all local government operations and offices. Coordinate activities of all City and County agencies and departments involved in solid waste management.

1987: No mandatory recycling programs for City or County government operations were developed.

2007: Through the PaperChase program, Mecklenburg County offices recycle paper and commingled container collection has been introduced to some on a pilot basis. Mecklenburg County Solid Waste also has entered into Interlocal Agreements with the Charlotte Mecklenburg School system, Central Piedmont Community College, and Mecklenburg County Alcoholic Beverage Commission to provide recyclable collection at all of the facilities they control.

Solid Waste Findings & Recommendations 2008

By Bruce Gledhill, PE, Director
Mecklenburg County Solid Waste

Findings

- Over the last year, the total quantity of waste landfilled by Mecklenburg County residents and businesses increased at a rate greater than the population growth. With an FY 2006 disposal rate of 1.89 tons per person, the County is lagging behind in achieving its stated waste reduction goals.
- While the per capita disposal rate increased in all three generation categories (residential, commercial, construction and demolition), the bulk of the growth was in the commercial category. To a great extent this additional waste can be attributed to a single site remediation project underway during the year.
- The quantity of recyclables collected in the residential curbside programs has measurably increased over the past two years. The residential recovery rate has increased from approximately 10 percent to 11 percent recycled of the total residential wastestream collected.
- While still largely untapped in its recycling potential, construction and demolition waste reduction has been closely aligned with the growing "green building" movement and as such is receiving considerable attention locally. In parallel, markets are developing for the recyclable materials from this wastestream.
- There has been little growth in the quantity of hazardous and radioactive wastes generated in Mecklenburg County. There continue to be adequate management systems in place to properly handle the wastes generated.
- Mecklenburg County's recycling and waste management infrastructure continues to be among the most comprehensive in the state. There is ample waste disposal capacity to serve the community's needs for the next 20 years if managed properly. While adequate, some of the public recycling and yard waste management facilities are showing their age and are struggling with the growing customer base.

Recommendations

- Increase participation in residential recycling. While all single family residents and many multi-family residents are provided with recyclable collection, it is estimated that less than half regularly participate in the program. Increased emphasis needs to be placed on motivating residents to recycle through increasing the awareness and benefits of the program and providing more convenient, flexible collection services.
- Expand the recycling by our business community. In spite of widespread compliance with the County's Source Separation Ordinance requiring businesses to recycle, waste generation in the commercial sector continues to increase, spurred in part by a rapidly growing local economy. Recycling participation needs to be expanded to a broader range of businesses with a greater number of materials recycled.
- Foster increased recycling of our construction and demolition (C&D) wastes. Locally, the recycling of C&D wastes is impaired by the low alternative disposal fees, an immature C&D recycling infrastructure, and low priority placed on recycling by the contractors. The County should actively promote the development of both the recycling infrastructure and markets for the recycled materials as well as increase the awareness of the benefits and opportunities provided by C&D recycling.
- Continue to provide the highest level of recycling and waste management services to the citizens of Mecklenburg County. Reinvest in County's public recycling and waste management infrastructure in order to provide a continued high level of service to the community, cost efficiently, while providing maximum protection to the environment.
- In each of the above areas, the County should continue to lead by example, encouraging others to recycle by improving our own internal recycling rates.

Garbage, Recyclables, Yard Waste, Bulky Trash - Where Does It All Go?

By Bruce Gledhill, PE, Director
Mecklenburg County Solid Waste

As most Mecklenburg County residents do, on one morning each week you roll out your garbage, place your recycling bin at the curb, neatly arrange, bag or contain your yard waste alongside, and then drive off to work. Lo and behold, you return home at the end of the day and everything has magically disappeared. Well, the magic behind it all has markedly changed over the last 20 years. Then, everything was collected in a single setout, there was no separation of garbage, recyclables and yard waste — everything went into the trash can. Now, three different trucks come down your street on collection day. Have you ever wondered where they all go once they are gone?

Recyclables collected from homes in Mecklenburg County are taken to the County's Metrolina Recycling Center, located off Graham Street in north Charlotte. Over 50,000 tons of residential recyclables were received in 2007. When recyclables are collected at the curb, the driver of the collection truck separates the material into two "streams:" fiber (newspaper, cardboard, junk mail, etc.) and commingled containers (bottles, cans, and other plastic or glass containers). Once these materials are delivered to the Metrolina Recycling Center they are routed onto a conveyor and separated manually and by machines into the different types of plastic, glass, aluminum, tin, newspaper or cardboard. Here, the recyclables are sorted, baled, and sold as raw materials to be reused in the manufacture of other products.

The separated recyclables are then formed into bales, each weighing nearly a ton, and sold to manufacturers of different products. For example, newspaper is turned into home insulation at the Metrolina Recycling Center, plastic can be made into fleece clothing or carpet, and aluminum can be used to make new aluminum cans. All of the recyclables placed at the curb ultimately end up as new products. (For more information on the types of materials that can be recycled see our Web page www.wipeoutwaste.com.)

Differing from 20 years ago, yard waste such as leaves, grass clippings and brush, are no longer placed in the landfill, being banned from landfills by the State of North Carolina in 1993. Today, residential yard waste is separately collected at curbside, typically hand loaded into the collection truck. This hand loading process makes it important to limit the size of individual pieces so that the yard waste is not too big for the driver to handle. Some municipalities alternatively provide containerized yard waste collection, which also limits the size of the yard waste collected.

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Where They Go continued from page 131

Most of the yard waste collected is then delivered to the County's Compost Central facility located near Charlotte Douglas International Airport. Over 80,000 tons of yard waste were handled there in 2007. At Compost Central the yard waste is ground by large tub grinders into pieces about one inch in size. Once the material is ground, it can be sold as landscaping materials (such as mulch) or be composted, a process in which the material is put into rows or piles and allowed to decompose. The decomposed material becomes a valuable soil additive and can be used in yards or gardens to promote growth of plants and vegetables. Those materials that are not made into landscaping products are turned into boiler fuel — where it replaces fossil fuels in local paper mills.

There was a significant illegal dumping problem 20 years ago and much of what was illegally dumped was bulky waste such as discarded appliances. Today, in most of the municipalities, residents call for a separate bulky waste collection. A special truck, usually with a powered lift-gate, collects the appliance and transports it to the County's Metal & Tire Recovery Facility, located on Rozzelles Ferry Road in west Charlotte. Here the appliance is unloaded and, if it's a refrigerator or air conditioner, a licensed technician safely removes the freon (an ozone contributing chemical) from the unit. Then the unit is crushed and the scrap metals sold as recyclables.

While 20 years ago you probably placed your garbage in a trash can or bag, today you likely place it at the curb in a large roll-out container supplied by the municipality. Now the driver doesn't even leave the collection truck when it stops in front of your house. Instead he/she operates a robot arm that automatically dumps the roll-out container into the truck. Today that residential garbage is then taken to the Charlotte Motor Speedway Landfill in neighboring Cabarrus County. Nearly 400,000 tons of Mecklenburg County residential garbage were landfilled there in 2007. At some point in the future this same residential garbage will be taken to the County's Foxhole Landfill, located on US 521 south of Ballantyne. Operating since 2001, the Foxhole Landfill is currently receiving only construction and demolition waste

Foxhole Landfill

but will ultimately convert to receiving residential waste. Both landfills are state-of-the-art facilities incorporating significant safeguards to prevent negative impacts to the environment. Once landfills are closed they can be utilized for various recreational activities or as nature preserves and walking trails. An example of this is the former Harrisburg Road Landfill which served Mecklenburg County 20 years ago. This landfill has been converted into the Charles T. Myers golf course, operated by County Parks and Recreation.

