The Unifour Strategic Air Quality Plan

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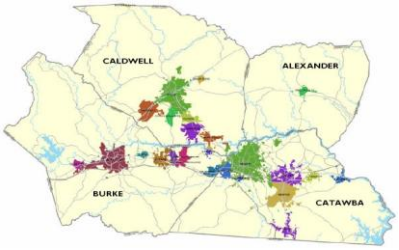

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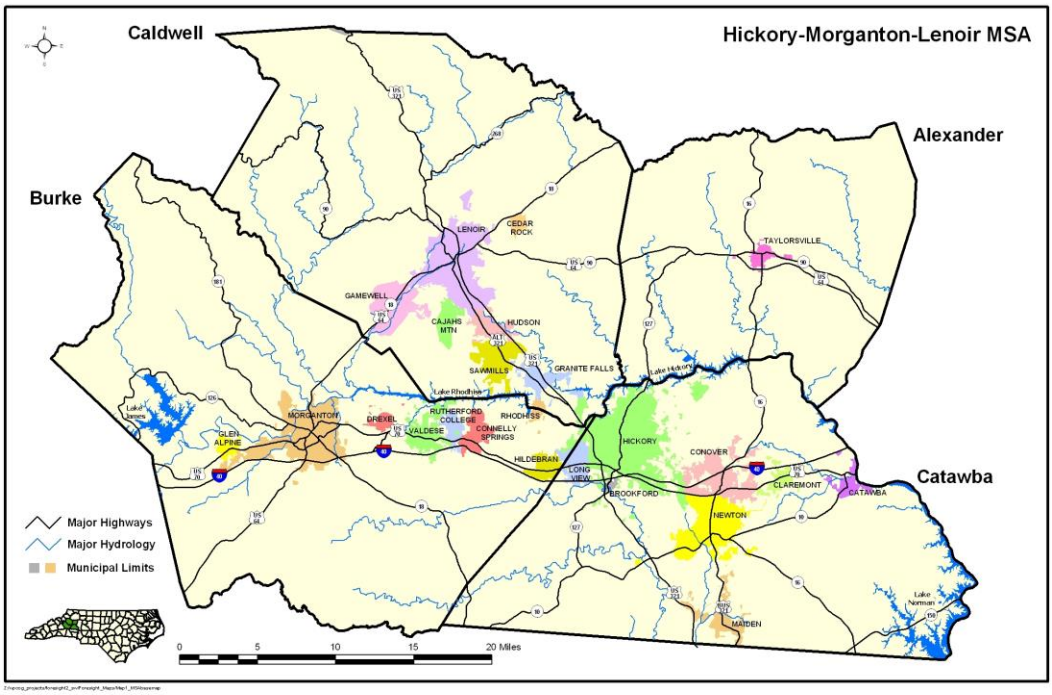
1. Introduction and Background

1.1 Community Profile

The Unifour Counties (Alexander, Burke, Caldwell and Catawba) are located in the foothills of North Carolina's Blue Ridge Mountain range. This area is home to one of the State's largest remaining concentrations of furniture and textile industries. Like much of the State and Southeast Region of the U.S., the Hickory Metro area has struggled to find a new economic identity after losing nearly 50,000 jobs since second quarter 2000.



Map 1. The Hickory-Morganton-Lenoir MSA

Furniture manufacturing and national trade has been a source of income for the timber-rich region of middle and western North Carolina since at least the 1880's when sawmill owners began to realize that greater profits could be made by making furniture closer to the mill rather than shipping the raw input across state lines to finished and resold elsewhere. Along with the furniture trade other suppliers of dowels, hinges, varnishes, glues, casters, drawer pulls and so forth also flourished. By 1921, North Carolina had a permanent furniture exposition in High Point, and Hickory and the surrounding area also have similar exhibitions to show the latest designs and styles. Local artisans produced high quality and unique furniture products that sold from coast-to-coast and could be found in stylish London homes as well. A hundred years later what had started out as a valuable tool to generate much-needed income during the Reconstruction Era had translated into North Carolina in the early 1980's acquiring the moniker "The Furniture Capital of the World."

The 1990's and early 2000's have not been kind to the furniture industry, as the area has been witness to a number of downsizings and plant closures due to international trade policies and pricing structures that have made competition all but impossible. This has produced a strong sensitivity in the region to any potential threat to the remaining businesses that still employ many people in the area and indirectly support many other suppliers, shop owners, and retail businesses.

Since any new or expanded business that might contribute significantly to fine particulate matter (PM 2.5) pollution has to undergo a "new source review," this is seen – to borrow a word from the N.C. Governor – as a "dampening" factor on industry. Perhaps just as importantly, no government or business official wants their area to be perceived as having "bad air" for the sake of its residents as well as placing it at a competitive disadvantage relative to others in a regional market. Currently the area is attracting many retirees and transitioning to a service oriented economy.

1.2 The UAQC/UAQOC

The Unifour Air Quality Committee (UAQC) is made up of stakeholders from the private and public sector that are dedicated to improving the air quality in the Unifour area. The Unifour Air Quality Oversight Committee members are comprised of ten elected officials from the Unifour (Alexander County, Town of Taylorsville, Burke County, City of Morganton, Caldwell County, City of Lenoir, Catawba County, City of Conover, City of Hickory, and City of Newton). The 10 elected members are based upon the ten original EAC members. The UAQOC was formed to make policy and financial decisions for regional air quality activities. Staff support for the UAQC and UAQOC is provided by the Western Piedmont Council of Governments (WPCOG). Funding for the UAQC/UAQOC activities is provided by the Greater Hickory Metropolitan Planning Organization (GHMPO), the Unifour Rural Planning Organization (URPO), and occasional assessments of the 28 local governments in the region (based on population).

In January 1999 the WPCOG learned that Unifour Region's ozone levels would violate the new EPA 8-Hour Standard. The following spring and summer public meetings were held with local governments, the North Carolina Division of Air Quality (NCDAQ), Economic Development Corporations, Chambers of Commerce and other interested groups. In November 1999 the Catawba Air Quality Committee (CAQC) was formed. During the next four years the CAQC was expanded to include other regional members to form the Unifour Air Quality Coalition. The coalition eventually evolved into more formal Unifour Air Quality Committee (UAQC) and the Unifour Air Quality Oversight Committee (UAQOC) which is made up of stakeholders and elected officials from throughout the region.

2. Air Quality and Emissions

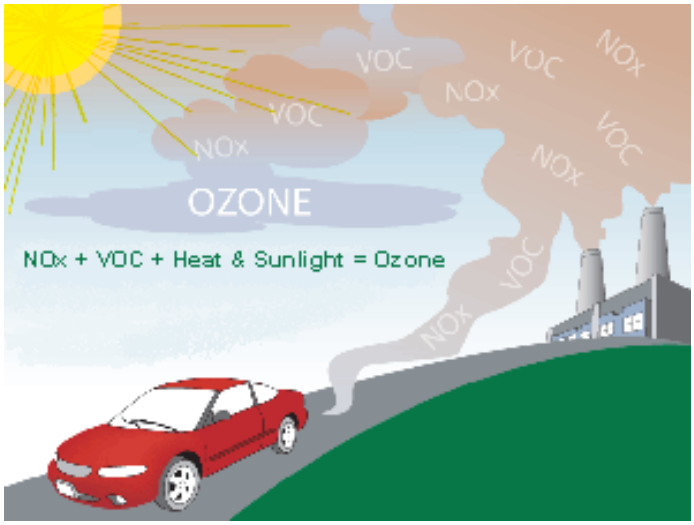
Ozone and particulate matter (PM) are two pollutants found in air that can cause harm to the health of people. (See attachments for the composition and affects of these substances.) The Clean Air Act of 1990 passed by Congress directed the Environmental Protection Agency (EPA) to issue regulations regarding these and other air quality issues. During the 1990's, the EPA conceived regulatory mechanisms requiring the states to submit plans and abatement strategies for ozone and PM to the EPA. Suites challenging the legality of EPA regulations were filed in the courts; thus, enforcement by the federal agency was delayed until the U.S. Supreme Court upheld EPA ozone and PM standards and clarified regulatory processes.

With the legal certification of the EPA's scientific methods and enforcement powers by the Court, the EPA directed the states to submit plans, which included designation of "non-attainment" and "attainment areas" within their borders. These "State Improvement Plans" must be approved by the Federal EPA. The N.C Division of Air Quality (NCDAQ), part of the N.C. Department of Environment and Natural Resources (DENR) is the state agency with the authority and responsibility for plan submission to the Federal government.

2.1 Ozone

A. Sources

Ozone (O3) is a gas composed that is formed from motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NOx and VOC that help form ozone. Ground-level ozone is the primary constituent of smog. Sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air.



Ozone is not usually emitted directly into the air, but at ground-level is created by a chemical reaction between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. It has the same chemical structure whether it occurs miles above the earth or at ground-level and can be 'good' or 'bad,' depending on its location in the atmosphere.

B. Health Impacts

Ozone can harm people's lungs, and EPA is particularly concerned about individuals with asthma or other lung diseases, as well as those who spend a lot of time outside, such as children. Ozone exposure can aggravate asthma, resulting in increased medication use and emergency room visits, and it can increase susceptibility to respiratory infections.

The United States has made significant progress reducing ground-level ozone across the country. Since 1980, ozone levels have dropped 21 percent as EPA, states and local governments have worked together to improve the quality of the nation's air. EPA expects improvement to continue, as a result of landmark regulations such as the Clean Air Interstate Rule, to reduce emissions from power plants in the East, and the Clean Diesel Program, to reduce emissions from highway, nonroad and stationary diesel engines nationwide.

C. Assessment of Ozone Trends

The Unifour has two ozone air monitors; one near Lenoir and the other in Taylorsville. Currently, the three-year average of ozone concentrations is under the 1997 8-hour air standard for both monitors. However, previous three-year averages (calendar year 2001-2003 and 2002-2004) indicated ozone levels above the acceptable federal level (see graphs). Therefore, the EPA designated the Unifour as a "non-attainment" area in April 2004. The designation leads to penalties involving the loss of federal and state grant funds for road and transportation improvements as well as, additional requirements for locating new industry/business in the area. Beyond the direct economic impacts, the "non-attainment" label can cause people not to move to geographic location, which can hurt economic growth and employment opportunities, etc.

The NCDAQ is required to evaluate design value (DV) trends and ozone exceedance trends to determine if any of the State's monitors show increases in ozone formation. Specifically, the NCDAQ evaluates the following data as part of the air quality analyses:

- 8-hour Ozone Design Value Trends – Most recent design values (1 and 3 year average of the 4th highest 8-hour ozone average), compared to the trend in design values from the 2000 timeframe to present.
- 8-Hour Ozone Exceedances – Number of exceedances of the 8-hour ozone standard at each monitor in the EAC areas for the most recent ozone season, compared to the number of exceedances at each monitor from 2000 to present.

8-hour Ozone Design Value Trends

The Federal standard for ozone until 2008 was 0.085 parts per million (ppm). The standard was lowered in 2009 to 0.075 ppm. Table 1 below shows the trend in 8-hour ozone values at monitors in Alexander and Caldwell County. The design values are presented in ppm, with design values exceeding the standard highlighted in gray with bold lettering.

Table 1.
4th Highest 8-Hour Ozone Values (parts per million), 2000-2009

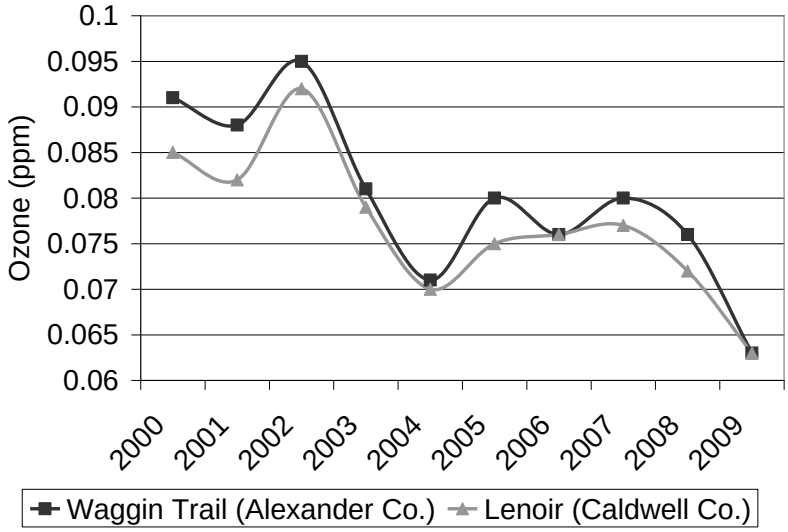
Monitor	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Waggin Trail (Alexander Co.)	**0.091**	**0.088**	**0.095**	0.081	0.071	0.080	0.076	0.080	0.076	0.063
Lenoir (Caldwell Co.)	**0.085**	0.082	**0.092**	0.079	0.070	0.075	0.076	0.077	0.072	0.063

Source: USEPA and NCDAQ, 2009.
Note: Data based on 0.085 8-hour federal ozone standard in 2000 to 2008 and the 0.075 parts per million standard in 2009. Grey shading are years that fourth highest 8-hour ozone value was higher than the federal standard. Federal ozone standards are currently under EPA review.

Higher ozone values were observed from 2000 to 2002 (Figure 1). As can be seen from the data, 2002 was a year in which high ozone was observed at both the Alexander and Caldwell County monitor sites. There has been a general decrease in the values following the 2002 period. In fact, since 2002 there have not been any instances where the 4th highest value was above the 1997 8-hour ozone standard. A closer look at the data reveals that the Unifour area saw decreases in monitored ozone levels in 2003 and 2004 with small increases in 2005 and 2007. As discussed further in the 2007 ozone season weather patterns section, the 2007 season was very conducive to ozone development,

Figure 1.

Unifour Area 4th Highest Ozone Values, 2000-2009



Source: USEPA and NCDAQ, 2009.

with warm temperatures and relatively little precipitation. In 2009, ozone design values were the lowest ever recorded in the region, which could be attributed to multiple factors, including traffic improvements, mobile source emission reductions, alternative fuels and technologies, more favorable weather patterns, and poor economic conditions.

8-Hour Ozone Exceedance Trends

Table 2 below shows the number of 8-hour ozone exceedances at monitors in Alexander and Caldwell County. The numbers exceeding the standard are highlighted with bold lettering.

The number of 8-hour ozone exceedances peaked during the 2002 season, in which 27 were observed at both monitors combined. Since 2002, exceedances of the 8-hour standard have decreased dramatically. There have been no exceedances of the 8-hour ozone NAAQS in the last six years (2004-2009) at either monitor.

Table 2.
Number of 8-hour Ozone Exceedances at Unifour Ozone Monitors, 2000-2009

Monitor	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Waggin Trail (Alexander Co.)	**7**	**5**	**17**	1	0	0	0	0	0	0	0
Lenoir (Caldwell Co.)	**4**	2	**10**	3	0	0	0	0	0	0	0

Source: USEPA and NCDAQ, 2009.
Note: Data based on 0.085 8-hour federal ozone standard in 2000 to 2008 and the 0.075 parts per million standard in 2009. Grey shading is years that four or more exceedances occurred for that year. Federal ozone standards are currently under EPA review.

4th Highest Value Trends

The design value is calculated by averaging the 4th highest 8-hour ozone value for each of three years. Since the design value is an average of three years, a decrease may be the result of one really good air quality year; or conversely, an increase may be the result of one bad air quality year. Therefore, looking at the trends of the 4th highest value can give insight as to how the air quality in an area is improving.

Table 3 on page 7 displays the 4th highest 8-hour ozone 3-year averages for the Unifour area. Although there can be a great deal of fluctuation in the 4th highest value, the general trend since 2001-2003 has been downward. There was an increase in these values from 2005 to 2007; however, these levels were still significantly lower than the 2001-2003 values. This downward trend continued with the 2007-2009 data. The 2009 value of 0.063 ppm for both monitors helped bring the 3-year averages below the 2008 standard of 0.075 ppm.

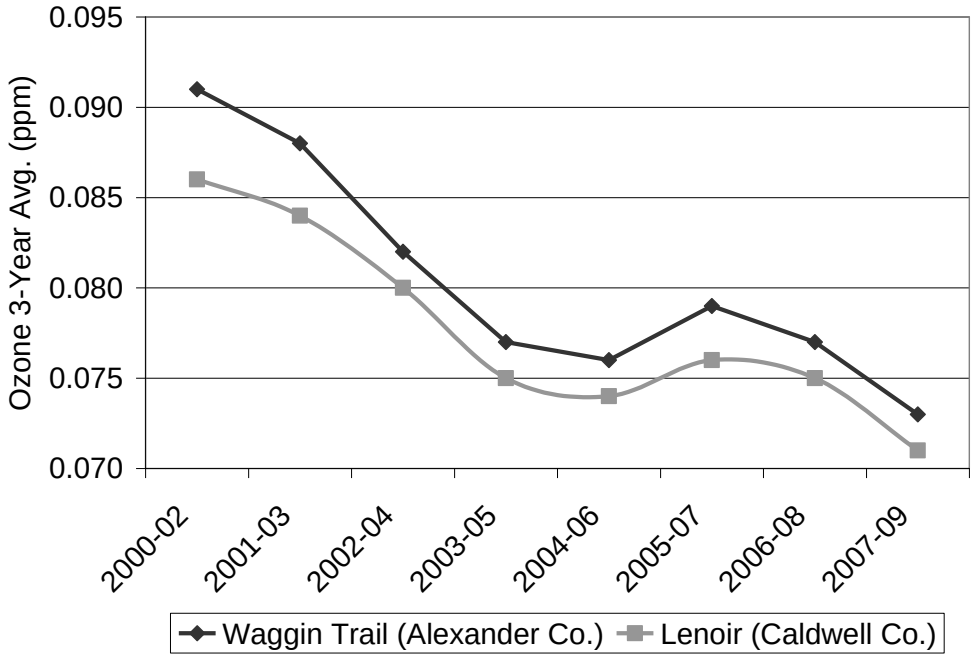
Table 3. Fourth Highest 8-Hour Ozone 3-year Averages (or Design Values) (parts per million), 2000-2009									
Monitor	**2000-02**	**2001-03**	**2002-04**	**2003-05**	**2004-06**	**2005-07**	**2006-08**	**2007-09**	**2008-2010**
Waggin Trail (Alexander Co.)	**0.091**	**0.088**	0.082	0.077	0.076	0.079	0.077	0.073	0.070
Lenoir (Caldwell Co.)	**0.086**	0.084	0.080	0.075	0.074	0.076	0.075	0.071	0.069

Source: USEPA and NCDAQ, 2009.
Note: Data based on 0.085 8-hour federal ozone standard in 2000 to 2008 and the 0.075 parts per million standard in 2009. Grey shading is violations of the three-year ozone federal standard (design value). Federal ozone standards are currently under EPA review.

Figure 2 shows the 4th highest ozone 3-year averages for both monitoring sites within the Unifour area. As can be seen from the data, since the 2002-2004 season, the area has been in attainment of the 0.085 ppm federal ozone standard. Since 2002, there have not been any instances where the 4th highest value was above the 8-hour ozone standard.

Figure 2.

Unifour Area 4th Highest Ozone 3-Year Averages (or Design Values), 2000-2009



Source: USEPA and NCDAQ, 2009.

D. Early Action Compact Summary

Overview of Unifour EAC Program

On December 17, 2004, the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Air Quality (NCDAQ), submitted to the United

States Environmental Protection Agency (USEPA) North Carolina's 8-hour ozone National Ambient Air Quality Standard (NAAQS) attainment demonstration for regions designated as Early Action Compact (EAC) areas. The EAC areas in North Carolina include the Cumberland County EAC area; the Mountain EAC area (Buncombe, Haywood, and Madison Counties); the Triad EAC area (Alamance, Caswell, Davidson, Davie, Forsyth, Guilford, Randolph, Rockingham, Stokes, Surry, and Yadkin Counties); and the Unifour EAC area (Alexander, Burke, Caldwell, and Catawba Counties).

Although, the area was designated "non-attainment", Catawba County and all other government jurisdictions, working under the structure of the Western Piedmont Council of Governments (WPCOG), formed a Unifour Air Quality Committee (UAQC), which has taken numerous proactive measures to inform the public about ozone levels and instruct the community about methods to abate the problem. The most significant and important measure was to enter into an Early Action Compact (EAC), which is an agreement signed by the EPA, DENR, and all Unifour local governments (see Local Control Measures and Catawba County Activities attached). The formal document, establishes a means for the entire Unifour to come into compliance with Federal EPA ozone standards at an accelerated pace. By entering into this agreement the Unifour avoided federal penalties until December 2007. The deferment was conditional upon no milestone being missed by local governments. If an EAC requirement is not achieved on time, the penalties immediately take effect.

Early Action Compact areas were given the opportunity to develop local control strategies to meet the 8-hour ozone NAAQS earlier than required by the Clean Air Act. In turn, the USEPA agreed to defer the effective date of the nonattainment designation for these areas. If an EAC area attains the 8-hour ozone NAAQS by December 31, 2007 and meets all of their EAC milestones, the USEPA will designate the area as attainment. The Mountain EAC area in North Carolina was designated as attainment in April 2004; however, the three counties listed above decided to continue their EAC agreement because of the public health benefits of the program. The December 2004 attainment demonstration predicts all of North Carolina's EAC areas meeting the 8-hour ozone NAAQS by December 31, 2007 and maintaining that standard through 2017. The air quality in the EAC areas has improved considerably since the designations. The Unifour and Cumberland EAC areas attained the 8-hour ozone NAAQS with the 2002-2004 design value period, three years earlier than required. Whereas, the Triad EAC area attained the 8-hour ozone NAAQS with the 2003-2005 design value period, two years earlier than required.

The Unifour Early Action Compact (EAC) illustrates efforts being made in the Unifour to reduce the formation of ground level ozone pollution. It serves to "facilitate self-evaluation and communication with EPA, NCDENR, stakeholders, and the public" in regards to the EAC program and to promote the program's goal to achieve cleaner air faster in the Unifour region. It documents the area's progress regarding the implementation of local control measures and provides specific information identifying the government agency or department that has the responsibility for implementation of each measure. In June 2007, the Unifour submitted the previous biannual progress report

detailing activities that have taken place in the region up to that point and significant progress being made implementing the control measures. This document builds on previous progress reports and describes stakeholder meetings and other activities by local members that have occurred since July 1, 2007.

The local emission reduction strategies were adopted and implemented based on their suitability for addressing ozone pollution from three primary approaches: education/awareness, transportation, and land use activities. Throughout the Unifour region there have been widespread efforts towards educating the public and raising awareness about air quality while also suggesting practical methods individuals can use to help improve the region's ambient air quality. Presentations to school children and elected officials, as well as a sustained media campaign focusing on ozone, have been the foundation of the education/outreach program. Local and regional newspapers, television and radio, and a growing internet presence, have also been very useful in making Unifour residents aware about ozone and air quality conditions.

Local Control Measures Implemented in the Unifour

1. **Expand the Inspection and Maintenance program for passenger vehicles.** Catawba County began July 1, 2003; Burke and Caldwell Counties began July 1, 2005. Authority and responsibility: NCDMV.
2. **A New Regional Transit System Implemented.** The Greenway Transit System combined four (4) individual providers into one multi-county transit system on July 1, 2008. All of the fleet's diesel vehicles use bio-diesel fuel and a hybrid vehicle has been ordered.
3. **Promotion of Compressed Work Weeks and Flex-time.** All ten members have agreed to promote this measure where practical, which is estimated to reduce NOx 1.3 tons/year. Authority and responsibility: Local EAC members.
4. **Develop Regional Bicycle and Pedestrian Plan.** Has been estimated to reduce NOx 1.6 tons/year and VOCs 2 tons/year. Greater Hickory MPO/Local EAC members.
5. **Outdoor Burning Ban.** The NC Environmental Management Commission approved a new rule that bans open burning on "Air Quality Action Days" when the AQI is Code Orange or above. Authority and responsibility: NCDAQ.
6. **City and County Energy Plans.** An energy conservation plan has been developed and adopted by all ten local EAC members that direct city and county departments to reduce energy consumption and conserve natural resources in an effort to reduce emissions from EGUs. Authority and responsibility: Local EAC members.
7. **Alternative Fuel Vehicles and the Clean Cities Program.** The UAQC is a Core Stakeholder in the Centralina Clean Fuels Coalition and all members of the EAC are committed to the pursuit and use of alternative fuel technologies. The area has several refueling stations for AFVs including biodiesel, CNG, and ethanol. Authority and responsibility: UAQC, Greater Hickory MPO, and Local EAC members.
8. **Support Efforts and Coordination of Metropolitan Planning Organization and Rural Planning Organization.** The Greater Hickory MPO and Unifour RPO do long range transportation planning to ensure that highway and transit programs conform to the

air quality goals established by the EAC. Authority and responsibility: MPO/RPO and Local EAC members.

9. **Improve Traffic Operational Planning, Engineering, and Maintenance.** The City of Hickory optimized its synchronized traffic signals along US 321, McDonald Parkway and Tate Boulevard, effectively increasing traffic flow and reducing congestion. Authority and responsibility: MPO/RPO and Local EAC members.
10. **Implement Smart Growth, Mixed Use and Infill Development Policies.** This measure helps reduce vehicle miles traveled and improve air quality through land use management programs. Several members have adopted land use regulations based upon Smart Growth concepts. Authority and responsibility: Local EAC members.
11. **Air Awareness Program.** All local members participate in the Air Awareness program and have adopted "Ozone Action Plans" that include provisions to help reduce ozone formation. Authority and responsibility: UAQC and Local EAC members.
12. **Adopt a Local Clean Air Policy.** Local stakeholders promote air quality awareness and work to minimize ozone pollution in their respective local communities. Authority and responsibility: Local EAC members.
13. **Air Quality Contacts for Each Local Member of the EAC.** Contacts disseminate information to local governments and assure adherence to goals of the EAC program. Authority and responsibility: Local EAC members.
14. **Landscaping Standards and Urban Forestry.** Implementation throughout Unifour to help mitigate the effect of the "Urban Heat Island" and promote energy conservation and reduce emissions from EGUs. Authority and responsibility: Local EAC members.

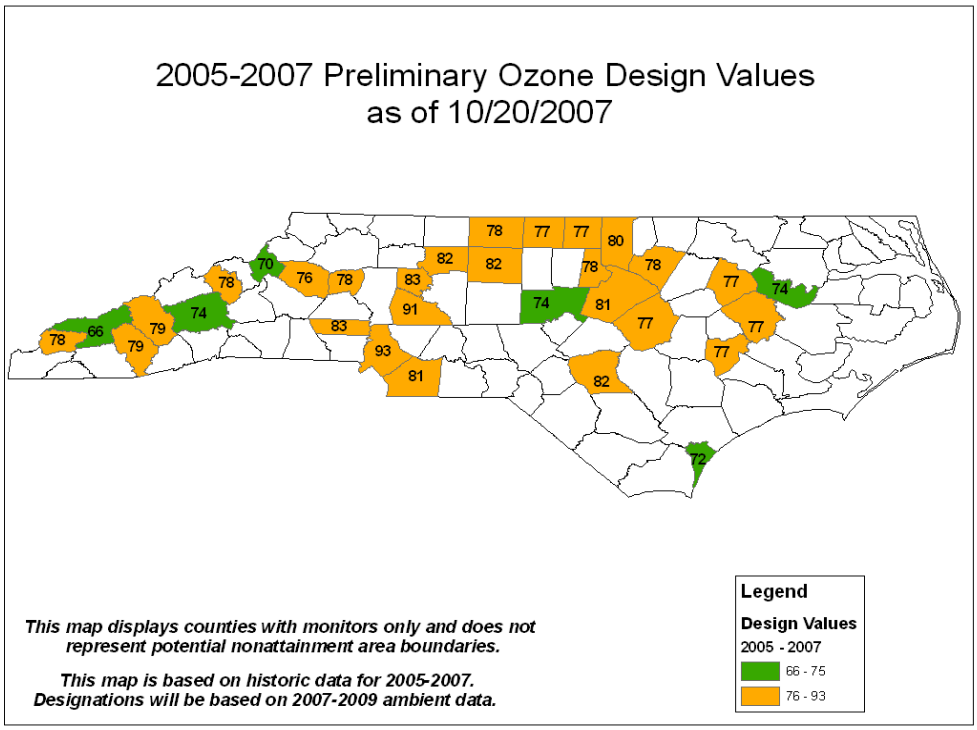
Every milestone requirement in the Unifour EAC has been met within appropriate time frames. In fall 2007, the EPA announced that 14 regions around the U.S. (who had entered into EAC's) were ahead of schedule for ozone level reductions, the Hickory/Catawba County Unifour area was one of those recognized for its efforts and accomplishing a reduction. Design value data from 2005 to 2007 as seen in Map 2 on page 13 clearly shows that the area was back in attainment for ozone. Thus, in April 2008, EPA declared the officially in attainment for ozone based on the 1997 0.08 parts per million (or 0.084 parts per million with rounding) standard.

Proposed Changes to the Ozone Standard

On March 12, 2008 EPA announced new federal ozone standards for ozone. Under the new guidelines the federal standard was to be lowered to 0.075 parts per million with no rounding. Attainment status would have been determined by EPA by March 12, 2010 based on the fourth highest 8-hour reading for the 2007, 2008 and 2009 ozone seasons.

In summer 2009, however, EPA announced that it would reconsider the 2008 ozone standard. In January 2010 EPA sent out a proposed rule that would lower the standard to a range between 0.060 and 0.070 parts per million. EPA will look at data from the 2008, 2009 and 2010 ozone seasons to determine attainment status. The proposed rule would also set up a new secondary standard. The final rule for the new ozone standard is expected to be released by the end of October 2010.

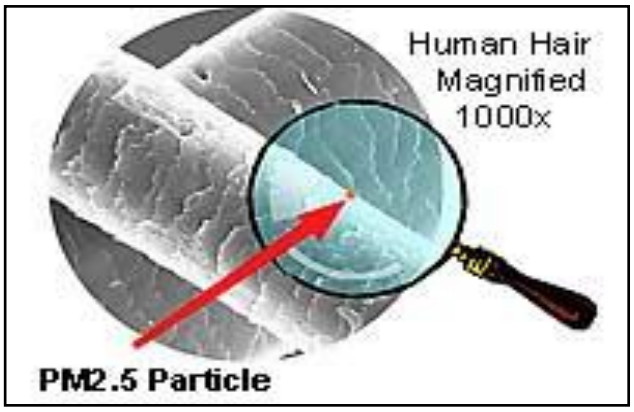
Map 2. 2005-2007 Preliminary Ozone Design Values as of 10/20/2007



2.2 PM 2.5

A. Sources

Fine particulate pollution, also called PM 2.5, consists of suspended fine particles that are less than or equal to 2.5 micrograms in diameter. PM 2.5 is made up of a variety of microscopic solids and liquid droplets such as allergens, dust, nitrates, organic chemicals and sulfates. Unlike ozone, PM 2.5 emissions can occur throughout the year, although the amount and chemical compositions of PM 2.5 depends on location, time of year and local weather conditions.



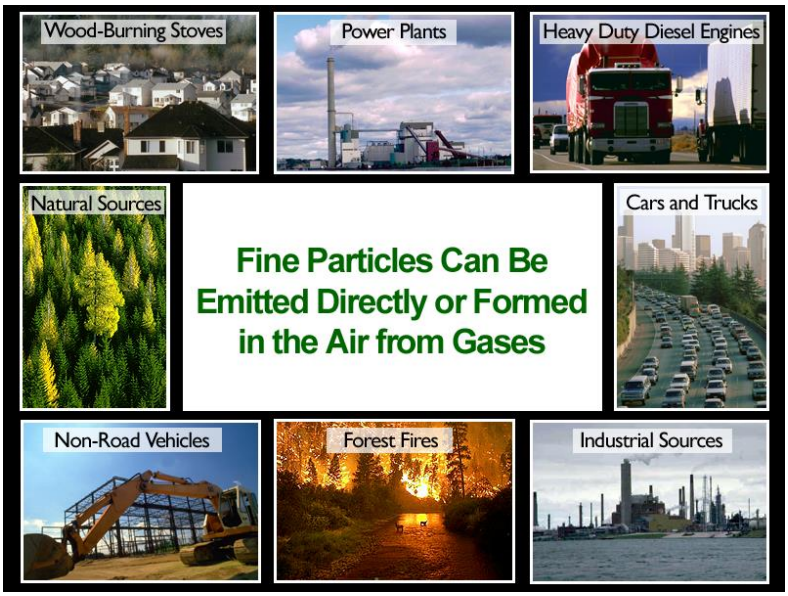
A cross-section of a human hair illustrates the size of PM particulates.

The formation and transportation of PM 2.5 is still under considerable study, however, it is known that PM 2.5 has both primary sources and secondary sources. The primary sources of PM 2.5 pollution are many and varied: wood smoke from residential or commercial combustion; automobile exhaust in the form of oxides of nitrogen; coal-fired power plants; small engines; open burning of trash or construction debris; and dust from agricultural operations or open areas. Secondary sources can be generated from fuel combustion working in conjunction with sunlight and water vapor.

B. Health Impacts

Health studies indicate a correlation between elevated PM 2.5 levels and premature death from heart or lung disease. High PM 2.5 levels have also been associated with heart attacks and respiratory symptoms such as asthma attacks and bronchitis. This can in turn lead to increased levels of hospitalization as well as school and work absences.

Although PM 2.5 has not been regulated for as long a time period as "coarse" particulates (PM 10), it is considered to be an even graver threat to human health since the finer particles are more readily absorbed deeper in lung tissue. The health effects of being exposed to high levels of PM 2.5 are serious, and include decreased lung function, irregular heart function including heart attacks, and exacerbating pre-existing asthma conditions.



C. Assessment of PM 2.5 Trends

History of the PM 2.5 Standard

After several years of analyzing various health and scientific research studies, EPA issued fine particle standards in 1997. After adding 1,200 monitors across the country

between 1997 and 2003, in April, 2003 EPA issued a memorandum to state governments showing the schedule for designating areas that were either in attainment or non-attainment for the new standard. EPA would "designate an area non-attainment if it has violated the fine particle standards over a three-year period, or if relevant information indicates that it contributes to violations in a nearby area." The three-year period was defined by EPA from 2001 to 2003.

The PM 2.5 standards were then revised in 2006. Currently, the yearly standard is set at 15 micrograms per cubic meter based on a three-year average of annual PM 2.5 concentrations. The 24-hour standard is currently 35 micrograms per cubic meter.

Hickory Water Tower Monitor Trends

Within the Unifour area, only one official monitor tracks PM 2.5 levels. The monitor is located one block west of US 321 close to the water tank owned by the City of Hickory. Additional monitoring related to the official monitor is also taking place on the site.

Table 4 shows the yearly readings for the Hickory monitor between 2000 and 2009. Monitor results reveal a decline in PM 2.5 levels from 15.98 in 2001 to 15.04 in 2003. The three-year average between 2001 and 2003, however, equaled 15.36, or just slightly above the standard.

Table 4.
Annual PM 2.5 Averages (micrograms per cubic meter), 2000-2009

Monitor	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hickory Water Tower	**17.9**	**16.0**	**15.4**	15.0	15.0	**16.0**	**15.2**	14.6	12.8	10.4	11.34

Source: USEPA and NCDAQ, 2010.
Note: Grey shading is years that the annual average exceeded the annual federal standard of 15 micrograms/per cubic meter. Federal PM 2.5 standards are currently under EPA review.