Recyclables and waste generated by businesses in Mecklenburg County are handled similarly, but separately from residential materials. Recyclables from businesses are generally required to be separated from solid waste by the County's Source Separation Ordinance. Both recyclables and waste are typically set-out in large "Dumpster" containers for collection instead of being placed curbside. Recyclables and waste are collected by private companies retained by the individual businesses, usually with a truck called a front-end loader that lifts the Dumpster over the front of the truck so the material discharges into the hopper. Once the recyclables are collected they are taken to various facilities owned by private recyclers to be baled and sold as raw materials to be made into other products. Business recyclables primarily consist of office paper and cardboard, which can be reused to make additional paper and cardboard.

Recyclables are also generated from the construction or demolition of buildings, and usually these consist of wood, metal, cardboard, brick or concrete. These materials are also taken to privately owned facilities to be recycled or reused. Concrete and brick can be crushed and reused as a paving material. Wood can be ground into mulch and dyed for landscaping material. Metal and cardboard are recycled into new metal or cardboard.

Similar to residential waste, the business and construction and demolition waste that cannot be recycled is garbage and is disposed in landfills. Garbage from businesses may be taken to the same Charlotte Motor Speedway Landfill as the residential waste or to various other landfills within the region. Landfill capacity, although relatively plentiful today, is a limited resource that should be conserved. It is unlikely that any new landfills will be sited in Mecklenburg County in the future.

Though reusing or recycling waste has the most environmental benefits, the majority of waste in Mecklenburg County is still not recycled, and ends up being buried in a landfill. Over 1.5 million tons of solid waste generated by residents and businesses in Mecklenburg County were disposed in landfills in 2006. The County's goal is to reduce that by 30 percent in the next 10 years.

Solid Waste Findings Comparison 1987 to 2007

By Bruce Gledhill, PE, Director
Mecklenburg County Solid Waste

In regard to Solid Waste, the 1987 State of the Environment Report (SOER) painted a far different picture of the state of solid waste management in Mecklenburg County than is seen today. In 1987 the County's solid waste management system was truly in a state of crisis and the SOER identified a series of "critical solid waste management issues":

- absence of waste disposal capacity
- improper handling of infectious waste
- illegal dumping
- mismanagement of construction and demolition (C&D) waste

The most critical of these issues facing the County in 1987 was the absence of waste disposal capacity for its residents. Two of three solid waste landfills in Mecklenburg County, the County's Holbrooks Road Landfill, and the City of Charlotte's York Road Landfill had closed the preceding year. The only remaining solid waste landfill, the County's Harrisburg Road Landfill, was estimated to only have three years life remaining, and then only if half of the County solid waste were directed to the BFI Landfill in Cabarrus County. The suggested solution to the impending disposal capacity crisis was an integrated solid waste management system combining waste reduction, recycling, incineration with energy recovery, and landfilling.

Over the past 20 years, most of the solid waste system elements designed to address the waste disposal crisis have been implemented and the crisis abated, although the path to the solution was a circuitous one. Back in 1987, the cornerstone of the proposed waste disposal solution was the construction of two waste incinerators with energy recovery. The construction of the first, a small incinerator in the University City area, was already under way at the writing of the 1987 SOER, and a second larger facility was planned in the Arrowood Road vicinity. The University City Resource Recovery Facility commenced operation in 1989, but was decommissioned only five years later as the costs of compliance with environmental regulations increased and the County's ability to direct waste to the facility was impeded by change in federal law. These same changes caused the plans for the proposed Arrowood facility to be abandoned.

The path to providing long-term landfill capacity has been equally circuitous but with a better outcome. At the time of the 1987 SOER, the County was actively considering three sites for a new County landfill. The leading candidate was a site in the extreme southern part of the County along US Route 521. The property had been purchased by the County in 1984 and the state had determined the property to be a suitable landfill site by 1987. Twelve years of litigation and permitting related activities followed before the County's US 521 Landfill (Foxhole) was issued its final permits in 1999.

Today, even with the doubling of population and annual waste disposal since the 1987 SOER, the newly available disposal capacity and the County's own Foxhole Landfill coupled with the continued use

of the expanded Allied Waste (BFI) Speedway Landfill in Cabarrus County results in more than 25 years of disposal capacity available for the County's residential solid waste. Today's emphasis is on maximizing the returns from the County's waste reduction and recycling programs in order to make the most of this valuable disposal capacity. As stated in the 2006 SOER, "adequate facilities, systems and capacity are available to serve the County's needs for the foreseeable future."

Although not covered by Mecklenburg County's planning efforts in 1987, the proper disposal of infectious or medical waste was considered a major issue at the time. Inadequate regulation, poor accounting of disposal practices and numerous small on-site incinerators raised the level of concern. In the 20 years from 1987 to today, these concerns have been all but eliminated. Beginning in 1990, a series of state and federal laws were enacted that significantly tightened the controls on the generation, storage, handling, transportation and disposal of medical wastes. Today, most medical waste is handled by specialized third-party contractors that provide proper containers, secure transportation, and proper disposal of these wastes in off-site facilities. One large medical waste incinerator currently operates in Mecklenburg County, but much of the medical waste is transported out-of-county to autoclave or steam sterilization facilities. After sterilization, the residual is then disposed in separate containers and placed into landfills. While safe disposal of infectious waste continues to be a concern, the appropriate regulations and infrastructure are in place and proper handling of these materials is no longer a problem.

The illegal dumping problem described in 1987 has also abated in the following 20 years due to a number of factors. Paramount among these factors has been the changing character of the community itself. The urbanization of the County over the last 20 years has limited the number of locations where illegal dumping could go unnoticed, limiting the opportunity. This same urbanization means that most residents of the County now live in incorporated municipalities that provide regular curbside collection of solid waste, limiting the need to do it yourself. Similarly, adequate access to permitted disposal sites is now readily available through the County recycling centers and public and private landfills and transfer stations located in and nearby to Mecklenburg County. While there are still isolated instances of illegal waste dumping in Mecklenburg County, they are not the systemic problem reported in 1987.

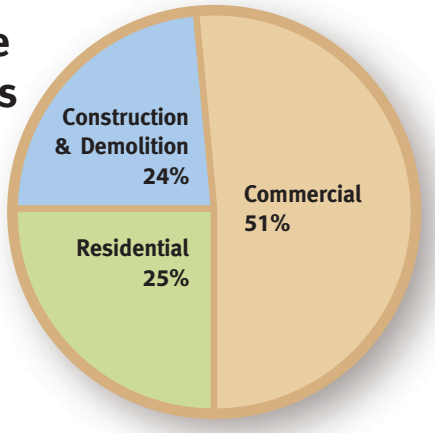
The final critical solid waste issue facing Mecklenburg County in 1987 was the mismanagement of construction and demolition waste. Much of that issue related to the illegal dumping previously described, including the "proliferation of small demolition and construction waste disposal sites." Significant strides have been made in addressing this issue over the past 20 years, but in part the issue remains. In that time the regulatory approach to these facilities has markedly changed. The entire classification of Demolition has been eliminated under the State Solid Waste Rules and replaced with two new classifications: Land Clearing and Inert Debris (LCID) landfills and Construction and Demolition waste (C&D) landfills. In both cases the new environmental requirements and their enforcement are more stringent. Of the former, there are still 38 permitted LCID landfills in Mecklenburg County, generally low volume sites that have been around for years. New LCID sites are unlikely and the number will decline over time. There are two landfills permitted to receive C&D waste in Mecklenburg County, one being the County's own Foxhole Landfill. Their capacity, along with the numerous similar sites just outside of Mecklenburg County provides adequate C&D facilities for the foreseeable future. While the number of sites may still be too great, the demolition wastes are now properly managed.