Since the monitor was above the standard EPA initially recommended Catawba and a portion of Burke and Caldwell counties be deemed non-attainment for PM 2.5. In

February 2004, the NC Division of Air Quality (NCDAQ) recommended that only the part of Catawba County (defined as the portion of Catawba County within the boundary of the Greater Hickory Metropolitan Planning Organization) be deemed for non-attainment since Burke, Caldwell and the rural portion of Catawba County was not contributing the PM 2.5 problem. In December 2004 EPA made its final designations. It placed all of Catawba County in non-attainment status for PM 2.5 based on the three-year average between 2001 and 2003 being slightly above the 15.0 standard. In April 2005 the PM 2.5 designation for Catawba County was consequently published in the federal register. Davidson and Guilford counties in North Carolina were also placed in non-attainment status.

Once an area has been designated as non-attainment with regard to EPA standards for a controlled pollutant, the area's local and state governments typically respond to have the designation overturned or lessened (geographically in size or in severity of the designation), or, if it is clear that the designation cannot be ameliorated, they must work to develop and implement a plan to bring the area back into attainment with the national standard.

The NCDAQ is required to evaluate PM 2.5 to determine if Catawba County is in attainment for the Federal Standards for PM 2.5. Specifically, the NCDAQ evaluated the following data yearly as part of the air quality analyses:

- Annual PM 2.5 Averages – Average daily reading during the course of one calendar year.
- PM 2.5 3-year Averages – Average of the last three years used to determine change over longer period of time.
- PM 2.5 98th Percentile Daily Reading – 6th or 7th Highest reading during the course of a year.

Annual PM 2.5 Averages

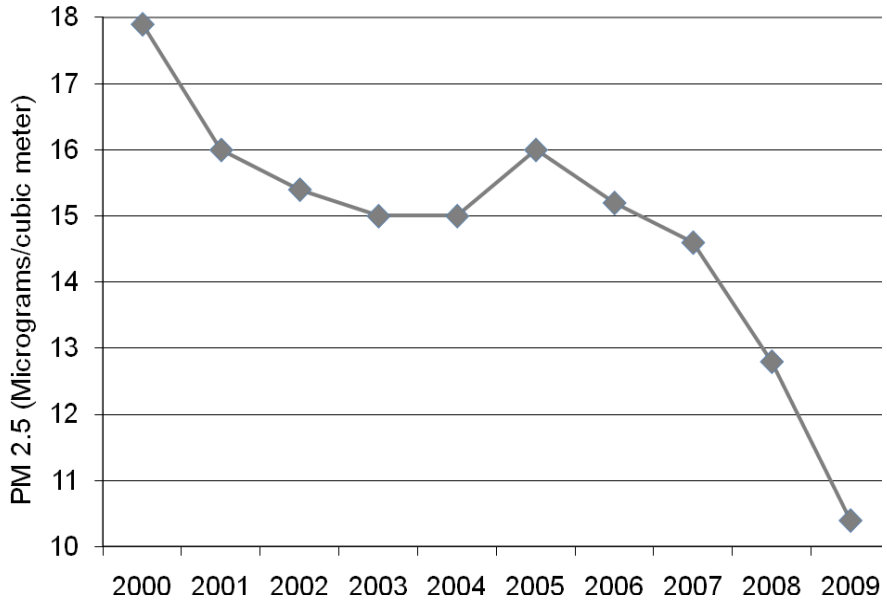
The current annual standard for PM 2.5 is 15 micrograms per cubic meter. Table 4 shows the trend in PM 2.5 averages at the monitor in Catawba County. The design values are presented in micrograms per cubic meter, with values exceeding the standard highlighted with bold lettering.

Annual PM 2.5 Averages peaked between 2000 and 2002. There is a general decrease in the values for the 2003 and 2004 periods before increasing again in 2005 and 2006. Both areas have been below the standard of 15.0 micrograms per cubic meter since the 2007 period. The Hickory monitor recorded its lowest annual PM 2.5 readings ever in 2008 and 2009 which could be attributed to multiple factors, including scrubbers at Duke Energy's coal fired Marshall Steam Station, traffic improvements, more precipitation, and a poor economy.

Figure 3 on page 15 graphically shows the general reduction in PM 2.5 in the Unifour area. PM levels have declined 32% between 2006 and 2009.

Figure 3.

Unifour Area Annual PM 2.5 Averages (micrograms per cubic meter), 2000-2009



Source: USEPA and NCDAQ, 2010.

PM 2.5 3-year Averages

The PM 2.5 three year average is a health based standard and is used to see how air quality is changing over time, so they average over a longer period of time. It is calculated by averaging the average annual value for each of three years. Since the design value is an average of three years, a decrease may be the result of one really good air quality year; or conversely, an increase may be the result of one bad air quality year. Therefore, looking at the trends of the 3-year average can give insight as to how the air quality in an area is improving.

Table 5 displays the 3-year averages for the Unifour area. The Unifour area was in nonattainment for the 15 micrograms per cubic meter until the 2006-2008 season.

Table 5.
PM 2.5 3-year Averages (micrograms per cubic meter), 2000-2009

Monitor	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-2010
Hickory Water Tower	**16.4**	**15.5**	**15.1**	**15.3**	**15.4**	**15.2**	14.2	12.6	11.6

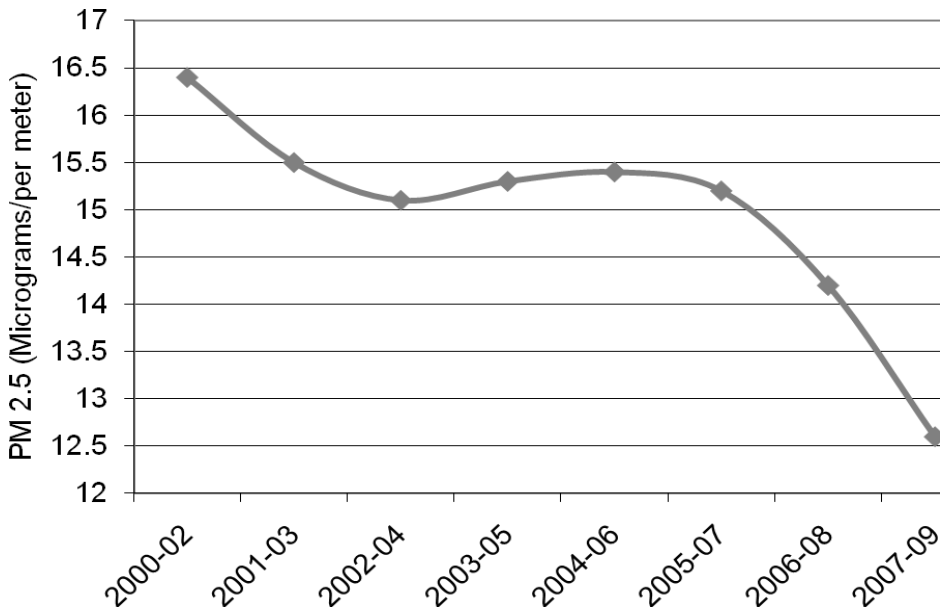
Source: USEPA and NCDAQ, 2010.

Note: Grey shading is years that the annual average exceeded the annual federal standard of 15 micrograms/per cubic meter. Federal PM 2.5 standards are currently under EPA review.

Figure 4 on page 16 graphically demonstrates a general downward trend with respect to the three year average.

Figure 4.

Unifour Area 3-Year PM 2.5 Averages (micrograms per cubic meter), 2000-2009



Source: USEPA and NCDAQ, 2009.

PM 2.5 98th Percentile Daily Reading

Besides setting an annual standard, EPA also has a daily PM 2.5 standard to protect public health. The annual federal standard is currently 35 micrograms per cubic meter. The standard is calculated at the 98th percentile for each year (EPA uses a three-year average for the standard), which is equivalent to the 6th or 7th highest daily reading at the monitor site in a given year. The PM 2.5 98th Percentile Daily reading has been below the standard every year except in 2005 (Table 6). The three-year average has never violated the daily standard.

Table 6.
PM 2.5 98th Percentile Daily Reading (micrograms per cubic meter), 2000-2009

Monitor	Yearly Readings						3-Year Average				
	2004	2005	2006	2007	2008	2009	2004-06	2005-07	2006-08	2007-09	2008-10
Hickory Water Tower	34.0	**36.9**	32.9	30.7	25.6	21.2	34.6	33.5	29.7	25.8	23.3

Source: USEPA and NCDAQ, 2009. (Final 2009 Data Currently not available)

Note: Grey shading is years that the 98th daily reading exceeded the annual federal standard of 35 micrograms/per cubic meter. Federal PM 2.5 standards are currently under EPA review.

B. Source Apportionment Summary

Attaining Pollution Standards in Catawba County

During the fall of 2006 and early winter of 2007, the Western Piedmont Council of Governments (WPCOG) sponsored a study to determine the sources of and control strategies for fine particulate matter, known commonly as PM 2.5. The concern motivating the study was prompted by Catawba County being designated as a non-conforming area for the pollutant by the U.S. Environmental Protection Agency (USEPA). The USEPA is responsible, based in part upon recommendations from each state's governor, for designating areas not in compliance with PM 2.5 pollution standards established by the National Ambient Air Quality Standards (NAAQS) under Section 107(d) of the Clean Air Act and later amendments.

Once an area has been designated as non-attainment with regard to USEPA standards for a controlled pollutant, the area's local and state governments typically respond to have the designation overturned or lessened (geographically in size or in severity of the designation), or, if it is clear that the designation cannot be ameliorated, they must work to develop and implement a plan to bring the area back into attainment with the national standard. In the current case, the first action was to have the initial USEPA-recommended non-attainment area reduced from four counties to just one: Catawba.

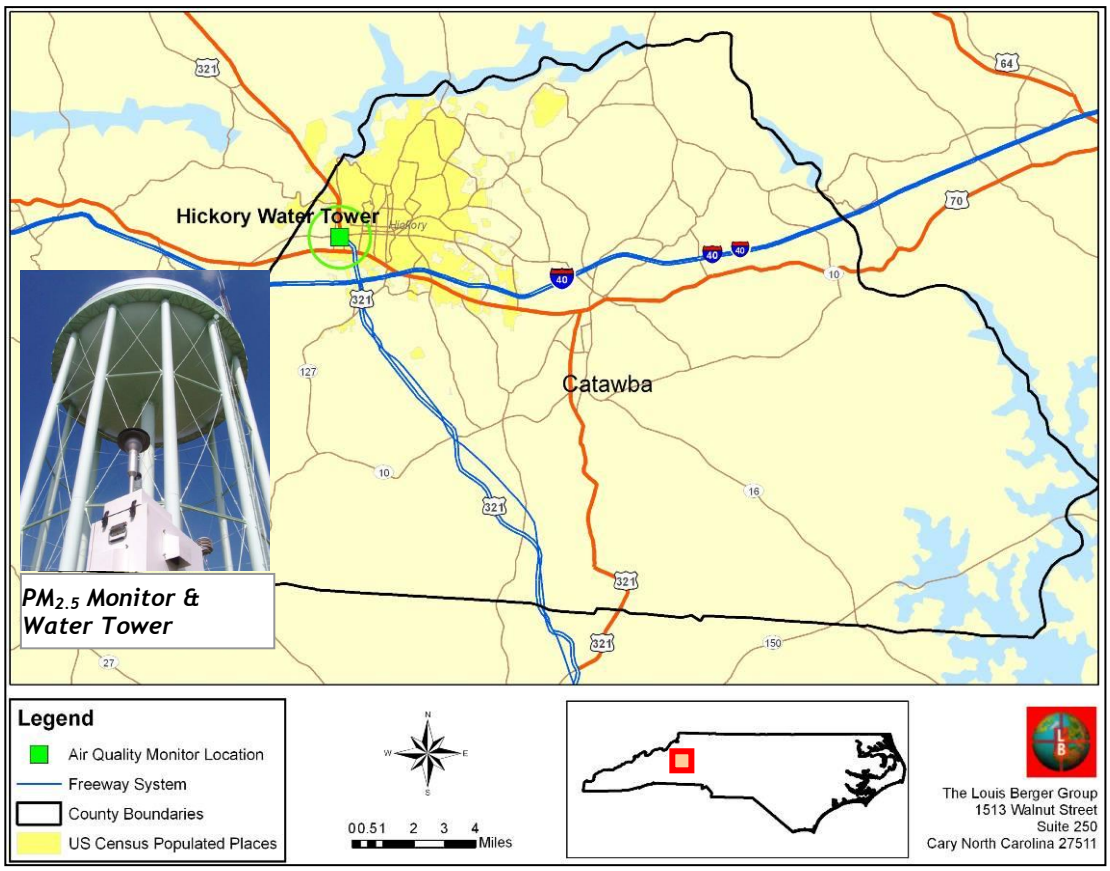
The technical data employed by North Carolina was sufficient for USEPA to reduce the non-attainment area from four counties to one county. Two other counties in North Carolina (Davidson and Guilford) also fell into non-attainment.

The Monitoring Site Location

This sensitivity to the new standard in Catawba County expressed itself most clearly by the local governments' strong belief that the siting of the Hickory monitoring device, known as the Hickory Water Tower monitoring site, was not representative of the region's overall characteristics (Map 3, page 18). Several actions challenging the validity of the location and/or data readings taken at the site took place between the time that the Catawba County designation took affect and the WPCOG hired a consultant to study the sources and control measures of PM 2.5.

The first of these challenges was to ask North Carolina Department of Environment and Natural Resources Division of Air Quality (NCDAQ) to place a second monitor within approximately one mile of the water tower site to determine if the second monitor

(located at the Hickory Rescue Squad) would show lower readings than the Water Tower location. For each quarter between July 2004 and June 2006 the rescue squad monitor



Map 3. Location of Catawba County, City of Hickory, and Monitoring Site

PM 2.5 levels were lower than the water tower monitor readings, indicating that localized events could be impacting the monitor at the water tower. In December 2005 the Unifour Air Quality Committee (UAQC) asked for an EPA audit of both of the rescue squad and water tower monitors. The audit was completed in March 2006. The EPA auditors concluded that both sites "technically" met the EPA siting criteria. They also concluded, however, that local impacts could adversely be affecting the results at the water tower monitor.

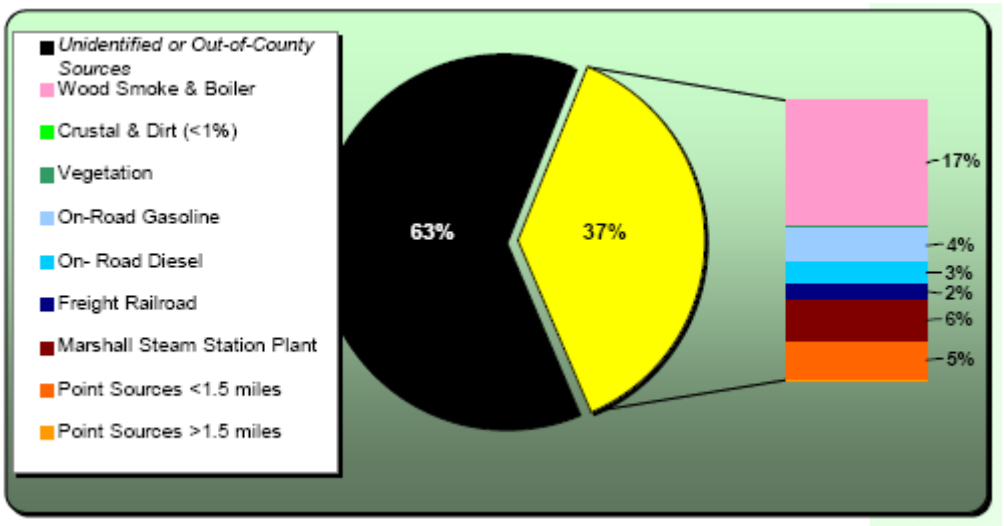
Based on the conclusions of the audit and the two monitor comparisons, the UAQC sent out a Request for Proposals in May 2006 to determine the source apportionment of the water tower PM 2.5 monitor. In July 2006, the Louis Berger Group, Inc. was asked to conduct the study. The following is a list of measures that were a result of that study.

It is highly unlikely that any of these strategies will make a significant impact at the Hickory site in terms of reducing PM 2.5 concentrations. In fact, the combination of cleaner fuels; activation of smokestack controls at the Marshall coal-fired power plant, and more stringent inspection/maintenance requirements will prove to be of the greatest benefit and may in fact reduce PM 2.5 readings at the monitoring site below the existing

annual and daily thresholds set by the US Environmental Protection Agency. Figure 5 on page 19 indicates the relative percentages of PM 2.5 by estimated source type.

However, a combination of local mitigation strategies can make a measurable impact that, in turn, would provide an additional surety that Hickory, Catawba County, and the Unifour Region are doing everything possible to reduce PM 2.5 emissions. It is also possible that (a) the existing National Ambient Air Quality (NAAQS) standards will

Figure 5. PM 2.5 Source Apportionments



change again, as they have recently for the daily standard; or (b) the existing local and statewide measures listed in Figure 1 will not be sufficient to push the PM 2.5 monitor readings below the attainment threshold. The recommended process for selecting these measures comprises the following four steps:

1. Select the measures that appear to be most easily attainable, given the availability of funding and likelihood of a high acceptance and penetration rate among stakeholder parties. The mix of packages should include those that have short- and long-term benefits to ensure that a continuous improvement is taking place.
2. Assess each of the mitigation strategies independently in more detail given the known conditions and environmental variables surrounding the Hickory Water Tower Monitoring Site. The result will be an optimal package of implementation measures, as well as setting targets for implementation.
3. Develop an informational brochure describing the issue of PM 2.5 for the Hickory-Catawba area, the preferred voluntary control strategies, and whom to contact for further information.
4. On a quarterly basis, continue to assess and adjust the monitor readings and effectiveness of the selected programs using the implementation targets developed in Step No. 2.

Mitigation Measure Strategies

The Hickory-Unifour Area and State of North Carolina already have a number of measures in place or in the process of implementation to address PM 2.5 pollution. In general, these measures were adopted originally to manage ozone precursors. The following (Table 7) illustrates the local control measures that have been adopted through the Early Action Compact (EAC) process and other measures that are being applied at the State and Federal levels.

Table 7. Local Mitigation Measures for PM 2.5 Sources

Local Measures	Responsibility
Open Burning Ban for Ozone Action Days	North Carolina
Ozone Action Day Program to reduce NOx	Unifour Governments
Awareness / Outreach	North Carolina/WPCOG
Energy Conservation Plan	Unifour Governments
Staff Person for Air Quality	Unifour Governments
Local Clean Air Policies	Unifour Governments
Increasing Landscaping Ordinances	Unifour Governments
Smart Growth Policies	Unifour Governments
Encourage Bicycle-Pedestrian Usage	Unifour Governments
Encourage Ridesharing and Flexible Work Schedules	Unifour Governments
Traffic Management, including signal optimization (e.g. US 321)	NCDOT, Local Governments
Enhanced Vehicle Inspection and Maintenance Regulations	North Carolina
Clean Smokestacks Act / Reduce Power Plant Emissions	North Carolina
Alternative Fuels	WPCOG / Various
State and Federal Measures	
Diesel Retrofit Program	USEPA
Great American Woodstove Changeout Program	USEPA
Safe Routes to School	USDOT

Of the measures shown, the most significant in terms of potential of reducing PM 2.5 emissions that are affecting the Hickory Water Tower Site monitoring station are the smokestack controls (specifically, on the Marshall Steam Station coal-fired power plant), low-sulfur diesel fuels, and enhanced vehicle inspection programs. It is less clear if these measures, by themselves, will produce decreases in the PM 2.5 readings at the monitoring site to ensure compliance into the future, especially given the changeable nature of sources and even of the regulatory standards themselves (e.g., USEPA lowering of the daily standard to 35 micrograms/cubic meter in September, 2006). Given this uncertainty, The Louis Berger Group suggested moving forward with a limited package of mitigation measures. The list of these strategies can be seen in Appendix A on page 53.

2.3 Other Criteria Pollutants

EPA sets National Ambient Air Quality Standards for four other criteria pollutants. They are carbon monoxide, sulfur oxides, nitrogen oxides, and lead. These pollutants can harm

health and the environment. EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health is called primary standards. Another set of limits intended to prevent environmental and property damage is called secondary standards.

A. Carbon Monoxide

Carbon monoxide, or CO, is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56 percent of all CO emissions nationwide. Other non-road engines and vehicles (such as construction equipment and boats) contribute about 22 percent of all CO emissions nationwide. Higher levels of CO generally occur in areas with heavy traffic congestion. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust.

Other sources of CO emissions include industrial processes (such as metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. Woodstoves, gas stoves, cigarette smoke, and unvented gas and kerosene space heaters are sources of CO indoors. The highest levels of CO in the outside air typically occur during the colder months of the year when inversion conditions are more frequent. The air pollution becomes trapped near the ground beneath a layer of warm air. Currently no CO monitors are required in the Unifour area.

B. Lead

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. As a result of EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and levels of lead in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of lead in air are usually found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

C. Nitrogen Dioxide

Nitrogen dioxide (NO_2) is one of a group of highly reactive gasses known as "oxides of nitrogen," or "nitrogen oxides (NOx)." Other nitrogen oxides include nitrous acid and nitric acid. While EPA's National Ambient Air Quality Standard covers this entire group of NOx, NO_2 is the component of greatest interest and the indicator for the larger group of nitrogen oxides. NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-

level ozone, and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system. Currently no NO_2 monitors are required in the Unifour area.

D. Sulfur Dioxide

Sulfur dioxide (SO_2) is one of a group of highly reactive gasses known as "oxides of sulfur." The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (66%) and other industrial facilities (29%). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. SO_2 is linked with a number of adverse effects on the respiratory system.

In June 2010 EPA set a new one-hour standard for sulfur dioxide of 75 parts per billion (ppb). The Unifour area will be required to have one sulfur dioxide monitor in the region. The monitor must be operational by January 1, 2013.

3. Public Education/Outreach and Air Awareness

The UAQC's education and outreach efforts were originally was driven by the Early Action Compact Process and served to raise awareness about air quality impacts, specifically ozone pollution. Education/outreach was directed at three distinct target audiences: a) local government decision makers; b) business and industry partners and c) the general public. There was a steep learning curve for all but the large industries many of who operated under existing air quality permits and had professionally trained staff.

The core group of regular participants in the UAQC has become knowledgeable about multiple aspects of air quality (i.e. monitoring; other criteria pollutants; state and federal regulation and regulators; transportation linkages; legal challenges and modeling). The UAQC partnering governments with the assistance of the WPCOG help with the outreach in their own jurisdictions.

3.1 Current Program Elements

A. Unifour Air Quality Conference

Organizing this annual spring conference has been the primary event sponsored by the UAQC. The purpose of the conference is to educate the public, government officials and the private sector on current air quality issues important to the Unifour region. The conference regularly attracts near 100 attendees representing local municipalities, local industries, public health organizations, public education agencies, environmental advocacy groups, state and federal agencies staff and other public groups and private citizens.

The conference has been held on the Lenoir-Rhyne University campus located in the City of Hickory. Lenoir-Rhyne's Reese Institute for Conservation of Natural Resources has graciously sponsored the complementary luncheon portion of the conference and organizes the online registration. Duke Energy, Shurtape Technologies and local Chambers of Commerce have provided additional support for the conference which has been free of charge.

2009 breakout session with Brian Crutchfield, Director Alternative Energies, Blue Ridge Electric Corporation discussed how "green" technologies and practices can reduce energy consumption and improve air quality

The UAQC has been successful at soliciting a variety of excellent speakers from various state and federal agencies as well as from medical, business, industrial professions and academia.

The opening and plenary sessions of the conference have taken place in Belk Centrum auditorium on the Lenoir Rhyne campus. The past plenary sessions have been an opportunity to hear from senior staff of our state and federal environmental regulatory agencies.

Morning and afternoon breakout sessions take place at locations throughout campus. Breakout session topics have varied each year with some fundamental topics being revisited but have included:

Air Quality and Health (2007/2008/2009) - sessions on health are designed to promote greater awareness of the air quality issues in the Unifour and the effects of poor air quality on human health. Specific attention was given to ozone and fine particulate matter (PM 2.5) and how all community members can protect themselves and their families and what we as a community can do to limit environmental exposure on poor air quality days.

Education and Outreach Doesn't Have to Be "Out-of-Thin-Air" (2007) - session focused on various approaches to educational and outreach efforts to improve air quality in the region. Panelists presented on efforts they have participated in followed by a discussion on lessons learned; pros and cons and what might work for a given target audience and desired outcome.

Energy Conservation/Sustainable Building (2007/2008) - session focused on how stationary source methods like LEED-certified building practices and low-impact development (LID) can positively influence energy usage and carbon, ozone precursor, and particulate pollution. The mobile source sector has also seen improvements in operating processes that provide similar benefits by adjusting operating procedures and implementing new technologies to reduce both idling and operating emissions.

Permitting/Regulatory Issues (2007/2008) - session focused on the impacts of emissions from industrial stationary sources on fine particulate (PM 2.5) and ozone in the Unifour. The session answered questions that industrial sources face in efforts to reduce the emissions of precursors of PM 2.5 and ozone, regulatory requirements that may be faced, and permitting of new sources or modifications to existing sources.

Transportation, Mobile Sources and Alternative Fuels (2007/2008) - session focused on the impacts of transportation and mobile source emissions on our region's air quality. The role of alternative fuels and potential impacts on particulate matter and ozone levels was also discussed.

Air Quality Monitoring in the Unifour Region (2007/2008) - Why is ozone a problem only during the summer months, but fine particulate matter is a year round concern for the region? Has any research been done to look at what is influencing our fine particulate and ozone monitors? This session looked at the various factors influencing the ozone and particulate matter monitor readings in the region. The goal of this session was to develop ways to continue to analyze the causes of ozone and fine particulate pollution in the Unifour.

Education and Outreach (2008) - session designed to focus on various approaches to educational and outreach efforts to improve air quality. To set the stage, presenters shared for a few minutes on selected efforts and resources. The purpose of the session was to better understand: 1) what AQ messages to get to public; 2) programs that have proven effective; 3) issues regarding implementation and 4) where to find resources and funding.

Air Quality Control Technologies and Compliance Issues (2009) - History of Pollution Control Technologies and Programs at Coal-fired Power Plants. Case Study Marshall Steam Plant

Global Climate Change and Air Quality (2009) - Global climate change - science and potential impacts to air quality

Air Quality and Energy Solutions for Business and Industry (2009)**: What can we do?** Reducing air pollution through energy conservation is a component of the region's air quality strategy. The session panelists discussed how "green" technologies and practices can reduce energy consumption and improve air quality. The goal of this session was for participants to develop ways of promoting energy efficiency in business and industry.

Air Quality and Energy Solutions for Home: What can we do? (2009) - Session panelists discussed how "green" technologies and practices can reduce energy consumption and improve air quality. The goal of this session was for participants to learn ways to reduce their need for electricity and improve air quality.

Transportation and Air Quality (2009) - Mobile source emissions and air quality issues - Programs and Policies. Designing transportation improvements and linking land use planning to air quality benefits.

Unifour Air Quality Planning and Partnerships (2010) - Two air quality planning efforts in the region were highlighted including the draft Unifour Air Quality Plan and the broader initiative with the CONNECT partnership to develop a first of its kind "Voluntary Air Quality Compact or Interlocal Agreement" to improve regional air quality.

How Air Quality Pollutants Impact Health and the Environment (2010) - **S**ession focused on how ozone, PM 2.5 and other pollutants impact human health and plant life. The secondary standards for ozone were discussed.

Green Job Creation in the Emerging Economy (2010) - Discussion of ongoing efforts in North Carolina to create green jobs and technologies that will promote energy efficiency, the use of alternative energies and improve air quality.

Transportation and Land Use Solutions to Improve Air Quality (2010) - New EPA air quality regulations are causing transportation and land use planners to reevaluate their policies and roles regarding air quality. This session addressed planning for adaptation, livability and sustainability and their affect on air quality.

Global Air Quality and Climate Change (2010) - A discussion of global climate change. The first presentation focused on climate change science followed by a presentation focused on the policies the international community is implementing to improve global air quality.

Panel discussions during breakouts and to wrap up the conference and optional tours have been included or are under consideration for future conferences.

We have been encouraged by the positive feedback received by attendees and the increased participation level of NCDAQ. The conference is anticipated to continue, with minor adaptations, as a key event sponsored by the UAQC.

B. Developing Regional Collaboration

The UAQC has played a key role in helping to bring regional jurisdictions together to share resources and knowledge, develop a regional approach to regulatory compliance. This collaboration has allowed local jurisdictions to improve air quality and avoid ozone nonattainment status.

SEQL, (Sustainable Environment for Quality of Life)

SEQL continues as an early ongoing collaboration SEQL is administered by the Centralina Council of Governments and the Catawba Regional Council of Governments. The greater Charlotte Region encompasses 15 counties with 117 political jurisdictions and a population base of 2.1 million people (Catawba County is our only partner).

The program draws on its coalition of participants to educate individuals about the sources of air pollution; health effects of air pollution and how people can protect against these effects; and simple actions they can take to reduce air pollution. Although the program currently concentrates on ozone pollution, plans are being developed to include fine particulate matter (PM 2.5) materials and information. The South Carolina program, called the Spare the Air Campaign, is administered by the South Carolina Department of Health and Environmental Control, Bureau of Air Quality. In North Carolina, the Division of Air Quality of the Department of Environmental and Natural Resources is charged with the program.

The Centralina Clean Fuels Coalition

The Central Clean Fuels Coalition seeks to improve the quality of life in the nine county Charlotte metro region by creating private/public partnerships to enhance the development of an alternative fuel vehicle marketplace and supporting infrastructure.

CONNECT

CONNECT a more recent collaboration (2009-2010) for the Unifour Air Quality Committee. CONNECT is a regional visioning initiative. The Air Quality Subcommittee

is developing and promoting the concept of a regional/bistate "Voluntary Clean Air Compact" or "Interlocal Agreement".

C. School Anti-Idling Campaign

The purpose of the idle reduction signage is to reduce pollution from idling buses and cars that negatively affect a child's healthy lung growth and development. Children are more vulnerable to the impacts of vehicle pollution than other populations.

Most of our air quality problems in North Carolina are mobile source related. Vehicle emissions are the number one source of air pollution in many areas in North Carolina. When a car is idling, it's also polluting**.** Idling wastes money and natural resources. It can damage vehicles, pollute the air, and harm our health. Our voluntary program is aimed at distributing free signs and materials to partners interested in keeping unnecessary idling under control in their parking lot and pick-up areas.

State Superintendent Dr. June Atkinson displays a heavy-duty metal sign that schools can post to remind parents and school bus drivers to turn off their engine while waiting on campus

During 2009-2010 all public schools in the region were provided one to two signs per school. School district staff mounts signs on existing posts or walls.

Curriculum utilized in conjunction with Anti-Idling:

1st Grade, Ready, Set, Stop Idling: Students learn what is good and bad for the air by watching a video clip, taking part in a card activity, acting like cars and drawing and writing about idling.

2nd Grade, Make a Good Choice: Choose No Idling: By creating posters and t-shirts and reading a book, students explore how making good choices can help the environment while bad choices do the opposite.

Grades 3 – 5, Idlers: Please Stop Your Engines: After collecting idling data at school for one week, students make graphs using the information and slogans for mock no-idle bumper stickers. Please Do Not Make Us Cough, Turn Your Engine Off, Students complete graphic and writing organizers to prepare for a persuasive essay that educates and creates awareness about the harmful effects of idling and persuades others to stop idling.

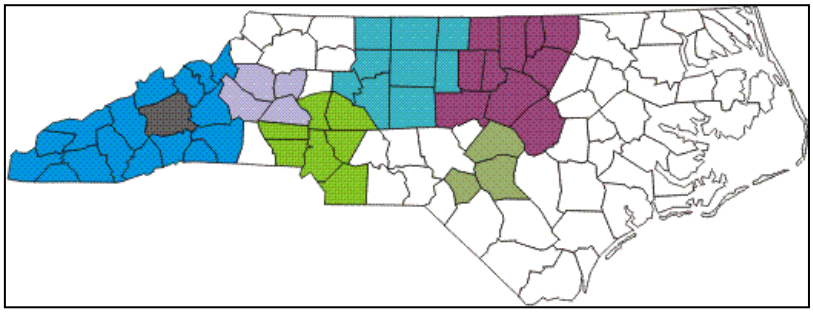
D. Special Events/Presentations

The UAQC welcomes requests for speakers and booths at special events. Several staff share the responsibility as speakers in the community. Presentations and displays are regularly adapted to include the latest air quality information.

Solar/Green Building Tour

Green Building and Solar Tour is an annual statewide event that the UAQC supports. The tour showcases a diverse array of residential, commercial industrial green buildings include the following technologies: solar PV, solar thermal, micro-hydropower, biodiesel production, geothermal, small wind renewable energy solutions, sustainable material use and energy efficiency techniques.

3.2 Partnership with North Carolina Air Awareness Program



Map 4. Air Awareness Coordinators. Highlighted counties have local Air Awareness Coordinators partnering in the statewide program. (Unifour Area in lavender)

The North Carolina Air Awareness Program is a public outreach and education program of the North Carolina Division of Air Quality. The goal of the program is to reduce air pollution though voluntary actions by individuals and organizations. For the past decade NCDAQ has supported and collaborated with local Air Awareness Coordinators throughout the state including the Unifour Area. Until recently the UAQC participated without outside funding to support education and outreach efforts. However in 2009, UAQC was awarded $20,000 per year for three years from a DAQ federal CMAQ funding to support the local education and outreach efforts.

A. Statewide Campaigns

The North Carolina Air Awareness Program is a public outreach and education program of the North Carolina Division of Air Quality. The goal of the program is to reduce air pollution though voluntary actions by individuals and organizations. The program seeks to educate individuals about the sources of air pollution and explain how the health effects of air pollution can be minimized by modification of outdoor activities on ozone action days. In addition, the program aims to inform the public of ways to minimize production of air pollutants to improve air quality over time.

In addition to being a partner in the Greater Hickory/Unifour area N.C. Air Awareness has local programs in: the Triangle, the Triad, the greater Charlotte area, Fayetteville, and the Asheville area.

NCDAQ works closely with local air agencies and councils of government to accomplish program goals. Although some program activities are centrally coordinated from the NCDAQ Raleigh Central Office, locally based area coordinators direct most local program activities. In the Triad and Charlotte areas, the local Air Awareness Programs are housed in the Forsyth County Environmental Affairs Department (FCEAD) and the Mecklenburg County Air Quality agency, respectively. In Asheville and the Triangle, local programs are housed at the NCDAQ Asheville Regional Office and the NCDAQ Central Office.

Program Components

The AQ Forecast: The most visible element of the program is the AQ forecast, seen by a large segment of the public on local TV news weather segments. Expected pollutant levels, in terms of color code and Air Quality Index (AQI) number, are forecasted year around by NCDAQ meteorologists. These forecasts are distributed to local media (television, radio, and newspaper) and to area businesses and individuals. The forecast is also displayed on the NCDAQ web page. Separate forecasts are issued for the Triangle, Charlotte, Hickory, Rocky Mount, Fayetteville, and Asheville. The FCEAD issues air quality forecasts for the Triad.