How Much and What Types of Waste Are Generated In the County?

By Joe Hack, Senior Project Manager
Mecklenburg County Solid Waste

During fiscal year 2007, which ended on June 30, 2007, the citizens of Mecklenburg County disposed an average of 10.192 pounds of waste per person per day. This equates to a total of 1,538,377 tons of waste disposed for the year. As large as this number seems, the per capita disposal rate represents a two-percent reduction in waste disposed when compared to the preceding year. To better understand the nature of the sources generating this waste, the County divides the total waste stream into three components; residential, commercial, construction and demolition (C&D). Commercial waste is the largest component consisting of 51 percent of the total waste stream, while C&D is 25 percent, and residential is 24 percent. These numbers only represent waste that is disposed and do not include the waste that is diverted at the source or recycled.

Solid Waste Components



Waste that is generated by households, both single-family and multi-family, is referred to as residential waste. There was over 373,299 tons of residential waste generated in Mecklenburg County during FY 2007. This is about 24 percent of the County's total waste stream. It is estimated that each individual in the County generates about 2.5 pounds per day of residential waste. For the typical household this amount equates to about one ton per year. These statistics reflect only that waste that is actually disposed and do not include waste that is recycled through curbside collection and drop-off programs.

Commercial waste is waste that is generated by businesses. It may come from manufacturers, office buildings, restaurants or the neighborhood grocery store. These businesses in Mecklenburg County generate over 787,958 tons of waste per year, by far the largest component of the total. According to the United States Environmental Protection Agency (EPA) and studies done here in North Carolina, about half of this waste stream is comprised of cardboard and paper. See chart on page 134. Because commercial waste is the largest portion of the County's waste stream and because a large portion of this waste stream is easily recyclable, Mecklenburg County adopted an ordinance in 2001 requiring applicable businesses to separate cardboard and paper from their other wastes. For more information about this ordinance and compliance assistance, please see our Web page, www.wipeoutwaste.com, or call 704-432-3200.

Construction & Demolition (C&D) waste includes waste that is generated from commercial and residential construction and demolition activities. C&D activities generated over 377,120 tons of waste or about 25 percent of the total waste stream in FY 2007. A local study suggests that wood accounts for about 34 percent of this waste stream with materials such as gypsum wallboard, masonry and roofing materials also being major constituents. Efforts are underway to reduce C&D waste disposal through education of builders in alternative building techniques and separation of the recyclable components at the source.

A great deal of waste is generated within Mecklenburg County, but not all of this waste is generated by County residents. Every day, people enter this County to work, shop and play, and each of these activities generate waste. Even with the wastes generated by non-residents, the County's per capita disposal rate has decreased over the past several years. Since fiscal year 1999 we have realized an 8-percent reduction in the waste disposed per citizen of Mecklenburg County. Efforts as outlined in the County's ten-year, Solid Waste Management Plan (2006 - 2016) will continue to reduce the amount of waste disposed.

Solid Waste Disposal Rate

Fiscal Year	lbs/person/day
1999	10.74
2000	10.96
2001	9.7
2002	9.8
2003	9.53
2004	9.36
2005	9.16
2006	10.38
2007	10.19

Commercial Waste Composition

	Material Categories			Material Categories			Material Categories	
Organic Materials	Yard Waste Grass & Leaves	2.4%	Other Waste	Textiles	1.5%	Paper	Newsprint (ONP)	2.6%
	Food Waste	10.5%		Carpet	1.8%		High Grade Office	3.6%
	Wood Pallets	2.6%		Computer Equipment Peripherals	0.5%		Magazines Catalogs	1.3%
	Treated Wood	3.7%		Electric & Electronic Products	0.9%		Uncoated OCC recyclable	9.0%
	Untreated Wood	6.5%		Rubber	1.0%		Uncoated OCC nonrecyclable	0.5%
	Diapers	0.8%		Construction & Demolition Debris	4.0%		Coated OCC	0.1%
	Other Organic Material	4.2%		Household Bulky Items	1.5%		Boxboard	1.0%
	TOTAL ORGANIC MATERIALS	30.8%		Miscellaneous	4.6%		Mixed Paper recyclable	5.0%
				TOTAL OTHER WASTE	15.8%		Mixed Paper nonrecyclable	7.2%
						Paper	TOTAL PAPER	30.3%
						Plastic	TOTAL PLASTIC	12.8%
						Metals	TOTAL METALS	7.5%
						Glass	TOTAL GLASS	2.7%

Newspaper, Junk Mail, Cans, Bottles, Leaves, Scrap Tires, Concrete, Brick and Block: Let's Recycle More and Throw Away Less!

By Laurette Hall, Waste Reduction Program Manager
Mecklenburg County Solid Waste

Is it true that if I place my newspaper in my curbside recycling bin in the morning, it may be turned into an insulation product by the time I get home from work? Yes, the possibilities exist in 2008, but not 20 years ago. We have come a long way in waste reduction and recycling, but we still have a great deal more we can do. In 1987, the State of the Environment Report stated that "not enough emphasis is being placed on meeting recycling goals and otherwise minimizing the amount of waste generated." Twenty years later, waste reduction, reuse and recycling has received greater attention and has accomplished greater results.

The 1987 State of the Environment Report acknowledged the significance of planning for effective and efficient municipal solid waste programs. The Solid Waste Management Plan was and remains the vehicle through which goals for the management of solid waste are established and programmatic approaches to reaching those goals is described.

In 1987, it was believed that less than one percent of waste was being recycled, but goals were established to increase recycling to 30 percent by 2006.

Well in 1989, the North Carolina Solid Waste Management Act required local governments to develop comprehensive solid waste management plans that anticipate and plan for the needs of the community over ten-year periods of time. Mecklenburg County's plan, *The Mecklenburg County Solid Waste Management 10-Year Plan*, serves as a guiding document for waste reduction, identifying strategies and accompanying programs needed to reach reduction goals. This document covers the planning years of 2006 through 2016. The plan no longer establishes recycling goals for the community, but tracks the amount of waste that is not going into landfills on a per capita basis.

The current plan establishes a 33 percent per capita reduction goal by the Fiscal Year 2012/13 for the commercial waste stream, an 11 percent per capita reduction goal for the residential waste stream, and a 33 percent per capita reduction goal for the construction and demolition waste stream. These reduction goals are measured from the baseline year of FY 1998/99. This plan is for unincorporated Mecklenburg County, the City of Charlotte, and towns of Huntersville, Davidson, Cornelius, Mint Hill and Pineville.

The community has implemented many programs to increase the recovery of materials for reduction, recycling and composting, and decrease

our dependency on landfills. Our community is demonstrating signs of greater awareness in requesting "green" disposal options for home and business purposes. Although the amount of business recycling is not tracked in Mecklenburg County, it is believed to be much higher than the one percent reported 20 years ago. Residents currently recycle approximately 29 percent of the waste generated in the home.

County residents have been also been successful in reducing the amount of waste sent to our landfills. In FY 2006/07, per capita waste disposal was reduced by two percent over the same period in FY 2005/2006, which represents an eight percent per capita reduction from the FY 1998/99 baseline year.

Why is waste reduction and recycling still important to our community? Although we still have more than 20 years of landfill capacity remaining in our immediate area, it is not infinite capacity. Plastics continue to be made from fossil fuels, and there is not an infinite supply of oil. The recycling of paper and cardboard remains a way of reducing the amount of virgin forest needed to supply our fiber needs. Recycling brings jobs to our communities and the recycling of materials such as metals and cardboard is economically profitable. There are markets for recyclable materials, both foreign and domestic. The business community has also expanded greatly to capture more recyclable materials such as metals, construction and demolition materials, paper and cardboard, plastics, glass, used oil and many more materials.

Over the past 20 years, our efforts to reduce, reuse and recycle have expanded with much success. We recognize the benefits to waste minimization and recycling and the effects that the management of solid waste has on other environmental media such as air and water. Mecklenburg County has changed the way that is manages its waste over the last 20 years and remains committed to the hierarchy established by the Environmental Protection Agency of reducing waste at its source, recycling and composting, and disposing of waste in properly designed, constructed and managed landfills.

Reduce, Reuse

If waste is not created in the first place, then it does not have to be managed by any system, such as landfilling or recycling. Can you produce less waste? The answer is yes. Well you make ask how or why you should have to. The answer lies in

responsibility to the environment, to the employer, to the person buying the goods and services at your home, to yourself. The Environmental Protection Agency estimates in 2006, U.S. residents, businesses, and institutions produced more than 251 million tons of MSW, which is approximately 4.6 pounds of waste per person per day. In 1987, the County did not have programs aimed at teaching the public to reduce the amount of waste generated. We now work with businesses to reduce waste, find alternatives to disposals, and find avenues for reuse in local and state programs. Programs for residents include: Don't Dispose - Donate It, Food Waste Diversion, Enviroshopping, Junk Mail Reduction, Household Hazardous Waste - Toxicity Reduction, Holiday Waste Reduction Campaign, and the PLANT-Piedmont Landscape and Naturescape Training and placing donation units at all of our staffed recycling centers.

Reduce, Reuse, Recycle at home

Twenty years ago, only one curbside recycling program existed in the United States that collected several materials at the curb. By 2006, about 8,660 curbside programs had sprouted up across the nation. Mecklenburg County residents can recycle their materials at the curb, using their red, green or blue bins provided by local municipalities. The curbside recycling program is also augmented by a network of recycling drop-off centers, located throughout the county. Items accepted in the curbside programs include No. 1 and No. 2 plastic

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Recycle More continued from page 137

bottles, newspaper, glass, spiral paper cans, junk mail, aluminum cans, mixed paper, gift wrap and cardboard. Why is recycling important in the management of solid waste. Well it's because residential waste represents approximately 24 percent of the total solid waste in the County, and can generally be thought of as the waste produced from the home. In FY 2006/07, Mecklenburg County residents increased their recycling with a total 149,708 tons of material recycled through residential programs. Approximately 72 percent of the materials recycled were fiber and the remaining 28 percent of the materials were commingled glass, plastic and metal materials. Of this total, yard waste contributed 80,504 tons, while curbside and other materials made up the rest.

As our society becomes more dependent upon disposable items, packaging continues to arrive in our curbside bins. Many of you have asked for larger containers for recycling. The municipalities are currently studying various options for collecting recyclables to increase the recovery of materials at the curb. The municipalities are also increasing their educational efforts to residents. As our nation becomes "greener," residents are being encouraged from many sources to produce less and pollute less.

Reduce, Reuse, Recycle at County Drop-off Centers

When the recycling bin is full, there is another option for recycling in Mecklenburg County. The County provides four staffed recycling drop-off centers and 35 unstaffed recycling drop-off centers for the convenient use of residents.

Since 1984, the County has been growing this network of recycling centers.

In FY 2006/07, there were 2062 tons of materials recycled through the centers. The Full-Service Recycling Drop-Off Centers and accept materials such as paper, cardboard, beverage containers, computers, household hazardous waste, computers, yard waste, appliances and scrap metal. Goodwill Donation Centers and cooking grease recycling services are also located at these sites. The Self-Service Recycling Drop-Off Centers and accept fiber, aluminum (metal), glass and plastic (#1 and #2) containers. These centers are visited by both residents and businesses.

As previously noted, there are a variety of items that residents may recycle at the Full-Service Recycling Centers. Residents may recycle household hazardous waste, such as paints, batteries and anti-freeze at the Full-Service Drop-Off Centers.

Approximately 392 tons of household hazardous waste material was collected and

properly recycled or disposed of in FY2006/07. Residents may also recycle computers, computer related materials, and other electronics at the Full-Service Drop-Off Centers. In FY2006/07, 317 tons of electronics was recycled through this program.

If you have ever wondered what happens to refrigerators or dishwashers placed at the curb or taken to recycling centers. Mecklenburg County provided for the recycling of 3,400 tons of appliances and scrap metal in FY 2006/07. These materials are also collected curbside and taken to the County's Metal and Tire Recovery Facility. Business customers generally utilize the County's Metal and Tire Recovery Facility.

Scrap Tires

For many years, discarded tires were left in abandoned fields or along roadsides. The 1987 State of the Environment Report speaks to the issue of illegal dumping within the county. Many measures have been taken over the last twenty years to remove the amount of waste illegally discarded and manage scrap tires more responsibly. In FY2006/07, the County provided for the management of approximately 14,826 tons. Two options are available for handling scrap tires. Residents may take tires directly to the Full Service Drop-Off Centers and the County's Metal and Tire Recovery Facility. Locations for these facilities can be found on www.wipeoutwaste.com.

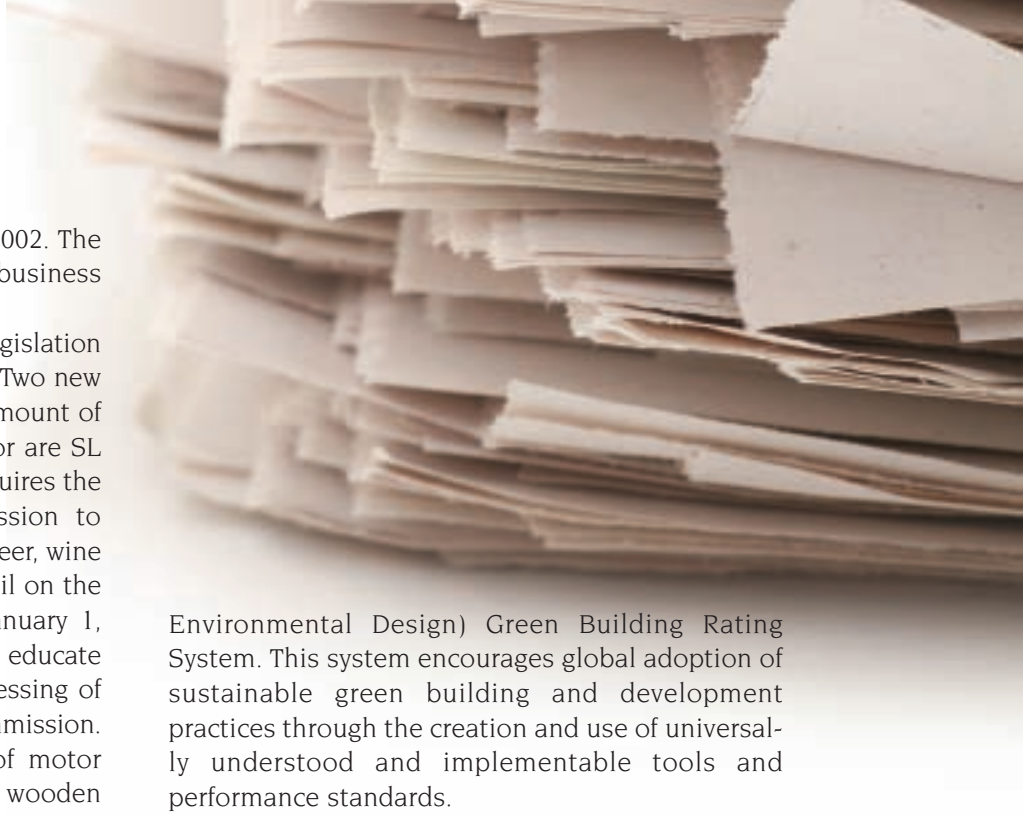
Another option for proper tire disposal is through a Rebate Program that is provided to tire retailers to reimburse their cost to discard the tires. Under this Rebate Program the scrap tires are taken to private processors/disposers permitted by the state. Tires that are collected through these programs are recycled into a variety of applications including road building projects as paving material, use in septic tank drain fields, and conversion to Tire Derived Fuel.