School-Based Outreach: Program staff conduct "Dare to Know your Air" educator-training workshops. Workshop participants can earn credit toward Environmental Educator certification (through Office of Environmental Education) as well as continuing education credits. Program staff also give classroom presentations at area schools. To learn more about school outreach programs, read the "For Teachers" page on the Air Awareness website. (**Please note that, due to budgetary constraints, air quality workshops have been temporarily postponed; see the website above for more information.)

Regional Air Quality Coalitions: As Coalition members, area business, agencies, and organizations multiply NCDAQ's education efforts by distributing the ozone forecast to employees and providing education about air quality. Regional Coalitions in Asheville, Hickory, the Triad, Charlotte, and the Triangle count over 500 businesses and organizations statewide.

Public outreach: The North Carolina Air Awareness Program utilizes a wide range of web and media outlets to broadcast our message to the general public. These include statewide radio messages covering open burning, idle reduction, clean air tips, and much more. Through both local coordinators and state representatives, our program regularly exhibits at health, environmental, and state fairs and festivals. Public information is distributed through the program website, http://daq.state.nc.us/airaware/ and the toll-free air quality hotline 1-888-

RU4NCAIR. Information may also be obtained by emailing air.awareness@ncdenr.gov

B. Know the Code Campaign

The Air Quality Index (AQI) is an index for reporting daily air quality. It tells you how clean or polluted your outdoor air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. For Information regarding indoor air quality please visit the Indoor Web site.

AirNow Web Site

The AIRNow Web site (run by EPA) provides the public with easy access to national air quality information. The Web site offers daily AQI forecasts as well as real-time AQI conditions across the US, and provides links to more detailed State and local air quality Web sites.

EnviroFlash

EnviroFlash is a new electronic information system designed to communicate environmental issues to the public. EnviroFlash is a partnership between the U.S. Environmental Protection Agency and state and local air quality agencies.

EnviroFlash provides you with timely air quality information that you can use to plan your daily activities and protect your health. With EnviroFlash, you have complete control of your forecast subscription. Subscription is fast and easy, and you decide which forecasts to receive. You can change or discontinue your subscription at any time through the automated EnviroFlash web page at www.enviroflash.info

The forecasts are developed daily by staff meteorologists at the North Carolina Division of Air Quality, just as they have been since 1998. These are the same forecasts you might see in your newspaper, or on your local TV weather report.

C. Anti-Idling

Unnecessary idling wastes fuel, costs money and pollutes the air. NCDAQ had developed several initiatives to reduce idling of all diesel and gasoline vehicles.

Passenger Vehicles Program: Turn Off Your Engine "Breathe Better, Save Money"

This is a voluntary campaign aimed at protecting people's health and the environment, especially children and people with respiratory problems, by reducing vehicle emissions which are one of the main contributors to air pollution in our region. Learn how you can receive signs for parking lots and information for your organization or school

Heavy-Duty Truck Rule

In 2010, the N.C. Environmental Management Commission (EMC) adopted the Heavy Duty Diesel Truck Rule as part of the state's efforts to reduce air pollution, protect public health and meet more stringent federal air quality standards. The rule requires operators of heavy-duty trucks to reduce unnecessary idling in North Carolina. The commission sought input from truckers, shipping companies and other stakeholders in developing the rule, and more than 20 states have similar rules.

Idling vehicles are significant sources of air pollution. The state Division of Air Quality estimates the rule will reduce nitrogen oxide (NOx) emissions, the primary cause of ozone in North Carolina, by up to 1,300 tons per year statewide. In comparison, a moderate-sized coal-fired power plant typically emits about 500 tons of NOx a year. The rule could reduce emissions of carbon dioxide, the most common greenhouse gas, by as much as 100,000 tons per year. Exhaust from idling vehicles also contains fine particles and toxic air pollutants that can pose health risks for truckers and other people at highway rest areas, truck stops and other places where idling vehicles congregate.

Operators could save a lot of fuel and money by complying with the idle rule. A heavy-duty vehicle typically burns about one gallon of fuel per hour while idling. DAQ estimates the idle rule will save up to 9 million gallons of fuel per year statewide.

Who must reduce idling?

The idle-reduction rule applies to on-road gasoline and diesel-powered vehicles with loaded weights greater than 10,000 pounds. Under the rule, operators should not idle their vehicles more than five consecutive minutes in any 60-minute period except for certain cases dealing with safety, health and economic concerns.

The rule makes allowances for cases when idling may be necessary. For example, operators of emergency vehicles such as fire trucks can idle while responding to emergencies or during training exercises. Heavy-duty vehicles can idle when it's necessary to operate equipment that depends on their engines, such as hoists and refrigerators. For a complete list of exemptions, see the back cover of this brochure.

Options for idle reduction

The easiest way to reduce idling is simply to turn off your engine. However, DAQ recognizes that vehicle operators often idle their engines for legitimate reasons, such as

providing power for air conditioners, refrigerators and other equipment. Truckers can avoid much idling by stopping at truck stops that provide electricity, shore power and other services.

Another alternative is to install auxiliary power units, or APUs, to provide the electricity needed to run air conditioners and other equipment. Even though APUs can cost as much as $10,000 to install in a truck, DAQ estimates that the fuel and wear-and-tear savings from reduced idling would offset those costs in about one to two years for most trucks, depending on fuel costs. DAQ may have grant money available for operators who install APUs. More information about APUs and possible rebates can be found at this page on the DAQ website: http://www.ncair.org/motor/Rebates/

DAQ and the local air awareness coordinators are focusing on education and outreach to achieve compliance with the idle rule for heavy-duty vehicles. However, as with an air quality rule, DAQ has the authority to levy fines. The division anticipates that most enforcement actions would be complaint-driven. Citizens can report suspected case of unnecessary idling at this page on the DAQ website: http://www.ncair.org/motor/

3.3 Educational Resources

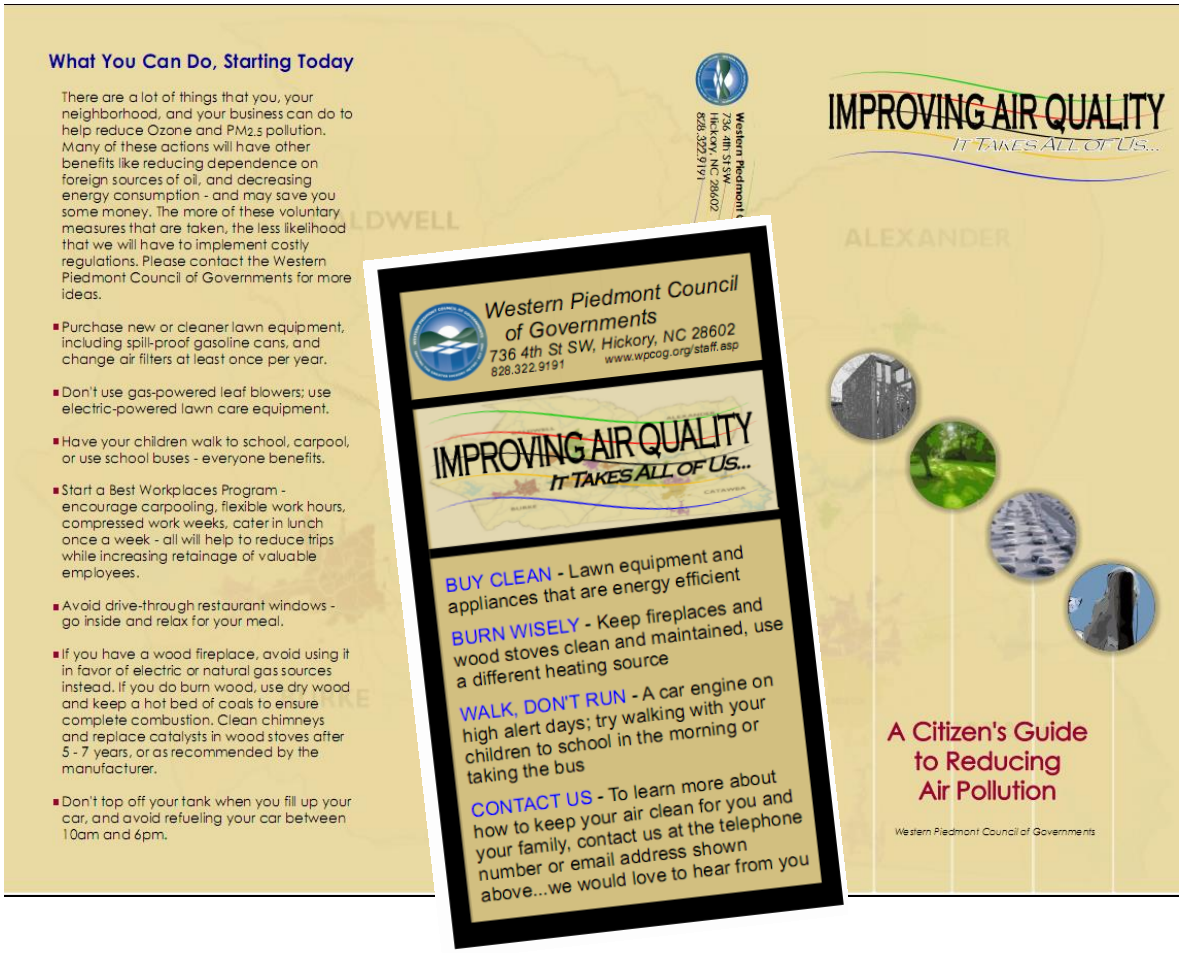
The main local print based outreach item produced by the UAQC is our brochures. They were originally produced 2008 in two forms one on overall local air quality issues and the other more focused on PM 2.5. Both brochures are in a trifold format printed on heavy glossy cardstock paper and contain a pocket for insert sheets that can be updated or focused for a particular target audience and message (A portion of the brochure can be seen on page 33. The entire brochure can be seen in Appendix B, page 57). The inside flap has a space for a message magnet (see page 33). These can be mailed, but most have been distributed through events and at local government offices.

A. The Message

Ozone and particle pollution, the two biggest air quality concerns in North Carolina, come from many of the same sources, primarily motor vehicles and industry (including power plants). Our individual activities create air pollution, and all of us have the power to improve air quality through our actions. Try some of the following:

1) **Leave your car at home.** Take the bus, car pool, van pool, walk or ride your bike to your destination.
2) **Don't drive to lunch.** Take a meal or walk to a nearby restaurant instead of driving out to eat during the workday.
3) **Drive right.** When you do drive your car, use cruise control whenever practical and stay within the speed limit. Avoid sudden stops and starts. Plan ahead and combine short trips whenever possible to avoid cold starts. Your vehicle may be your single biggest impact on air

quality. Make air quality a priority by factoring emissions and fuel efficiency into your vehicle purchasing decisions. Find how vehicles compare by using the EPA's Green Vehicle Guide or the US Department of Energy's fuel economy website.



4) **Keep vehicles maintained.** Keep your car, boat, and lawn equipment tuned up and follow your car's maintenance schedule. Engines that are well maintained are more fuel-efficient and cause less pollution.

5) **Check your tire pressure.** Keep your tires properly inflated; you'll save gas and reduce tire wear, too.

6) **Don't idle.** Avoid idling in drive-through lanes - park and walk in instead. Idling your vehicle wastes gas and increases pollution and idling can damage your car more than shutting off and re-starting your engine.

7) **Refuel at dusk.** Postpone refueling your car until after 6 p.m. on Air Quality Action Days. This reduces the emissions during the peak daylight hours when ozone formation is most likely.

8) **Don't top off your tank.** When refueling your vehicle, stop at the click to avoid spilling gas and polluting the air and surface water.

9) **Reduce use of gasoline-powered lawn equipment.** The small engines in lawn care equipment are major polluters. Use hand-powered or electric lawn care equipment whenever possible, and consider landscaping to reduce the amount of grass on your property. On Air Quality Action Days, wait until after 6:00 p.m. to use gas-powered lawn equipment.

10) **Conserve electricity.** In the summer, set your air conditioning at the highest comfortable temperature (try 78 degrees). During winter, try a setting of 68 - 70 degrees to reduce electricity use by your heat pump. Reduce wintertime particulate matter pollution from oil furnaces by keeping them well maintained. Use ceiling fans to increase both cooling and heating efficiency. Turn off appliances when not in use. Look for the Energy Star label when purchasing major appliances.

11) **Try something different.** Use water-based paints and cleaners instead of solvent-based products.

Multimedia Advertisements

Television: "Breathing"; "Jogger"; "Couple"; "Kids" Radio: "City Bus"; "Lung Heart Brain"; "Soccer Kids". The program is exploring the use of "Social Media" and branching out to the Internet.

Print Material

Informational Brochure: "Ozone: The Good & the Bad"
Informational Brochure: "Color Code Guide"
Informational Brochure: "Smokestacks on Wheels"
Informational Brochure: "Ozone and Your Health"
Informational Flyer: "Air Quality Action Day Tips To Reduce Air Pollution"
Informational Flyer: "Individual Tips for Cleaner Air Everyday"
Informational Flyer: "Workplace Activities for Air Quality Action Days"

B. Educators and Students

Air Jeopardy! Air Jeopardy! is an online trivia game packed with information about air pollution, weather, and other air quality issues. A list of answers and questions used in the game is also available for your convenience.

Coloring Book, Air Pollution A-Z This coloring book is designed to help students learn about air pollution while having fun. You may view individual pages, or you can download the entire coloring book (PDF).

Air Quality Workshops for Elementary, Middle and High School The goal of this free workshop is to make teachers familiar with the properties of air, what air pollution is, how each of us contributes to air pollution, and the things we can do to prevent it. We try to reach this goal through a combination of hands-on activities, presentation materials, videos and games. Each teacher will leave the workshop with a notebook and a video, plus lots of great ideas. A pre-workshop assignment will be required by each attendee in order to receive: One Continuing Education Unit (C.E.U.) and Criteria I Credit for the North Carolina Environmental Education Certificate. The assignment materials will be mailed to each person in advance. You will be required to watch a 15-minute video on ozone and read a number of related documents. This two-hour assignment will help you better understand the color codes in the Air Quality Index and the heath message associated with ozone forecasting.

Teacher Lesson Plans:

- Cool School Challenge Materials (Correlates to Washington State standards)
- The Search For One Clean Breath (Correlates to National standards)

C. Employers - Workplace Tips for Clean Air

Employers

- Designate a workplace coordinator for your **AIR QUALITY ACTION DAY** program. This person will be responsible for getting the word out within your company on action days. They will be the contact for air quality forecasting from N.C. Air Awareness.
- Notify employees of upcoming **AIR QUALITY ACTION DAYS** through e-mail, posters, intercom announcements, etc. Also, have your contact person insure that managers remind their employees.
- Provide convienent or covered parking for employees who car/van pool.
- Allow your staff to work at home, if possible, through telecommuting - especially on Air Quality Action Days.
- Use teleconferencing, instead of driving to meetings.
- Promote alternatives to drive-alone commuting, like carpooling, vanpooling, biking, walking, or teleworking.
- Obtain and promote transit maps and schedules for nearby routes to your employees. Including: bus, car/van pool, and bike routes.
- Start a ridesharing program. Contact N.C. Air Awareness at **1-888-RU4NCAIR** for help.
- Offer employee incentives, recognition, and praise for alternatives to driving alone.

- If possible, encourage flex-time to reduce roadway congestion during peak commuting hours.
- Subsidize transit (bus and vanpool) for your employees. Visit www.CommuterChoice.com to learn about corporate tax incentives for subsidizing transit
- Buy a bike rack for your employees' use, or allow them to park bicycles safely indoors.
- Encourage employees to stay in during lunch on Air Quality Action Days. This could be done by creating a special lunch discount in your cafeteria. Or encourage emploees to bring their lunch and provide free beverages, desserts, etc. Or organize deliveries from popular restaurants.
- Provide on-site services, such as ATMs to help employees make fewer trips.
- Arrange for an energy audit of your facility to reduce pollution and operating costs

Fleet Maintenance

- Delay refueling vehicles and equipment until late in the day on Air Quality Action Days. If you must refuel, do so after 6:00 p.m. whenever possible. Or refuel the evening before an **AIR QUALITY ACTION DAY** is issued.
- Coordinate deliveries from your site to eliminate multiple vehicle trips.
- Turn off vehicles when loading or unloading for extended periods of time. Idling for long periods uses more fuel than stopping and starting your engine.
- Consider conversion of your fleet vehicles to use alternative fuels: compressed natural gas (CNG), liquefied natural gas (LNG), propane, or electricity.

Industrial

- Defer cleaning with volatile solvents until late in the day on Air Quality Action Days. Use alternative cleaners that are non-volatile and non-hazardous when possible.
- Put off using gas-powered tools on Air Quality Action Days. Small engines are a significant source of air pollution.
- Schedule structural painting for cooler weather.
- Defer high-emission or batch production activities until evening shifts on Air Quality Action Days.
- Make water-based latex paints, stains, and sealers your first choice. If using oil-based coatings, ask for low-solvent versions.

- Implement money saving pollution prevention actions in such areas as waste separation, solvent recycling, or the use of high efficiency electric motors.

D. Commute Options

Save money, relieve stress, catch up with that book or report... all of these are great reasons to find another way to get to work and around town! And while you're saving money, you'll be saving the environment. Cars cause air pollution and global warming pollution. Air pollution from cars even comes down in rain and causes water pollution. Plus, the less gasoline we use, the less petroleum we need to extract and ship by pipeline, tanker, and truck.

Local Resources: Greenway Public Transportation provides over 300,000 trips each year to residents living in Alexander, Burke, Caldwell and Catawba County. Greenway is a responsible transportation solution and an excellent way to build a cleaner, more vibrant, healthier and less congested community. The "Just One Day a Week" campaign, encouraging automobile drivers in the region to give up their cars one day out of the week and ride public transportation instead.

Statewide Resources: Share the Ride NC; CarPoolWorld; eRideShare; NC DOT TransitNet; Drive Green, Save Green.

E. Web Resources:

Our local air quality web based content is hosted on the WPCOG website. Presentations from the Air Quality Conferences and documents can be found at http://www.wpcog.org/publications.asp . The main air quality content is embedded in our transportation website. http://trans.wpcog.org/programs_airquality.html This area includes additional downloads and links. A website overhaul is planned for 2011.

Useful AQ Links

- Forecast Earth: Air Aware Video (AIRNow.gov)
- Clean School Bus USA (U.S. EPA)
- Divide the Ride (carpooling site for families with school-aged children)
- Indoor Air Quality Tools for Schools (U.S. EPA)
- International Walk to School Day
- EPA children's page
- Open burning coloring sheet for children
- The Road to Clean Air (Newspaper in Education Insert)
- Drive Green, Save Green.
- American Lung Association of North Carolina
- Air & Waste Management Association Home Page

4. Recommended Air Quality Strategies

4.1 Planning Process

Multiple air quality strategies were gathered from multiple sources, including the Ozone Early action Compact strategies and the PM 2.5 Source Apportionment Study recommendations, as well as materials and guidance documents prepared by NC DAQ. The intent was to gather any strategy that may be applicable to the area and present them to multiple groups in order to determine what the most applicable strategies may be.

The strategies are divided into four different categories for the purposes of this plan:

1) Education Mitigation Strategies
2) Transportation Mitigation Strategies
3) Major Stationary Source Mitigation Strategies
4) Site Control Measures

Staff presented the UAQC with a scoring methodology that rated each strategy based on cost, difficulty of implementation, and perceived benefits of each strategy. A preliminary "score" for each strategy was calculated for prioritization purposes. Air Quality Benefits counted for 50% of the score while Cost counted for 25% and Difficulty counted for 25%. The following table demonstrates how each item is scored.

Table 8: Strategy Scoring

	Cost	Difficulty	Benefits
High	1 point	1 point	6 points
Medium	2 points	2 points	4 points
Minimal	3 points	3 points	2 points

The maximum score for each strategy was 12 while the minimum score was a 4. Definitions for the strategies, as well as the scoring summary table for each individual strategy are shown in Appendix C, page 63. The following is a summary of each strategy, followed by its accompanying table.

A. Strategy Scoring

Table 9 on page 39 summarizes the scoring for the strategies after UAQC/UAQOC Staff and Committee review.

Table 9: Strategy Scoring Results

	Strategy Scoring	
	Strategy	**Score**
	Education Mitigation Measure Strategies	
1	**Adopt a Local Clean Air Policy**	**11.5**
2	**Air Monitoring and Emergencies**	**12**
3	**Air Quality Partnerships**	**12**
4	**Educational Programs (Air Awareness, Ozone Outreach)**	**11**
5	**Develop online presence**	**10**
	Transportation Mitigation Strategies	
1	**Airport Ground Equipment Emissions**	**4**
2	**Alternative Fuel and the Clean Cities Program**	**9**
3	**Diesel Retrofit Technologies**	**10**
4	**Diesel Truck Anti-Idling & Truck Stop Electrification**	**9**
5	**Encourage Bicycle and Pedestrian Development and Usage**	**10**
6	**Gas cap check and replacement program**	**7**
7	**Public Transportation Benefit Programs**	**11**
8	**Reduce Locomotive Idling**	**6**
9	**Transportation Design and Operations**	**8**
10	**Two-Stroke Engine Restrictions/Buy-Back Program**	**8**
11	**Voluntary Non-Peak Refueling of Vehicles**	**10**
12	**Anti-idling program**	**10**
	Major Stationary Source Mitigation Strategies	
1	**Best Workplaces for Commuters Campaign**	**11**
2	**Compressed Work Weeks or Flexible Hours**	**12**
3	**Fuel Switching**	**6**
4	**Stationary Controls**	**7**
5	**Voluntary Stationary Source Operations**	**6**
	Site Control Measures	
1	**Promote Energy Audits/Efficiency**	**10**
2	**Enhanced Burning Restrictions**	**7**
3	**Implement Smart Growth, Mixed Use and Infill Dev. Policies**	**11**
4	**LEED for New, Rehabilitated, or Expanded Buildings**	**10**
5	**Tree Planting Programs and Landscaping Standards**	**12**
6	**Urban Forestry**	**12**
7	**Woodstove Programs**	**4**

B. 2010 4th Annual Unifour Air Quality Conference

In order to gather public input on the plan's strategies, UAQC staff held a session at the 4th Annual Unifour Air Quality Conference, held on May 25th, 2010, at Lenoir Rhyne University. The Conference is a yearly event held by the UAQC and the Reese Institute for the Conservation of Natural Resources. The session was held in conjunction with two other breakout sessions at the conference and contained roughly a third of the conference

attendees, which included 79 people representing local municipalities, local industries, public health organizations, public education agencies, environmental agencies, State and Federal agencies and other public groups and private citizens. This represented a group that already had a good understanding of air quality issues, were likely to have educated opinions about the strategies, and were from different industries, and therefore a different take on the subject. After supplying some background information and summarizing the strategies, staff asked the session attendees to rank the strategies by category. The results from this ranking are provided in the following table.

Table 10: Strategy Ranking from the Unifour Air Quality Conference, 2010

	Strategy Ranking	
	Strategy	**Rank**
	Education Mitigation Measure Strategies	
1	**Adopt a Local Clean Air Policy**	**3**
2	**Air Monitoring and Emergencies**	**5**
3	**Air Quality Partnerships**	**1**
4	**Educational Programs (Air Awareness, Ozone Outreach)**	**1**
5	**Develop online presence**	**4**
	Transportation Mitigation Strategies	
1	**Airport Ground Equipment Emissions**	**12**
2	**Alternative Fuel and the Clean Cities Program**	**3**
3	**Diesel Retrofit Technologies**	**4**
4	**Diesel Truck Anti-Idling & Truck Stop Electrification**	**5**
5	**Encourage Bicycle and Pedestrian Development and Usage**	**7**
6	**Gas cap check and replacement program**	**11**
7	**Public Transportation Benefit Programs**	**2**
8	**Reduce Locomotive Idling**	**10**
9	**Transportation Design and Operations**	**6**
10	**Two-Stroke Engine Restrictions/Buy-Back Program**	**9**
11	**Voluntary Non-Peak Refueling of Vehicles**	**8**
12	**Anti-idling program**	**1**
	Major Stationary Source Mitigation Strategies	
1	**Best Workplaces for Commuters Campaign**	**5**
2	**Compressed Work Weeks or Flexible Hours**	**2**
3	**Fuel Switching**	**1**
4	**Stationary Controls**	**3**
5	**Voluntary Stationary Source Operations**	**4**
	Site Control Measures	
1	**Promote Energy Audits/Efficiency**	**2**
2	**Enhanced Burning Restrictions**	**5**
3	**Implement Smart Growth, Mixed Use and Infill Dev. Policies**	**1**
4	**LEED for New, Rehabilitated, or Expanded Buildings**	**3**
5	**Tree Planting Programs and Landscaping Standards**	**4**
6	**Urban Forestry**	**6**
7	**Woodstove Programs**	**7**

4.2 Final Recommendations

Using the information provided from the UAQC's strategy scoring and the Unifour Air Quality Conference survey, the recommendations were narrowed down by category (Tables 11-14). A major determining factor was that the Strategy score above an eight. The strategies in the Education Mitigation Strategy category scored high, and staff felt that as a general category they were all important, so they were all kept in (Table 11).

Table 11: Education Mitigation Measure Recommendations

	Education Mitigation Measure Strategies	Score	Rank	Included
1	**Adopt a Local Clean Air Policy**	**11.5**	**3**	**Yes**
2	**Air Monitoring and Emergencies**	**12**	**5**	**Yes**
3	**Air Quality Partnerships**	**12**	**1**	**Yes**
4	**Educational Programs (Air Awareness, Ozone Outreach)**	**11**	**1**	**Yes**
5	**Develop online presence**	**10**	**4**	**Yes**

With the Transportation Mitigation Strategies Category, the top eight strategies picked by the survey were used (Table 12). When compared with the scoring matrices, those eight items all scored well, so this outcome was a simple determination.

Table 12: Transportation Mitigation Recommendations

	Transportation Mitigation Strategies	Score	Rank	Included
1	**Airport Ground Equipment Emissions**	**4**	**12**	**No**
2	**Alternative Fuel and the Clean Cities Program**	**9**	**3**	**Yes**
3	**Diesel Retrofit Technologies**	**10**	**4**	**Yes**
4	**Diesel Truck Anti-Idling & Truck Stop Electrification**	**9**	**5**	**Yes**
5	**Encourage Bicycle and Pedestrian Development and Usage**	**10**	**7**	**Yes**
6	**Gas cap check and replacement program**	**7**	**11**	**No**
7	**Public Transportation Benefit Programs**	**11**	**2**	**Yes**
8	**Reduce Locomotive Idling**	**6**	**10**	**No**
9	**Transportation Design and Operations**	**8**	**6**	**Yes**
10	**Two-Stroke Engine Restrictions/Buy-Back Program**	**8**	**9**	**No**
11	**Voluntary Non-Peak Refueling of Vehicles**	**10**	**8**	**Yes**
12	**Anti-idling program**	**10**	**1**	**Yes**

The Major Stationary Source Mitigation Category was a challenge, due to higher rankings of those items that had scored low in the matrices (Table 13, page 42). Staff felt like "Best Workplace for Commuters Campaign" should be included, despite being ranked low by the conference survey, due to the ease in which it can be worked into an educational narrative along with many of the other items on this list. "Fuel Switching",

on the other hand, scored very low, but was ranked very high on the conference survey. Despite scoring well below 8, staff determined that it could be included, and may be a part of a larger educational effort. Anything more may be out of the range of control for those implementing this plan.

Table 13: Major stationary Source Mitigation Recommendations

	Major Stationary Source Mitigation Strategies	Score	Rank	Included
1	**Best Workplaces for Commuters Campaign**	**11**	**5**	**Yes**
2	**Compressed Work Weeks or Flexible Hours**	**12**	**2**	**Yes**
3	**Fuel Switching**	**6**	**1**	**Yes**
4	**Stationary Controls**	**7**	**3**	**No**
5	**Voluntary Stationary Source Operations**	**6**	**4**	**No**

With the Site Control Measures Category, the top five strategies picked by the survey were used (Table 14). Similar to the "Transportation Mitigation Strategies" Category, when compared with the scoring matrices, those five items all scored well, with the exception of Enhanced Burning Restrictions. This item scored low, and staff determined that it should be removed, due to the difficulty of implementation. Urban Forestry, which was ranked next to last on the list but scored very high, was combined with Tree Planting Programs and Landscaping Standards.

Table 14: Site Control Measure Recommendations

	Site Control Measures	Score	Rank	Included
1	**Promote Energy Audits/Efficiency**	**10**	**2**	**Yes**
2	**Enhanced Burning Restrictions**	**7**	**5**	**No**
3	**Implement Smart Growth, Mixed Use and Infill Dev. Policies**	**11**	**1**	**Yes**
4	**LEED for New, Rehabilitated, or Expanded Buildings**	**10**	**3**	**Yes**
5	**Tree Planting Programs and Landscaping Standards**	**12**	**4**	**Yes**
6	**Urban Forestry**	**12**	**6**	**No**
7	**Woodstove Programs**	**4**	**7**	**No**

5. Implementation

Implementation of the final twenty strategies, as described in Section 4, is described below. The goal, timeframe, measure of success, responsible parties, funding, and funding sources are described here, organized under each of the twenty strategies.

5.1 Education Mitigation Strategies

Adopt a Local Clean Air Policy	
Goal	Local stakeholders promote air quality awareness and work to minimize ozone pollution in their respective local communities.
Timeframe	Evaluate Annually
Measure of Success	Number of Clean Air Quality Policies Adopted. Continued attainment of Air Quality Standards
Responsible Parties	WPCOG, UAQC Members, Local Government Staff and Officials
Funding	Staff Support
Sources	Local Governments, MPO

Air Monitoring and Emergencies	
Goal	Local governments can monitor air quality closely and implement strategies to inform the public of air quality conditions, forecasts, and alerts.
Timeframe	Continuously
Measure of Success	Number of methods of information dissemination. Number of people informed.
Responsible Parties	WPCOG, UAQC Members, Local Government Staff and Officials, NC DAQ, EPA
Funding	Staff Support
Sources	Local Governments, MPO

Air Quality Partnerships	
Goal	Form partnerships with private and public entities in order to bring additional resources to promote cleaner healthier air.
Timeframe	Ongoing
Measure of Success	Number of Partnerships formed. Number of active initiatives.
Responsible Parties	WPCOG, UAQC Members, Private and Public Entities
Funding	Staff Support
Sources	Private and Public Support

Educational Programs (Air Awareness, Ozone Outreach)	
Goal	Develop and implement a program to educate and motivate individual and businesses/organizations, to take action to improve air quality. Examples include: educating the public about proper wood burning techniques, curtailing mobile sources, and other low-cost measures.
Timeframe	Seasonally varied campaigns
Measure of Success	Number and diversity of educational programs. Continued attainment of Air Quality Standards.
Responsible Parties	WPCOG, UAQC Members, NC Air Awareness (NC DAQ)
Funding	20K - 60K Annually
Sources	CMAQ Grant (NC DAQ), Greater Hickory Metropolitan Planning Organization (GHMPO), and other Local, State and Federal funding and grants

Develop an Online Presence	
Goal	Develop a website to educate the public, with links to and from partner sites. Utilize social media where appropriate.
Timeframe	Website created by 2011
Measure of Success	Website developed. Number of website visits.
Responsible Parties	WPCOG, local governments, UAQC members
Funding	5K – 25K (initial website development, upkeep, and content management)
Sources	Local, State and Federal funding

5.2 Transportation Mitigation Strategies

Alternative Fuel and the Clean Cities Program	
Goal	Promote the use of alternative fuel technologies through partnerships such as the Centralina Clean Fuels Coalition.
Timeframe	Ongoing
Measure of Success	Number of AFV's in local government fleets. Number of alternative fueling stations in region.
Responsible Parties	WPCOG, local governments, local providers
Funding	Staff support
Sources	Local, State and Federal funding, GHMPO

Diesel Retrofit Technologies	
Goal	Educate local governments and businesses on the benefits of retrofitting or replacing on-road diesel emissions, non-road diesel engines, equipment, and vehicles.
Timeframe	Ongoing
Measure of Success	Number of retrofits and replacements. Number of workshops, trainings, educational materials used.
Responsible Parties	WPCOG, UAQC Members, Local Government Staff and Officials
Funding	Promotion (Staff support), Cost-share (significant investment
Sources	State and Federal grants

Diesel Truck Anti-Idling & Truck Stop Electrification	
Goal	Investigate potential for utilizing idle reduction technologies on heavy duty trucks and truck stop electrification program.
Timeframe	Investigation completed by 2011/2012.
Measure of Success	Investigation concluded.
Responsible Parties	WPCOG Staff
Funding	Staff support
Sources	GH MPO

Encourage Bicycle and Pedestrian Development and Usage	
Goal	Pursue further opportunities for non-motorized travel throughout the Unifour.
Timeframe	2010-2015
Measure of Success	Number of Bicycle and Pedestrian projects planned and implemented. At least 5% increase in sidewalks in the region by 2015. Quantify bike lane mileage
Responsible Parties	Local Governments, NCDOT, GHMPO, WPCOG GIS and Planning Staff support.
Funding	Infrastructure costs
Sources	State and Federal funding

Public Transportation and Commuter Benefit Programs	
Goal	A campaign may bundle various measures that produce benefits for using public transportation and other commuter options.
Timeframe	Reviewed annually
Measure of Success	Development of new transit programs. Increased use of public transportation.
Responsible Parties	WPCOG, Greenway Transit, private contractors
Funding	Dependent upon programming.
Sources	Local, State and Federal funding, private funding.

Transportation Design and Operations	
Goal	Creating transportation systems that produce fewer traffic delays and fewer rapid accelerations can play a role in reducing PM 2.5 (and ozone precursor) emissions.
Timeframe	Ongoing
Measure of Success	Number of improvements in design and operations. Continued attainment of Air Quality Standards.
Responsible Parties	WPCOG, GHMPO, NCDOT, municipalities, Unifour Rural Planning Organization (URPO)
Funding	Project Dependent
Sources	Local, State and Federal funding, CMAQ (NCDAQ)

Voluntary Non-Peak Refueling of Vehicles	
Goal	Outreach efforts can reduce vehicle refueling during early morning and late evening.
Timeframe	Annually, spring/summer focus
Measure of Success	Educational materials distributed. Change in public behavior.
Responsible Parties	WPCOG, NCDAQ Local Governments
Funding	Staff support, social marketing program
Sources	Air Awareness programs

Anti-Idling Program	
Goal	Provide DAQ "Anti-Idling" signs in areas where people are likely to idle like schools, restaurants, and other ideal locations.
Timeframe	Ongoing, including statewide initiative in 2011.
Measure of Success	Number of signs posted.
Responsible Parties	WPCOG, NCDAQ
Funding	Sign and staff support, social marketing
Sources	NCDAQ, UAQC partners

5.3 Major Stationary Source Mitigation Strategies

Best Workplaces for Commuters Campaign	
Goal	Promote a campaign that encourages employers to provide incentives for workers that use alternative modes of transportation for getting to work.
Timeframe	2011-2015
Measure of Success	Number of employers participating. Number of people using alternative modes of transportation.
Responsible Parties	WPCOG, Local Employers, Greenway Transit, Area Chambers of Commerce
Funding	Dependent upon benefits offered
Sources	State and Federal funding, MPO, Local Employers

Compressed work weeks or flexible hours	
Goal	Encourage the use of compressed work weeks or flexible hours. This will be beneficial in reducing the number of vehicles on the road during peak hours, reduction in facility energy use.
Timeframe	2011-2015
Measure of Success	Number of employers participating.
Responsible Parties	WPCOG, Local Employers, Area Chambers of Commerce, UAQC Partners, NCDAQ, Public and Private utility companies.
Funding	Staff support, potential cost savings
Sources	Local employers

Fuel Switching	
Goal	Encourage stationary combustion sources that are contributing to the PM 2.5 impacts to participate in a fuel switching program to switch to cleaner burning fuels.
Timeframe	2011-2015
Measure of Success	Number of participants in fuel switching program. Continued attainment of Air Quality Standards.
Responsible Parties	WPCOG, Participating Businesses
Funding	Dependent upon equipment conversion cost.
Sources	State and Federal funding, private sector funding.