Reduce, Reuse, Recycle on the Job

In 2006, 73 percent of County residents surveyed by the Urban Institute of the University of North Carolina at Charlotte indicated that they recycled at work. Forty-two percent of them were aware of the ordinance requiring the separation of paper and cardboard for the purpose of recycling. These numbers are quite impressive and demonstrate awareness of mandatory requirements for commercial recycling. In spite of the obtained awareness, commercial waste disposal increased in FY 2007 to 787,958. After many years of consecutive reduction, a single disposal event may have accounted for a large increase in disposal from the commercial sector.

The strategy for reducing the amount of commercial waste going into the landfill includes a law, enforcement and education. The ordinance, the *Mecklenburg County Ordinance To Require The Source Separation Of Designated Materials From The Municipal Solid Waste Stream For The Purpose Of Participation In A Recycling Program*, requires any business that contracts for 16 cubic yards or greater of trash collection per week to keep office paper and corrugated cardboard separate from other trash. The ordinance was adopted by Mecklenburg County, the City of Charlotte, and the towns of Cornelius, Davidson, Huntersville, Mint Hill and

Recycle More continued on page 140



Recycle More continued from page 139

Pineville and became effective January 1, 2002. The ordinance continues to be enforced to business that fall within its threshold.

The County continues to support legislation enacted by the North Carolina Legislature. Two new laws that will serve to further reduce the amount of waste landfilled from the commercial sector are SL 2005-348 and SL 2005-362. SL 2005-348 requires the Alcoholic and Beverage Control Commission to develop a recycling plan for all holders of beer, wine and mixed beverage containers sold at retail on the premises. This act became effective on January 1, 2008. The County is currently working to educate permit holders on the collection and processing of recyclables in partnership with the ABC Commission.

SL 2005-362 prohibits the disposal of motor vehicle oil filters, rigid plastic containers, wooden pallets and oyster shells from landfills. The law becomes effective October 1, 2009. In response to this law, the County is studying the generation and disposal infrastructure of wood waste and commercial municipal solid waste. It is also studying the generation and disposal practices of small businesses in Mecklenburg County.

Mecklenburg County Government continues to lead by example in the commercial recycling sector, with its own internal recycling program. In FY2007, there was 16,916 tons of waste recovered from the County's waste stream. Our goal is to recover over 33,000 tons by FY2020. Efforts are underway to expand the number of materials recycled to include beverage containers, as well as other materials such as paper, cardboard, computers and many other products. This program also includes all County facilities and the Charlotte Mecklenburg Schools, Central Piedmont Community College, and the City of Charlotte.

Reduce, Reuse, Recycle on the Job Site

Although recent trends may indicate the slowing of the local economy and the building boom in Mecklenburg County, the County continues to experience growth in residential commercial building and the disposal of building materials. In FY 2006/07, 377,299 tons of C&D waste was landfilled in the County, a one-percent increase from the previous year and represents 25 percent of the overall waste stream.

Mecklenburg County continues to provide outreach and education to industry professionals. Opportunities for recycling are also being spurred by LEED (The Leadership in Energy and Environmental Design) Green Building Rating System. This system encourages global adoption of sustainable green building and development practices through the creation and use of universally understood and implementable tools and performance standards.

An environmentally sustainable demolition project The Charlotte Coliseum demolition

On June 3, 2007, the Coliseum's final performance wowed its spectators and fulfilled expectations of its fans. On this day, National Demolition Association Member, CST Environmental, Inc., hosted the final performance — the implosion of the largest basketball arena built. The $52 million, 465,000 square-foot facility served as a spectacular arena in the world of sports, and offered a spectacular opportunity to recover a portion of this investment by recycling of materials during its demolition. CST Environmental successfully recovered over 70,000 tons of material including masonry brick, concrete, ferrous and non-ferrous metals. A part of the coliseum will remain on the site, as the brick and masonry will be used as fill for the City Park development project. The 18,000 tons of asphalt from the parking lots will be harvested and used as material for The Loop at City Park, the 3-mile trail system. Items such as the 24,000 seats, basketball court and other miscellaneous items were sold or donated by Pop and Land Enterprises to local sports organizations. More than 90 percent of the material was recycled, exceeding the industry recycling standard of 30 percent.

There has been an increased interest by the private sector to provide opportunities for recycling of construction and demolition materials. The private sector remains involved in recycling large quantities of concrete and asphalt. Markets remain stable and lucrative for metals and corrugated cardboard. Demolition contractors are recycling such items as ceiling tiles, carpets and glass. Furnishings are also being diverted into the reuse sector.

The County continues to crush concrete, brick and block for reuse of the aggregate and the grinding of clean wood waste for sale as boiler fuel at its Foxhole Landfill. The Foxhole Landfill has recently received its ISO 14001 Environmental Standards Certification the first certification awarded to a municipal solid waste landfill in the southeastern portion of the United States. Certification under ISO 14001 is a voluntary activity designed to improve the environmental performance of an organization by developing, implementing, and regularly auditing an EMS that sets goals, institutes policies and procedures, and monitors performance. This achievement was consistent with the direction provided in the County's Environmental Leadership Policy.

Yardwaste from your business or from your home

Mecklenburg County residents are provided the opportunity to have their yardwaste turned into compost, mulch and soil products through a comprehensive system of collection and processing of materials, education and promotion. Yard waste is waste resulting from landscaping and yard maintenance such as brush, grass, tree limbs, and similar vegetative material and land-clearing debris. Yard waste may come from residents or businesses. Residential yard waste is collected through curbside programs and taken to the County's composting facilities. Residents may also take these materials directly to the Full-Service Drop-Off Centers. Compost and mulch products are derived and sold from the yard waste received at these facilities. There was 80,504 tons of yard waste received by Mecklenburg County in FY 2006/07.

For the resident that would like to compost their own yard waste. The County offers a series of four-hour composting, PLANT-Piedmont Landscape and Naturescape Training, classes at sites throughout Mecklenburg County. This is a comprehensive yardwaste management program that includes, composting, erosion control, landscaping with native plants, grasscycling, vermicomposting and toxicity reduction The novice composter may also become a Master Composter by participating in a 16-week Master Composter Training Course. Another very popular composting technique, worm composting, is popular amongst school age kids and practiced by many adults. The County also partners with a compost vendor to sale compost bins to residents of the county.

Litter - Don't Throw it Away!

By Laurette Hall, Waste Reduction Program Manager
Mecklenburg County Solid Waste
and Brenda Ewadinger, North Carolina Keep America Beautiful Coordinator

Based on the information available at the time of the 1987 SOER, it is difficult to assess if the County were more or less littered at that time, or if litter has increased over the last twenty years. If asked, many residents may describe how Mecklenburg County used to be a lot cleaner than it is now. While that claim is anecdotal, what we do know that is the population has increased over that period, and it can be surmised that the population increase has had a negative effect on the cleanliness of our community.

In 2001, recognizing a change in the perceived cleanliness of our community, Mecklenburg County launched its litter prevention program. The program addresses cleanup, enforcement, prevention and legislation. This program existed in addition to programs of cleanup and education being carried out by municipalities within the county.

The Litter Index

The Keep America Beautiful Litter Index is a measurement tool that allows a visual assessment of the types of litter present in a community. Assessors rank the amount of litter that can be visually observed using the following scale: 1=No Litter; 2=Slightly Littered; 3=Littered; and 4=Extremely Littered. The data obtained through this assessment tool can be beneficial in determining the types of programs a community needs, and the tools that are effective or ineffective in changing attitudes and behavior. The Mecklenburg County index is compiled by the Keep Mecklenburg Beautiful program and the City of Charlotte's index is compiled by Keep Charlotte Beautiful.

Litter Index Scores

Fiscal Year	Mecklenburg County	City of Charlotte
FY01	2.6	*
FY02	2.3	1.7
FY03	2.3	1.87
FY04	2.3	1.4
FY05	2.1	*
FY06	2.1	2.04
FY07	*	1.85

*Index scores not available

Promotion and Education

Keep Mecklenburg Beautiful and Keep Charlotte Beautiful are two Keep America Beautiful (KAB) affiliates in Mecklenburg County, Keep Mecklenburg Beautiful (KMB), founded in 2004, and Keep Charlotte Beautiful (KCB), founded in 1974. KAB prides itself in being a "national community improvement system" helping to define local waste reduction issues, beautification and litter prevention, and education on environmental media.

KMB, Mecklenburg County's KAB affiliate, participates in the Great American Cleanup from March 1 through May 31 of each year. The KMB program also promotes litter prevention through a diverse media plan, including print media, television, a promotional car, radio and billboard. Many presentations are given throughout the year, in conjunction with such events as Earth Day, America Recycles Day to schools, neighborhood associations, businesses and residents in order to heighten the awareness of litter as an issue. One of the most innovative educational campaigns occurred during the fall of 2007, in which nearly 500 tarps were distributed to local truck owners as a part of the North Carolina Department of Transportation's "Tarp Your Load" campaign.

KCB, one of the nation's oldest KAB affiliates has been in place for over twenty years. Their 20 member board operates within the City of Charlotte's Neighborhood Development department and is responsible for such events as litter stings by the Charlotte-Mecklenburg Police Department, Adopt-A-Street, neighborhood recognition programs, anti-graffiti programs and also participation in the Great American Cleanup.

Public Involvement

How can local citizens become involved in litter reduction in our County? One way is to participate in an Adopt a Highway or Adopt a City Street program. In 1988, the North Carolina Department of Transportation's Office of Beautification recognized the need for citizenry involvement in road cleanups. They developed a program that could save taxpayers millions of dollars annually, while allowing them to become active in cleanup efforts. The Adopt a City Street was established in 1989 by the City of Charlotte as a program of the Keep Charlotte Beautiful organization.

Swat-a-Litter-Bug

A very popular citizen participation program, Swat-a Litterbug allows citizens to report acts of littering, whether deliberate or unintentional. An average of 100 citizen complaints is logged monthly. The Keep Mecklenburg Beautiful Swat-A-Litterbug Program is a way to educate people who litter from their vehicles. Call 704-432-1772 to report littering violations.

The owner of the reported vehicle is sent a letter from Keep Mecklenburg Beautiful explaining why litter is illegal, that it creates a safety issue, is extremely unsightly and is very expensive to clean up. During a time of severe drought, as is currently the case, the most common violation reported is the littering of lit cigarette butts from moving vehicles because of the potential fire implications.

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Litter continued from page 143

Enforcement and Legislation

Local Legislation-City of Charlotte Sign Ordinance Changes

Members of both the Keep Mecklenburg Beautiful and City of Charlotte staff recognized the need for changes regarding road side signage that would make it less attractive to place signs illegally and leave them in place, making them litter. Changes to the Sign Ordinance adopted in 2007 by the City of Charlotte City Council include increased monetary penalties for violations of the sign ordinance.

Local Policy: Uncovered Loads

Mecklenburg County is affecting the amount of litter produced from untarped loads by charging additional fees on these loads coming into its Foxhole Landfill. These loads are commercially generated, and 85 loads paid the additional payment of $2,595 in FY06/07.

State Legislation-2007 NC General Assembly Litter Bills Introduced Summary

In 2007, the North Carolina General Assembly introduced a record number of bills aimed at litter prevention and education. Listed following are examples and status of some of the legislation introduced, but not yet ratified.

SB215
Litter Reduction Act of 2007

SB1202
Litter Violation Reported by Citizen.

SB1255
Cleanup of Abandoned Mobile Homes

HB1134
Cleanup of Abandoned Manufactured Homes.

HB1678
LRC Study Littering.

HB1867
Litter Prevention and Education Funds.

Cleanup

Litter cleanup is a community's responsibility. Sustainable cleanup efforts must be multi-tiered. The North Carolina Department of Transportation, City of Charlotte and towns, and Mecklenburg County take the lead responsibility for our community's roadways and appearance. Prevention and education are also a very important element of any cleanup effort.

In Mecklenburg County, cleanup is addressed from a community approach from volunteers to inmate labor to contracted cleanup services. An example of such efforts is the Great American Cleanup, a flagship program for the Keep America Beautiful association eliciting hundreds of miles of volunteer cleanup with thousands of hours of volunteer time.

Hazardous Waste in Mecklenburg County

By Mike Bogart, Environmental Specialist
Mecklenburg County Solid Waste

For 14 years, throughout the late 80s and 90s, Mecklenburg County industries had the dubious distinction of generating more hazardous wastes than those in any other county within North Carolina. However, this trend has changed drastically since the beginning of the new millennium. The changing face of industry within Mecklenburg County, public awareness, along with enforcement and continuing education of county residents by the Land Use and Environmental Services Agency (LUESA) personnel, are continuing to make a significant impact in the total amount of hazardous wastes generated and handled within Mecklenburg County as a whole.

In 1995, our County led the state in hazardous waste generation with approximately 9,900 tons of hazardous waste generation, which accounted for almost 20 percent of the total amount of hazardous waste generated in North Carolina. According to the most recent data available, for fiscal year 2005, as provided by the United States Environmental Protection Agency (USEPA), Mecklenburg County industries produced approximately 12,500 tons of hazardous wastes in 2005. Though this number is a significant total increase over the 1995 total, it is equal to approximately 3.3 percent of the total amount of hazardous waste generated in the state during 2005. While it is a slight increase over the 12,385 tons produced in 2003, this two-year period's projected increase in Mecklenburg County's population of approximately 50,000 new residents easily accounts for the increased hazardous waste production within the county. There was a spike of approximately 112,000 tons of production seen in Mecklenburg County in fiscal year 2001. This high level of hazardous waste production in 2001 was attributed to the closure and inventory disposal reporting requirements that were placed on several large chemical corporations that either moved their operations from Mecklenburg County, or closed down operations outright during that reporting period. Those activities caused a one time disposal of material into the waste stream.

Last year the Mecklenburg County Land Use and Environmental Services Agency's Emergency Response Team responded to relatively few incidents that had the potential to release hazardous wastes into the environment. Accidental spills and illegal dumping are the most publicized way in which hazardous wastes are released into the environment. However, hazardous wastes are also introduced into the environment unknowingly by the improper use or disposal of household

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hazardous wastes such as cleaning solvents detergents, petroleum byproducts and acids.

A waste may be considered to be hazardous if it is ignitable, corrosive, or reactive. A waste may also be considered hazardous if it contains certain amounts of toxic chemicals. In addition to these characteristic wastes, USEPA has also developed a list of over 500 specific hazardous wastes referred to as listed wastes. Hazardous wastes may be solid, semi-solid or liquid. The hazard to human health or the environment caused by exposure to these substances can be felt immediately or over an extended period of exposure depending on the substance.