5.4 Site Control Measures

Promote Energy Audits/Efficiency	
Goal	Promote the use of energy plans that include strategies to reduce energy costs and increase energy performance.
Timeframe	2011-2015
Measure of Success	Number of Energy Plans Adopted. Reduction in energy usage.
Responsible Parties	WPCOG, UAQC Partners, Local Government Staff and Officials, NC Dept. Of Commerce, NCDENR, public and private utilities
Funding	Dependent upon energy plans and projects.
Sources	State and Federal funding, private and public utilities

Implement Smart Growth, Mixed Use and Infill Development Policies	
Goal	These land development measures help reduce vehicle miles traveled and improve air quality through land use management programs.
Timeframe	2011-2015
Measure of Success	Number of sustainable policies adopted. Continued attainment of air quality standards
Responsible Parties	WPCOG, UAQC Members, Local Government Planning Staff and Officials
Funding	Staff Support (planning)
Sources	Local, State and Federal funding

LEED for New, Rehabilitated, or Expanded Buildings	
Goal	New standards to encourge new structures and a more limited set of "retrofit" measures for existing buildings that could be created and adopted by local governments.
Timeframe	2011-2015
Measure of Success	Number of policies reviewed and adapted by local governments. Number of buildings incorporating these standards.
Responsible Parties	WPCOG, UAQC Members, Local Government Planning Staff and Officials, local business and industry, NC Green Building Council, NC Dept. of Commerce, Local building trade associations.
Funding	Planning Staff Support
Sources	Local, State and Federal funding

Tree Planting Programs and Landscaping Standards	
Goal	Encourage local tree planting programs and adoption of new landscaping standards to help reduce energy usage.
Timeframe	2011-2015
Measure of Success	Number of local tree programs. Number of new landscaping standards adopted. Qualifying as Tree City USA
Responsible Parties	WPCOG, UAQC Members, Local Government Staff and Officials, Division of Forestry
Funding	Depending on level of involvement in various programs
Sources	State and Federal funding, Arbor Day Foundation

6. Evaluation and Amendment Process

The Unifour Air Quality Plan is intended to be an ever-changing document. When necessary, amendments should be made that adapt the Plan to changing situations in the Region and new challenges that may present themselves in the future. The Unifour Air Quality Plan should be responsive to these changes; therefore it will be necessary to evaluate the Plan periodically. The Unifour Air Quality Plan*'s* essential guiding principles, goals and policies, should remain largely unchanged to prevent undermining the overall intentions and integrity of the long range planning process. Any changes to the Unifour Air Quality Plan should be facilitated through the UAQC/UAQOC in the same manner established for amendments to other policy documents approved by the UAQC/UAQOC.

In order to assure that the Unifour Air Quality Plan is serving its purpose and meeting its intended goals, the Plan should be monitored and evaluated regularly. Each year staff should re-evaluate the status of the Plan and associated policies to develop a plan of work necessary to achieve the UAQC's goals. This process will help ensure that the Unifour Air Quality Plan is implemented effectively and in a timely manner, while remaining relevant to current conditions.

Appendix A

Mitigation Strategies in the PM 2.5 Source Apportionment Study by The Louis Berger Group

The following summarizes the number of transportation control measures and qualitatively assesses their benefits, acceptance and cost relative to an application at and near the Hickory Water Tower Monitoring site. These strategies found in the PM 2.5 Source Apportionment Study are further broken out into three, broad categories of mitigation strategies: transportation; Major Stationary Source; and Site-Related.

Transportation Mitigation Strategies

1. Alternative Fuel Vehicles
Purchasing policies for public vehicles can favor hybrid and bio-diesel vehicles, and an awareness campaign can do the same for the general public. Alternative fuels greatly reduce emissions and fuel usage.

2. Diesel Truck Anti-Idling & Truck Stop Electrification
Truck drivers (although not necessarily the American Trucking Association) tend to oppose anti-idling measures, which have spread to a large number of states and municipalities. Much of this opposition is due to the confusion of complying with varying policies in different jurisdictions, so a statewide policy would be most appropriate. Combining with truck stop electrification helps to offset concerns about cold temperatures and the effects of loss of sleep on drivers.

3. Diesel Retrofit Technologies
Vehicle volumes near receptor sites have been studied and found to have a contribution to PM 2.5 concentrations (although elemental carbon is highly correlated to site-level diesel traffic). An ancillary benefit is reduction of exposure to other forms of diesel-combustion related pollution. The new Smartway Truck Loan program (USEPA) offers up to $25,000 collateral-free for five-year loans to purchase oxidation catalysts, for example, which can reduce PM 2.5 emissions from 20% to 50%. For school buses, crankcase filtration systems run about $450 and a half-day of labor for each installation, and, in conjunction with exhaust filtration systems, can reduce over 90% of diesel emissions.

4. Reduce Locomotive Idling
Since Hickory has a substantial freight train presence in the immediate vicinity of the monitor, reductions in locomotive idling may be important. The limited number of firms engaged in locomotive transport through Hickory would make an outreach campaign relatively simple and cost-effective. Actions may be voluntary or regulatory. Reduced idling reduces noise, fuel usage, and engine maintenance in addition to emissions.

5. Two-Stroke Engine Restrictions/Buy-Back Program
Over 20 cities in California have banned or regulated leaf blower use, principally based on noise considerations but Los Angeles has banned their use for air quality reasons (www.zapla.org/). Emissions are a direct source of PM 2.5, while the action of the blower stirs up larger particles. Restricting commercial blower use in the vicinity of the monitoring site should be mandatory; a larger program should be a part of any voluntary action measure.

6. Transportation Design and Operations
Since mobile sources comprise a significant contribution to PM 2.5 readings at the Hickory Water Tower Monitoring site, creating transportation systems that produce fewer traffic delays and fewer rapid accelerations can play a role in reducing PM 2.5 (and ozone precursor) emissions. Replacing traffic signals with traffic circles; improving signal timing on US Highway 70; and modifying truck routes on high-alert days are some recommendations.

7. Voluntary Non-Peak Refueling of Vehicles
Outreach efforts can reduce vehicle refueling during early morning and late evening.

Major Stationary Source Mitigation Strategies

1. Best Workplaces for Commuters Campaign
Reduced commuting reduces emissions, fuel consumption, and traffic congestion; plus employers may need less area for parking. A campaign may bundle various measures that produce commuter benefits and challenge large employers to offer these benefits to employees. Programs can be entirely voluntary or mandatory for large employers; if mandatory then may require employer to meet an annual emission reduction target (ERT) for their worksite. Provides employers with a menu of emission reduction options including: transit fee subsidization or reimbursement, parking cash-out for employees who don't drive, offering telecommuting and flexible work hour options, old-vehicle scrapping, clean on-road vehicles, and clean off-road vehicles.

As an alternative to meeting a worksite ERT, allows employers to implement an employee commute reduction program. Such a program would require large employers to collect survey data on their employee's commute distances and ridesharing participation every two years. Such a program would allow the City to devote resources and efforts in assisting employers with their voluntary trip reduction efforts.

2. Fuel Switching
Identified stationary combustion sources that are contributing to the PM 2.5 impacts at the Hickory site may be encouraged to participate in a fuel switching program to fuel types (such as natural gas) that have lower emissions of PM 2.5. This would involve a permanent fuel switch.

3. Stationary Controls
Maximum reductions from stationary sources would occur through the installation of air pollution controls on sources. The cost of installing this equipment may be prohibitive for the smaller businesses in the area.

4. Voluntary Stationary Source Operations
Manufacturers and any others using wood- or diesel-fired boilers would voluntary manage the fuel types and burn rates after being notified of an impending Code Orange Day. This would entail some education on both the part of the private manufacturer and local/state staff to determine the best way of notifying operators and modifying the production processes.

Site Control Measures

1. Encouragement of Best Design Practices
There are a number of measures that can be incorporated into the site review/design process for local governments that can both reward and encourage best practices, some of which are described in other measures: bicycling/walking, transit ridership, site design/materials that reduce maintenance, and so forth. A Certificate Program for Excellence in Design for these different areas could be developed and granted during the site review process to the developer, signaling to review boards as the project moved forward that this project exceeded the typical standard for new developments. Furthermore, a simple software tool could be developed that rewarded developers of mixed-use properties reductions in parking requirements, lower off-site and on-site mitigation efforts, and perhaps density bonuses for creating a better-designed project. These policies could be applied area-wide or only in certain redevelopment districts that meet specific criteria.

2. Enhanced Burning Restrictions
Prohibits outdoor residential open burning on Code Yellow Days for Ozone and PM 2.5 days, instead of the current Code Orange day restriction. May incur more opposition than the current restrictions due to the greater number of days that the ban would be enforced. Recommend removing existing exemptions for Code Orange days as well.

3. Greenscaping
Cost-efficient and environmentally friendly solutions using natural landscaping which requires less mowing, weeding or core aeration and less water. Reduces material use and emissions by reduced mower use. In addition to adopting such practices on public lands, some communities have had success in obtaining EPA grants to sponsor Low Maintenance Landscaping Competitions for homeowners.

4. LEED for New, Rehabilitated, or Expanded Buildings
LEED (Leadership in Energy and Environmental Design) standards for new and remodeled/expanded buildings (requiring building permit). New standards for new structures and a more limited set of “retrofit” measures for existing buildings would be created and adopted by local governments. Benefits of green design go beyond the

obvious environmental benefits of reduced pollution, and resource consumption. Green design also provides economic benefits of operations and maintenance savings, socio/cultural benefits and worker productivity benefits.

- Maximize the site's natural conditions and maximize the facility's east-west axis to exploit solar access and day-lighting. Maximize energy efficiency by using light colors for roofing and wall finishes; high R-value wall and ceiling insulation; and minimal glass and east and west exposures and more glass on south and north.
- Develop strategies to provide day-lighting for at least two-thirds of the day, minimizing the need for artificial light in the learning spaces. Recognize the limitations associated with perimeter day-lighting and the benefits associated with roof monitors.
- Consider use of solar systems to reduce peak electrical demand. Include motion sensors tied to dimmable lighting controls to reduce utility costs. Fiber-optic lighting maximizes efficiency, reduces overheating, and eases lamp replacement in areas that are difficult to reach. Consider low-energy mechanical Systems options such as solar, absorption cooling or geothermal heat pumps, or Air to Air Heat exchanges.

Develop a commissioning process that helps ensure proper operation of mechanical, electrical and solar systems. Recognize the need to educate visitors and staff so they can make the most of their sustainable facility.

5. Public Awareness/Voluntary Reduction

Two sources may be readily affected by an awareness program: private industry and public use of wood stoves, traffic diversion, lawn mowers/leaf blowers, etc. Educating the public about proper wood burning techniques, curtailing public off-road and on-road diesel vehicle usage, and other low-cost measures will be the easiest to capture initially.

6. Urban Forestry

Key factors include leaf size (smaller, complex leaf surfaces are better), location relative to source(s), and maintaining dense foliage coverage for both height and length. Other benefits include reduction in coarse particulates, improved aesthetics, and control of urban heat sink effects that lead to ozone formation.

7. Wood Stove Changeout

Some of the data collected indicate that a portion of the PM 2.5 problem at the Hickory Water Tower site is related to wood smoke; however, there is no seasonal fluctuation indicative of home fuel sources. Financial assistance and a strong outreach program are required to implement the wood stove changeout program. Potential strategies include regulations for EPA-Certified wood stoves in new homes, required change to EPA-Certified wood stoves upon sale of a home, and reduced usage during high PM levels. Emission avoidance is 3.7 tons of direct PM 2.5 per 100 stoves changed.

Appendix B

Unifour Air Quality Brochure

What You Can Do, Starting Today

There are a lot of things that you, your neighborhood, and your business can do to help reduce Ozone and $PM_{2.5}$ pollution. Many of these actions will have other benefits like reducing dependence on foreign sources of oil, and decreasing energy consumption - and may save you some money. The more of these voluntary measures that are taken, the less likelihood that we will have to implement costly regulations. Please contact the Western Piedmont Council of Governments for more ideas.

- Don't use gas-powered leaf blowers; use electric-powered lawn care equipment.
- Purchase new or cleaner lawn equipment, including spill-proof gasoline cans, and change air filters at least once per year.
- Have your children walk to school, carpool, or use school buses - everyone benefits.
- Start a Best Workplaces Program - encourage carpooling, flexible work hours, compressed work weeks, cater in lunch once a week - all will help to reduce trips while increasing retainage of valuable employees.
- Avoid drive-through restaurant windows - go inside and relax for your meal.
- If you have a wood fireplace, avoid using it in favor of electric or natural gas sources instead. If you do burn wood, use dry wood and keep a hot bed of coals to ensure complete combustion. Clean chimneys and replace catalysts in wood stoves after 5 - 7 years, or as recommended by the manufacturer.
- Don't top off your tank when you fill up your car, and avoid refueling your car between 10am and 6pm.

IMPROVING AIR QUALITY

IT TAKES ALL OF US...

A Citizen's Guide to Reducing Air Pollution

Western Piedmont Council of Governments

GROUND LEVEL OZONE - *WHY DOES IT MATTER?*

When our Region doesn't meet national standards for air pollution, that hurts our business climate as well as our health. When Ozone (O3) is present in the lower atmosphere, it can be very harmful to your lungs, as well as irritate the respiratory system. This ground-level ozone occurs from motor vehicle exhaust, industrial emissions, gasoline vapors, and chemical solvents; as well as some natural sources. These pollutants, under the influence of sunlight and heat, can form harmful concentrations in the air; especially in the summer months. Urban areas tend to have high levels of ground-level ozone, but even rural areas can be subject to these high levels as wind can carry ozone and pollutants many miles away from their original sources.

IMPROVING AIR QUALITY - *WHAT IS BEING DONE?*

To reduce Ozone and $PM_{2.5}$ levels several actions are being taken by various government agencies.

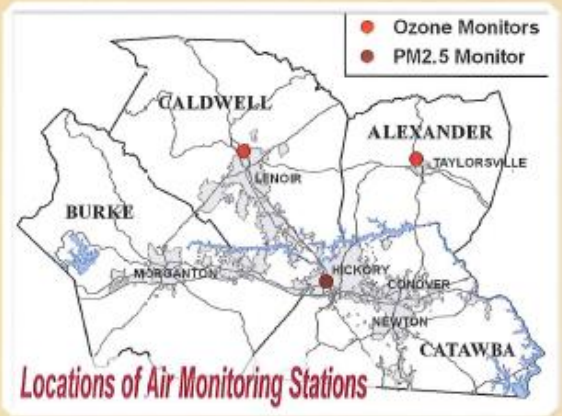
- *Use of cleaner fuels*
- *Installing smokestack controls*
- *Tighter inspections of cars and trucks*
- *Improving traffic operational planning, engineering, and maintenance*
- *Pushing for stronger out-of-state controls*
- *Limiting engine use during hot, summer months when Ozone tends to be more of a problem*
- *Open burning bans*
- *City and County energy plans*
- *Air awareness programs*

Improving the region's air quality, however, cannot be done by government alone. Other measures, including some everyone can participate in, are shown on the "pull sheets" inside this pamphlet.

FINE PARTICLES - *WHY DO THEY MATTER?*

Fine particles (also known as $PM_{2.5}$) are smaller than 2.5 microns in diameter, or approximately 1/30 the size of a human hair. The sources of $PM_{2.5}$ include fuel combustion from automobiles, power plants, wood burning, industrial processes, and diesel powered vehicles such as buses and trucks. These fine particles are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds (all of which are also products of fuel combustion) are transformed in the air by chemical reactions. Fine particles are of concern because they are risk to both human health and the environment. Even though only Catawba County has been designated by EPA as nonattainment for $PM_{2.5}$, the entire region can work together to reduce fine particulate levels.

A lot of possibilities exist for addressing the Ozone and $PM_{2.5}$ pollution problems, including education, voluntary measures, transportation & land use measures, business sources, and government measures. Use the color-coded sheets at right to learn more about each type of action.



VOLUNTARY MEASURES

There are a lot of things we all can do to help reduce Ozone and $PM_{2.5}$ pollution in our community that cost very little or nothing in terms of time or money. Here are a few ideas:

Replace Appliances and Power Tools with **More Energy-Efficient Devices.** *Light bulbs, lawn mowers, chain saws, weed eaters, leaf blowers (if you need them), refrigerators, wood stoves - all of these come in forms that use less energy than their counterparts of just a few years ago - and they can save you a lot of money very quickly. Look for Energy Star or CARB-compliant labels.*

Use of electric lawn mowers, leaf blowers, chain saws and other tools make a difference in reducing emissions - a good choice for light- to medium-duty yard work around the house.