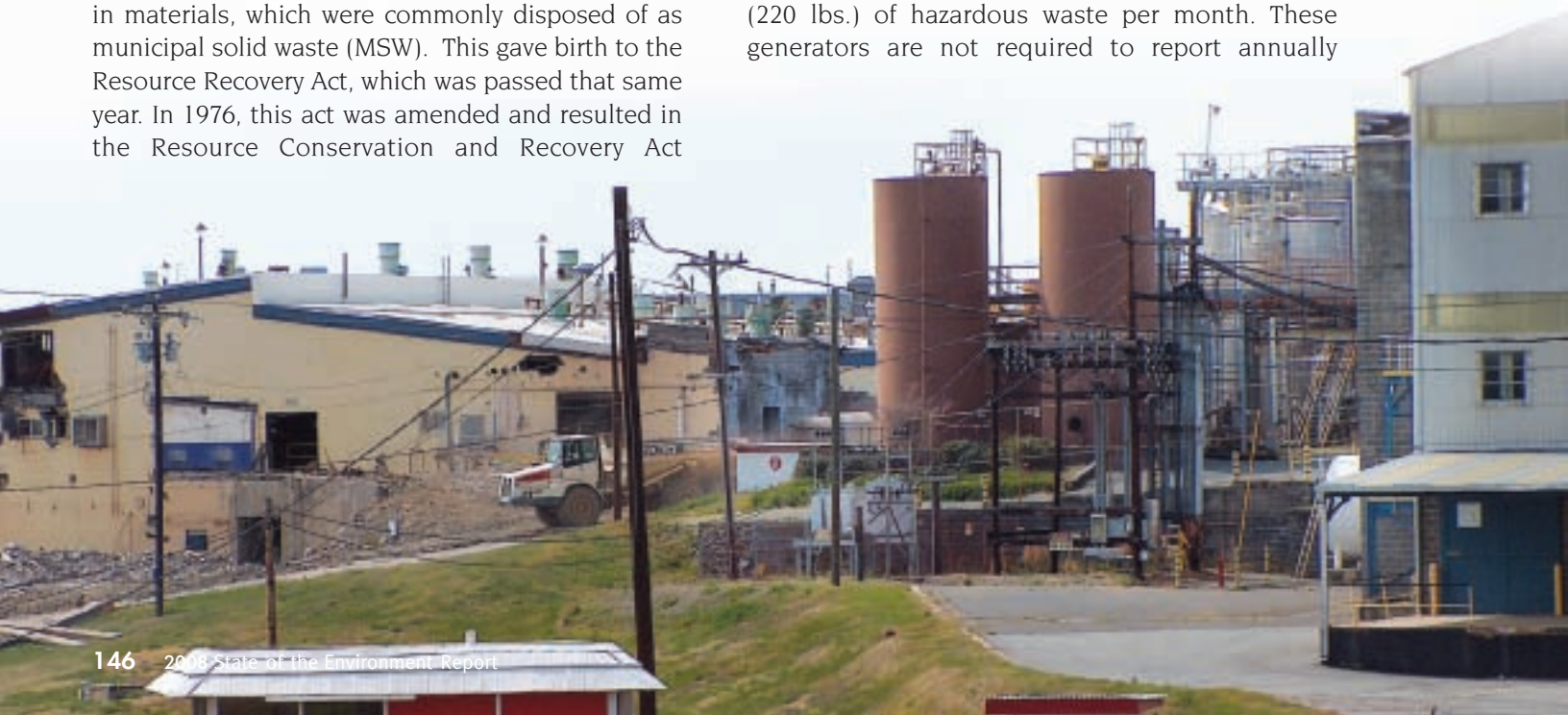
In 1978, the nation as a whole became aware of the threat of hazardous wastes when leaking drums of hazardous wastes were found buried throughout neighborhoods in the Love Canal housing development in Niagara, New York. Just two years prior to this discovery, Congress had passed the first law regulating hazardous waste generation, management and disposal. Since that time, there have been numerous news specials about communities across the nation, which have been contaminated by hazardous wastes. Many of these wastes have been found to cause cancer, birth defects and a variety of neurological disorders. Because of the seriousness of the threat posed by these chemicals, lawmakers have passed a variety of legislation in an attempt to prevent further contamination of the environmental and exposure of the public.

In 1965, Congress passed the Solid Waste Disposal Act. Five years later, in 1970, Congress realized that there was great potential value to be found in materials, which were commonly disposed of as municipal solid waste (MSW). This gave birth to the Resource Recovery Act, which was passed that same year. In 1976, this act was amended and resulted in the Resource Conservation and Recovery Act (RCRA). This series of acts placed the U.S. government firmly in the arena of waste management, and also gave the federal government the ability to regulate solid waste within the United States. Congress gave the USEPA the authority and responsibility to act as the regulating agency for these acts.

For the purposes of the RCRA, household hazardous wastes and municipal solid wastes are excluded from this definition. The objective of this definition was to qualify hazardous waste as primarily a product of industry. Given the sampling of people who generate hazardous wastes, it becomes clear why RCRA defines hazardous waste as product primarily created by industry. RCRA categorizes for regulation the industries that generate, transport, store, dispose of, or handle hazardous wastes as part of their business enterprises. Generators are classified as either large quantity generators, small quantity generators or conditionally exempt small quantity generators.

Large quantity generators are those generators producing more than 1,000kg (2,200 lbs.) of hazardous waste per month or 1kg of acutely hazardous waste per month. Because these generators are responsible for the lions share of the total amount of waste generated they are most regulated. Large quantity generators are required to track and report annually the amounts of wastes generated. Large quantity generators may store their wastes on site for up to 90 days from when the accumulation began. There are currently 44 large quantity generators in Mecklenburg County (there were 46 in 2003).

Small quantity generators are those generators producing between 1,000kg (2200 lbs.) and 100kg (220 lbs.) of hazardous waste per month. These generators are not required to report annually



and may store their wastes on site for up to 180 days from when the accumulation began. There are currently 246 small quantity generators in Mecklenburg County (there were 226 in 2003).

Conditionally exempt generators are those generators that produce less than 100kg (220 lbs.) of hazardous waste per month. Because conditionally exempt small quantity generators typically generate very low quantities of waste and may do so sporadically, small quantity generators may store wastes on site for up to 270 days from when the accumulation began. There are 1,045 conditionally exempt generators in Mecklenburg County (there were 944 in 2003).

Any facility used for the treatment, storage and/or the ultimate disposal of hazardous wastes must be registered as a Treatment, Storage or Disposal Facility (TSD). There are currently 15 TSD facilities in Mecklenburg County.

Hazardous Waste Transporters are not regulated by the RCRA, but are regulated by the Hazardous Waste Transportation Act and by the Emergency Preparedness and Community Right to Know Act. There are no firm numbers on exactly how much hazardous waste material is transported through Mecklenburg County. There are 14 registered hazardous waste transporters in Mecklenburg County.

Significant strides in reducing the amount of hazardous waste generated in Mecklenburg County were made early on. While the production rates of hazardous materials are slowly on the rise after initial reductions, there have been significant relative reductions as noted. It's too soon to state that the relative production reductions measured are permanent, but there continues to be a decrease across the board in the number of large quantity generators as industry has begun to switch to suitable non-hazardous process chemicals and implement process controls to reduce the volume of waste generated.