Pay attention to **Ozone Action Day and $PM_{2.5}$ Air Quality Alerts**, and make a few changes. *Walk to lunch, refuel your car later or earlier in the day, carpool with a friend, avoid mowing the lawn or working with two-cycle engines, and don't burn wood or trash outside on Code Yellow and (especially) Orange Action Alert Days.*

Change Everyday Habits to reduce air pollution such as: *conserving energy at home and at work, refueling carefully by avoiding spills and not topping off, keeping all vehicle engines tuned up, keeping tires inflated and properly aligned, and using environmentally safe household products whenever possible.*

Other Steps that can be taken, especially on high Ozone days, include: *Setting air conditioners to 78 degrees, using public transportation, walking or riding a bike, taking your lunch or walking to a restaurant, limiting idling if parked for over two minutes, and refueling or mowing your yard after 6:00 PM.*

More Resources:
NCDENR Division of Air Quality (http://daq.state.nc.us/)

Q & A

Q. CAN POOR AIR QUALITY IMPACT THE AREA'S ECONOMY?

A. The condition of an area's air quality can have a very significant impact to the local economy. The impact of poor air quality can contribute to health costs, loss of work days, and can negatively affect quality of life. Companies look at these factors when deciding where to locate. Ozone pollution can also contribute haze and air that is hard to breathe. This impacts tourism, which is a large part of the revenue that many communities have come to depend on.

Q. ARE CAUSES FOR OZONE AND $PM_{2.5}$ INDEPENDENT OF EACH OTHER, OR IS THERE OVERLAP IN THEIR SOURCES?

A. Fuel combustion from transportation activities seems to be a big factor in contributing to both Ozone and $PM_{2.5}$. Likewise, the presence of $PM_{2.5}$ can enhance or otherwise influence the effects of Ozone, and vice versa. In this respect improvements in such areas as cleaner fuels, tighter vehicle inspections, and improvements in traffic operations can help to reduce both Ozone and $PM_{2.5}$.

Q. WHY CAN'T WE RELY ON OUT-OF-STATE OR POWER PLANT CONTROLS TO SOLVE OUR AIR POLLUTION PROBLEM?

A. Although wind can carry Ozone and the pollutants that form $PM_{2.5}$ hundreds of mile away from their place of origin, and out-of-state sources account for over 2/3 of our $PM_{2.5}$ pollution, these are all beyond our control. North Carolina has been a strong proponent for controlling these transported sources, but the Unifour Region needs to pursue their own goals to reduce $PM_{2.5}$ and Ozone pollution. The Marshall power plant is doing its part by installing smokestack controls, but the wind direction analysis implies that we will see only a small (about 4%) reduction in $PM_{2.5}$ at the monitor site from these controls.

Q. SHOULDN'T WE JUST TARGET MAJOR INDUSTRIAL POLLUTERS?

A. No, because doing so would present a burden on an already-stressed sector of the local economy; voluntary measures are being pursued; and these sources do not account for all of the local Ozone and $PM_{2.5}$ pollution.

Q. IF I WANT TO FIND OUT MORE ABOUT AIR POLLUTION AND WAYS TO HELP, WHERE CAN I GO FOR INFORMATION?

A. Each of the sheets in this brochure lists other resources, but for general information, please contact the Western Piedmont Council of Governments (828.322.9191; www.wpcog.org) or refer to the USEPA's website (www.epa.gov/ttn/airinnovations).

TRANSPORT & LAND USE

Mobile sources and inefficient land use account for a significant share (>20%) of the locally produced $PM_{2.5}$ emissions and 50% of Ozone Pollution. Here are some ways to keep us moving in the right direction:

Changing the **Way We Build.** *By making buildings more accessible to bicycling, walking, and public transit; improving the landscaping and maintenance needs of a site; or by creating low impact site designs, an enormous amount of energy and pollution can be reduced. These are not "new" or expensive practices - many of them were used a lot but have been forgotten until recently, like orienting buildings to capture the most sunlight in the winter and the least in the summer. New and refurbished buildings can compete for a new Best Environmental Design Award (Home or Business Category) conducted annually by the Western Piedmont Council of Governments (WPCOG).*

LEED (Leadership in Energy and Environmental Design) design practices like low-maintenance landscaping, insulation, thermal windows, and energy-efficient heating/cooling systems help reduce energy consumption, pollution, and costs to business and home owners alike.

Smart Moves. *Little money exists to create new roadway capacity, which is gobbled up when a lot of driveways and traffic signals interrupt traffic flow and create more "jack rabbit" starts. Improving signal timing; reducing driveways; and providing connections between stores and businesses help keep traffic moving and reduce accidents and pollution. Biofuels, catalysts, and reducing idle time for trucks and buses also reduce pollution.*

Drive Better and Smarter. *The number of cars with remote start options is increasing dramatically - let your car warm up as you drive to reduce idling emissions. Don't idle your car unnecessarily if possible, avoiding drive-through windows at laundromats and restaurants. Don't "top off" your tank when filling up.*

More Resources:

U.S. Green Building Council (www.usgbc.org/)
BuildingGreen (www.buildingGreen.com)
Center for Environmental Excellence (http://environment.transportation.org)

BETTER BUSINESS

Point sources of pollution include primarily smokestack industries, which, in the Unifour Area, often mean manufacturing facilities. These are important sources of income to many people, so working to reduce emissions without putting us out of work is an important challenge. Here are some ways we can win:

Providing **Alternatives to Wood Burning** Boilers. *Many industries, including furniture manufacturers, use wood in their boilers to provide energy to the manufacturing process. Making other fuels competitive through incentive pricing programs will be a continuing goal for the Unifour Area.*

Tweaking the **Manufacturing Process.** *By making small and/or temporary changes to fuel mixtures and burn rates on high-alert days for Ozone and $PM_{2.5}$ pollution, industries in high-priority areas can help reduce impacts in the monitor vicinity.*

Other kinds of air pollution sources are area sources, mainly open burning, agriculture, building sites, and dirt parking lots. Limiting these activities or limiting their potential to raise and transport dust by using vegetative screening, chip or compost yard waste, provide water trucks to spray dry areas during construction, and other measures can help reduce pollution.

Distribute the Goods More Efficiently. Although not strictly a point source of pollution, trucking fleets at point sources like distribution facilities, loading yards, and even schools can contribute greatly to a variety of air pollution problems. Reduce idling time during, before, and after loading operations. A new program sponsored by the USEPA called SmartWay has been established to help provide small company loans to retrofit trucks to reduce air pollution and save money.

Encourage Environmentally Friendly Behavior in employees. *Provide incentives for employees that vanpool, carpool, walk, or bicycle to work. Allow flexible hours for employees that are able, to work from home or to drive during more favorable times during the day.*

More Resources:

SmartWay small company truck loans (202.343.9218)

COMMITMENTS

What Local Government is Doing About Air Quality

Local governments in the Unifour Area have been working hard to reduce $PM_{2.5}$ and Ozone levels in the region. In November 1999, the Catawba Air Quality Committee (CAQC) was formed. In the summer of 2000 the CAQC was expanded to include other regional members to form the Unifour Air Quality Coalition. The coalition eventually evolved into the more formal Unifour Air Quality Committee (UAQC) and the Unifour Air Quality Oversight Committee (UAQOC) which is made up of stakeholders and elected officials from throughout the region. The Unifour Air Quality Oversight Committee/Local Early Action Compact (EAC) members are comprised of ten elected officials from the Unifour (local EAC members).

The UAQC and UAQOC meet monthly *and have committed to improving air quality in the region through a multitude of strategies. Measures already taken by the group include:*

- **Retaining counsel** *to help with regional air quality legal issues.*
- **Hiring technical consultants** *to provide participants with guidance and expertise. For instance, the UAQC / UAQOC commissioned a study to determine the local causes of $PM_{2.5}$ in the Unifour area.*

Centralina Clean Fuels Coalition. The Unifour is a stakeholder in the Department of Energy Clean Cities Program, committing to the use and development of alternative fuel technologies.
www.eere.energy.gov/cleancities/

- **Reaching an agreement** *between Federal, State, and Local governments to address Ozone pollution in a more expedient manner through an Early Action Compact (EAC) than what is required by the Clean Air Act.*
- **Adopting city and county energy conservation plans** *that directs city and county departments to reduce energy consumption and conserve natural resources.*
- **Improving traffic operational planning and maintenance.** *The City of Hickory, for example, has increased traffic flow and reduced congestion by better synchronizing its traffic signals.*
- **Participating in the Air Awareness Program** *and adopting "Ozone Action Plans" that include provisions to help reduce Ozone formation.*
- **Implementing planning initiatives** *that include smart growth, mixed use, infill development policies, landscaping standards, and urban forestry.*

GOVERNMENT

Local governments have choices that they can make about purchasing decisions, development requirements, policies, and funding assistance that can greatly enhance other opportunities to reduce Ozone and $PM_{2.5}$ pollution. Here are some examples:

Change **Building Codes and Requirements.** *Governments control building standards such as choice of landscaping requirements, bonuses for better design practices, building design / orientation, insulation requirements, bicycle/walk accessibility, construction practices/contracts, and the location and density of houses, schools, shops, and offices. Changing the design, location, and accessibility of these properties can make a long-term difference in energy consumption, public health/safety, and air pollution levels.*

Buy Smart. *Local governments can choose to purchase energy-efficient or electric vehicles; engage in LEED-certified, low-impact design practices for new or expanded public facilities; and steer monies in capital improvement programs towards projects that conserve energy and reduce air pollution.*

Develop an Energy Conservation Plan. *An Energy Conservation Plan can be adopted that requires municipal departments to reduce the amount of energy being used and to better conserve resources. Examples of measures that can be taken include energy-efficient construction standards for new buildings, retrofitting existing structures or infrastructure for energy efficiency, converting fleets to alternative fuels, and encouraging recycling and composting among applicable departments.*

Formation of Early Action Compact (EAC). *In 2004, all of Alexander and Catawba Counties and portions of Burke and Caldwell Counties were to be designated as non-attainment of the federal eight-hour Ozone standard. An Early Action Compact was formed between ten local governments, the NC Division of Air Quality and the EPA. In May 2005, all ten participating governments adopted Ozone Action Plans, providing them with strategies to implement when Ozone levels are predicted to be high.*

More Resources:
National Association of Local Government Environmental Professionals (www.nalgep.org/default.cfm)

Appendix C

Scoring Strategy Summaries

Education Mitigation Measure Strategies

1. Adopt a Local Clean Air Policy.

Local stakeholders promote air quality awareness and work to minimize ozone pollution in their respective local communities.

	Cost	Difficulty	Benefits
High			X
Medium	X		
Minimal	X	X	

2. Air monitoring and emergencies

Local governments can monitor air quality closely and implement strategies to inform the public of changes.

	Cost	Difficulty	Benefits
High			X
Medium			
Minimal	X	X	

3. Air quality partnerships

Continue to form partnerships with private and public entities in order to bring additional resources to promote cleaner healthier air.

	Cost	Difficulty	Benefits
High			X
Medium			
Minimal	X	X	

4. Educational Programs (Air Awareness, Ozone Outreach)

Continue to develop and implement an aggressive program to educate and motivate individual and businesses/organizations, to take action to minimize ozone pollution. Educating the public about proper wood burning techniques, curtailing public off-road and on-road diesel vehicle usage, and other low-cost measures.

	Cost	Difficulty	Benefits
High			X
Medium	X		
Minimal		X	

5. Develop an Online Presence

Develop a website to educate the public, with links to and from partner sites.

	Cost	Difficulty	Benefits
High			X
Medium	X	X	
Minimal			

Transportation Mitigation Strategies

1. Airport Ground Equipment Emissions

Emissions from airport ground equipment can contribute to air pollution levels. Alternative fuels and low emission technologies can be used to improve the emissions.

	Cost	Difficulty	Benefits
High	X	X	
Medium			
Minimal			X

2. Alternative Fuel and the Clean Cities Program

The UAQC is a Core Stakeholder in the Centralina Clean Fuels Coalition and the UAQC will promote the use of alternative fuel technologies. The area has several refueling stations for AFVs including biodiesel, CNG, and ethanol.

	Cost	Difficulty	Benefits
High			
Medium		X	X
Minimal	X		

3. Diesel Retrofit Technologies

Educate local governments and businesses on the benefits of retrofitting or replacing on-road diesel emissions, non-road diesel engines, equipment, and vehicles.

	Cost	Difficulty	Benefits
High			X
Medium	X	X	
Minimal			

4. Diesel Truck Anti-Idling & Truck Stop Electrification

Explore opportunities for installing on-board idle reduction technologies on heavy duty trucks and electrifying truck stops.

	Cost	Difficulty	Benefits
High		X	X
Medium	X		
Minimal			

5. Encourage Bicycle and Pedestrian Development and Usage

Continue to pursue further options for non-motorized travel throughout the Unifour.

	Cost	Difficulty	Benefits
High			
Medium			X
Minimal	X	X	

6. Gas Cap Replacement Program

Leaking gas caps contribute to air pollution and waste fuel due to evaporation. 17% of gas caps are missing or damaged.

	Cost	Difficulty	Benefits
High			
Medium	X		
Minimal		X	X

7. Public Transportation Benefit Programs

Reduced commuting reduces emissions, fuel consumption, and traffic congestion. A campaign may bundle various measures that produce benefits for using public tranportation.

	Cost	Difficulty	Benefits
High			X
Medium		X	
Minimal	X		

8. Reduce Locomotive Idling

The limited number of firms engaged in locomotive transport through Hickory would make an outreach campaign relatively simple and cost-effective. Actions may be voluntary or regulatory. Reduced idling reduces noise, fuel usage, engine maintenance in addition to emissions.

	Cost	Difficulty	Benefits
High		X	
Medium			
Minimal	X		X

9. Transportation Design and Operations

Creating transportation systems that produce fewer traffic delays and fewer rapid accelerations can play a role in reducing PM 2.5 (and ozone precursor) emissions.

	Cost	Difficulty	Benefits
High	X	X	X
Medium			
Minimal			

10. Two-Stroke Engine Restrictions/Buy-Back Program

Emissions are a direct source of PM 2.5, while the action of the blower stirs up larger particles.

	Cost	Difficulty	Benefits
High			
Medium	X	X	X
Minimal			

11. Voluntary Non-Peak Refueling of Vehicles

Outreach efforts can reduce vehicle refueling during early morning and late evening.

	Cost	Difficulty	Benefits
High			
Medium			X
Minimal	X	X	

12. Anti-Idling Program

Provide DAQ "Ant-Idling" signs in areas where people are likely to idle like schools, restaurants, and other ideal locations.

	Cost	Difficulty	Benefits
High			
Medium			X
Minimal	X	X	

Major Stationary Source Mitigation Strategies

1. Best Workplaces for Commuters Campaign

Reduced commuting reduces emissions, fuel consumption, and traffic congestion; plus employers may need less area for parking. A campaign may bundle various measures that produce commuter benefits and challenge large employers to offer these benefits to employees.

	Cost	Difficulty	Benefits
High			X
Medium		X	
Minimal	X		

2. Compressed work weeks or flexible hours

Encourage the use of compressed work weeks or flexible hours. This will be beneficial in providing an example for the private sector and reducing the number of vehicles on the road during peak hours.

	Cost	Difficulty	Benefits
High			X
Medium			
Minimal	X	X	

3. Fuel Switching

Identified stationary combustion sources that are contributing to the PM 2.5 impacts at the Hickory site may be encouraged to participate in a fuel switching program to fuel types (such as natural gas) that have lower emissions of PM 2.5. This would involve a permanent fuel switch.

	Cost	Difficulty	Benefits
High	X	X	
Medium			X
Minimal			

4. Stationary Controls

Maximum reductions from stationary sources would occur through the installation of air pollution controls on sources. The cost of installing this equipment may be prohibitive for the smaller businesses in the area.

	Cost	Difficulty	Benefits
High	X	X	X
Medium			X
Minimal			

5. Voluntary Stationary Source Operations

Manufacturers and any others using wood- or diesel-fired boilers would voluntarily manage the fuel types and burn rates after being notified of an impending Code Orange Day. This would entail some education on both the part of the private manufacturer and local/state staff to determine the best way of notifying operators and modifying the production processes.

	Cost	Difficulty	Benefits
High	X	X	
Medium			X
Minimal			

Site Control Measures

1. Promote Energy Audits/Efficiency

Promote the use of energy plans that include strategies to reduce energy costs and increase energy performance. Plans may also include renewable energy use such as wind, solar, biomass, and geothermal energy.

	Cost	Difficulty	Benefits
High			
Medium			X
Minimal	X	X	

2. Enhanced Burning Restrictions

Prohibits outdoor residential open burning on Code Yellow Days for Ozone and PM 2.5 days, instead of the current Code Orange Day restriction.

	Cost	Difficulty	Benefits
High		X	
Medium	X		X
Minimal			

3. Implement Smart Growth, Mixed Use and Infill Development Policies.

These land development measures help reduce vehicle miles traveled and improve air quality through land use management programs.

	Cost	Difficulty	Benefits
High			X
Medium		X	
Minimal	X		

4. LEED for New, Rehabilitated, or Expanded Buildings

LEED (Leadership in Energy and Environmental Design) standards for new and remodeled/expanded buildings. New standards for new structures and a more limited set of "retrofit" measures for existing buildings would be created and adopted by local governments.

	Cost	Difficulty	Benefits
High			X
Medium	X	X	
Minimal			

5. Tree Planting Programs and Landscaping Standards

Encourage local tree planting programs and adoption of new landscaping standards. Planted trees and vegetative landscaping reduce the need for air conditioning, reduce the heat island effect in urban areas, and help reduce energy usage.

	Cost	Difficulty	Benefits
High			X
Medium			
Minimal	X	X	

6. Urban Forestry

Encourage community based programs, such as Tree City USA, or other programs that promote tree plantings or preservation in the area. Key factors include leaf size (smaller, complex leaf surfaces are better), location relative to source(s), and maintaining dense foliage coverage for both height and length. Other benefits include reduction in coarse particulates, improved aesthetics, and control of urban heat sink effects that lead to ozone formation.

	Cost	Difficulty	Benefits
High			X
Medium			
Minimal	X	X	

7. Woodstove Programs

Financial assistance and a strong outreach program are required to implement the wood stove changeout program. Potential strategies include regulations for EPA-Certified wood stoves in new homes, required change to EPA-Certified wood stoves upon sale of a home, and reduced usage during high PM levels.

	Cost	Difficulty	Benefits
High	X	X	
Medium			
Minimal			X