Contaminated Sites

The regulation of all handlers and generators of hazardous wastes becomes important when ensuring that these people show due care and caution while handling and disposal of these wastes. These are guidelines and regulations that ensure that these wastes are properly transported, stored and handled. These regulations are in place to protect both the environment and the human population from being unnecessarily exposed to hazardous wastes. However, accidental releases and spills do occur and the result becomes land contaminated with hazardous wastes. When accidental releases and spills occurred prior to the acts passed by Congress, the contamination was not always properly cleaned up. This led to the creation of many contaminated sites across the country, including sites throughout North Carolina and Mecklenburg County. These sites are regulated by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), which is commonly referred to as the "Superfund Act."

In 1987, the General Assembly of North Carolina passed legislation to create the Inactive Hazardous Sites Program to identify, correct and control properties within North Carolina, which had been contaminated by hazardous materials. This act reflects many of the aspects of the Superfund Act and was designed to work within the same framework. The USEPA and/or NCDENR assess the sites that are potentially contaminated, and prioritize them for investigation. When these sites are investigated, the extent of contamination is determined. The investigating agency then decides whether or not the site requires clean up based on the presence of contamination and the potential human or environmental impact any contamination present may have. Sites in need of clean up, as deemed by the USEPA, are placed on the National Priority List (NPL). Sites in need of clean up, as determined by the NCDENR, are placed on the State Priority List (SPL). In either case, these sites are attended to only as funds become available. There are two NPL sites and 49 SPL sites in Mecklenburg County.

When a spill or accidental release of hazardous material occurs in Mecklenburg County, emergency personnel respond to the scene in accordance to the County's all hazards plan. The all hazards plan is a prepared emergency response protocol that satisfies the mandate in the Superfund Amendment and Reauthorization Act (SARA) that communities plan for potential responses to large-scale emergencies and disasters. Emergency responders included Police and Fire Department units with special hazardous materials units of the fire department, the Mecklenburg County Department of Environmental Protection and elements from either NCDENR or USEPA, are critical players in the all hazards plan.

Hazardous waste is a byproduct of modern society. It is incumbent upon industries and consumers to minimize the amounts of hazardous wastes they create. The proper management and reduction of hazardous materials and wastes can reduce the detrimental effects these materials have on the public health and the environment.

Further information available at: www.enr.state.nc.us and www.epa.gov

Radioactive Wastes and Mecklenburg County

By Mike Bogart, Environmental Specialist
Mecklenburg County Solid Waste

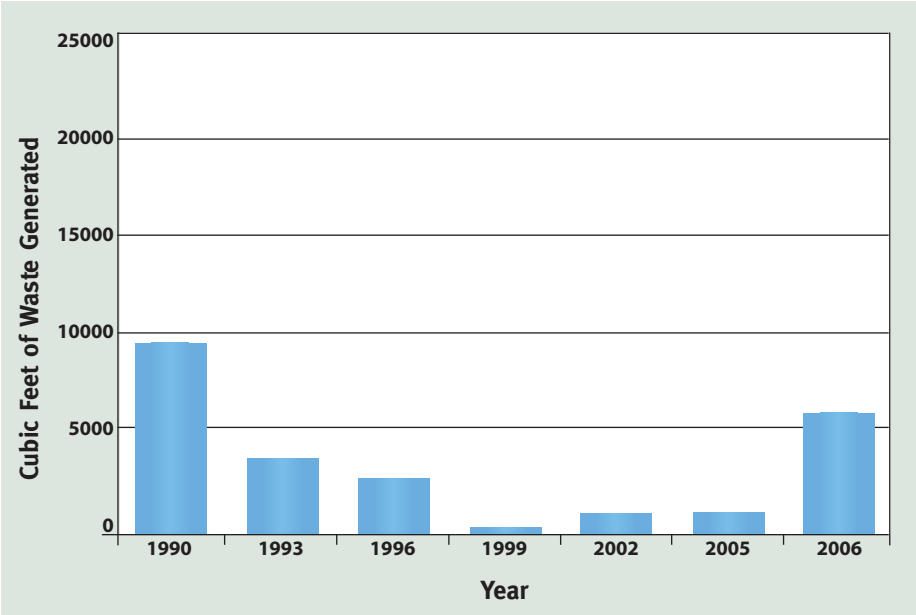
Situated in northwestern Mecklenburg County is Duke Power McGuire Nuclear Powered Electrical Generating facility. This facility began operation in June 1981 under a permit that does not expire until June 2021. This facility is the only source of high-level radioactive waste in Mecklenburg County and also accounts for almost all of the regulated low-level radioactive waste generated in Mecklenburg County. The differences in the handling, storage and disposal requirements of these two types of radioactive wastes, with regards to each other, as well as non-radioactive wastes is important for the safety of those that handle the wastes as well as for the safety of the environment and residents of Mecklenburg County.

Radioactive material comes in many forms. It is naturally occurring and found around all of us every day. It is energy that travels in waves and in the form of high speed particles that have been emitted during a natural decay process (ionizing radiation). There are three types of ionizing radiation particles: alpha, beta and gamma. Protecting human beings and the environment from any type of radiation is composed of primarily two strategies; provide shield and create distance between the source of the radiation and the entity to be protected. Each particle type has different characteristics that require differing protective measures to be taken.

Alpha particles are relatively large and slow-moving. While they are blocked by your skin, they can be harmful if ingested or inhaled; however they do not travel far from the source. Beta particles can penetrate clothing and skin thereby causing direct tissue and DNA damage leading to many illnesses, including cancers; these particles have higher energy and smaller size then alpha particles and therefore require more shielding and/or a greater separation in distance. Gamma rays are the last type of ionizing radiation and have the greatest penetrating and further ionizing properties; they can induce other materials to become radioactive. Handling materials that emit Gamma rays requires special shielding for protection to avoid the significant exposure hazards that they may pose and the greatest distance of separation. These different types of radioactive materials are utilized for a wide variety of beneficial usages such as medical diagnostic and treatment, food preparation and safety enhancement, energy production and many other everyday tasks the require electromagnetic energy.

All of these everyday uses, other than energy production, create very small to negligible amounts of low-level radioactive waste and account for only a fraction of one percent of the total amount of low-level waste generated. Most of these wastes are generated by medical and dental facilities and are easily disposed of after waiting for a minor amount of decay to occur on site. These wastes are then readily disposed of in the appropriate waste stream and handled safely with ease. All other low-level waste is generated at the nuclear powered electrical generating facility. In 2006 the Duke Power McGuire Plant created 6,382 cubic feet of low-level radioactive waste. This waste is composed of items such as protective clothing, mops, filters rags and just about any house keeping or protective items you can imagine that would not come in direct contact with the original power generating materials. The amount of waste generated on an annual basis at this facility fluctuates greatly. While in the past, much of this type of waste was stored of at the facility, it is currently being disposed of in Barnwell, S.C., at a licensed facility.

The only source of high-level radioactive wastes in Mecklenburg County is the Duke Power facility. It is created from the material that powers the facility: the radioactive fuel rods are utilized to generate heat and create the stream that powers the electrical generating turbines. The high-level radioactive waste material is created when fuel rods in the assemblies need replacement and are removed. On removal, the waste rods being generated are currently being stored on site, as they are at all nuclear powered electrical generating facilities in the United States. While no exact numbers on the amount of storage capacity left at the site is available at this time, projections from the last reported numbers in 1998 put the available storage remaining at approximately 20 percent. Though this number seems small, that is still a large amount of storage available and should carry the facility forward many more years. Prior to utilizing the full storage capacity at this facility the new national repository for high-level nuclear wastes should be completed and operational. This facility is to be located at Yucca Mountain, NV. The U.S. Congress directed the Department of Energy, the Environmental Protection Agency and the National Academy of Sciences to work together in development of the site prior to its implementation as the national repository. The site has been in development for almost 20 years at this time.



Further information available at: www.enr.state.nc.us and www.epa.gov