



## 2015 AIR QUALITY REPORT

A publication of the  
Forsyth County Office of  
Environmental Assistance  
and Protection



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# Air Quality in Forsyth County 2015



## EXECUTIVE SUMMARY

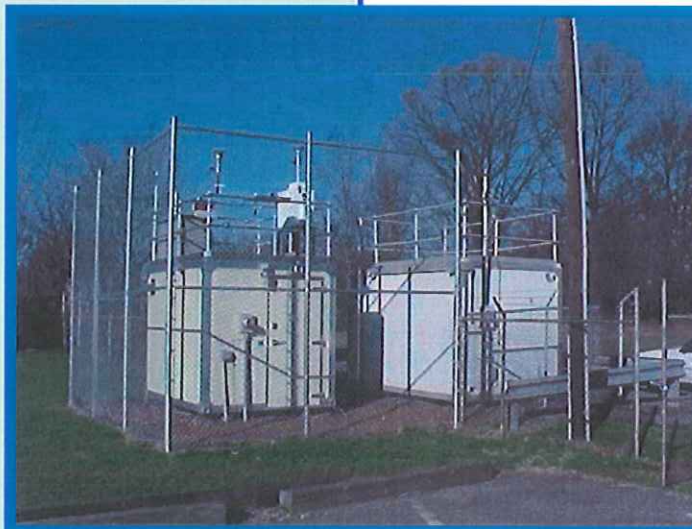
The Forsyth County Office of Environmental Assistance and Protection (FCEAP) operates the air program and air monitoring network for the Forsyth County, NC area. FCEAP's local program is certified by the US Environmental Protection Agency. In 2015, Forsyth County was in attainment for all six criteria pollutants (Carbon Monoxide, Lead, Nitrogen Dioxide, Ozone, Particulate Matter and Sulfur Dioxide) for which National Ambient Air Quality Standards (NAAQS) are established under the Clean Air Act. Furthermore, this report will show that air pollution in Forsyth County is trending downward as air quality improves and conditions are favorable for economic growth and development in the area. However, efforts to continue this downward trend are needed to provide adequate protection from the effects of population growth and increases in traffic congestion. Additionally, NAAQS are reviewed by US EPA every 5 years and lower standards are possible based on the most recent scientific evidence with regards to impacts to both public health and the environment.





## 2015 AIR QUALITY REPORT

Air monitoring stations contain an array of electronic equipment and computers. This state-of-the-art equipment along with stringent quality management procedures ensure accurate data and timely reporting.



# Air Quality in Forsyth County 2015

## INTRODUCTION

Under the Clean Air Act, National Ambient Air Quality Standards (NAAQS) were established for six major air pollutants (criteria pollutants): Ozone (O<sub>3</sub>), Carbon Monoxide (CO), Particulate Matter (PM<sub>10</sub>, PM<sub>2.5</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Sulfur Dioxide (SO<sub>2</sub>), and Lead. The NAAQS establish maximum allowable concentrations for the criteria pollutants as needed to protect public health and welfare from known or anticipated adverse effects. By rule, the standards are reviewed every 5 years to determine if the allowable concentrations need adjustment based on the most recent scientific information with regards to human health and welfare. Air quality measurements above the NAAQS are referred to as “exceedances” and locations experiencing a pattern of exceedances may be designated as “nonattainment areas” under the Clean Air Act. Nonattainment areas may be required to undergo rule changes that impact current or future pollution control strategies implemented by industry and mobile sources to ensure the

improvement of air quality. Areas that do not experience the prescribed pattern of exceedances remain designated as “attainment areas”.

## NETWORK DESCRIPTION

The Forsyth County Office of Environmental Assistance and Protection (FCEAP) operates a comprehensive air monitoring network to ensure that the health of Forsyth County residents and visitors is adequately protected and to monitor the effectiveness

of the local regulatory program. The monitoring network is operated in strict accordance with a quality assurance program that meets or exceeds all US EPA guidelines and requirements. Both on-site calibrations and the timely review of data downloaded by computer are performed to assure proper instrument operation. During periods of elevated levels of air pollutants, critical readings can be tracked instantaneously so that air quality advisories can be issued in a timely manner. All of Forsyth County’s monitoring data are reported to the US EPA’s Air Quality System (AQS) for use in state-wide and federal policy decisions.

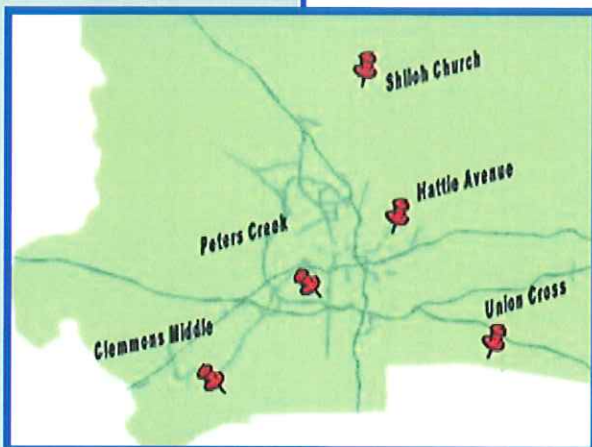




## 2015 AIR QUALITY REPORT

# Air Quality in Forsyth County 2015

## NETWORK DESCRIPTION (cont.)



The Forsyth County monitoring network was designed to sample the major pollutants required under the Clean Air Act at locations consistent with the objective of protecting human health and welfare. With

the elimination of lead in gasoline in the late 1980s, measured levels of lead in the ambient air became undetectable and monitoring for this purpose was no longer needed. Currently, the requirement for monitoring lead is source-specific and requires monitoring in the vicinity of facilities emitting 0.5 tons or more lead per year. At this time, Forsyth County does not have any facility with lead emissions approaching this threshold. Additionally, FCEAP will be

Measurements at FCEAP's monitoring stations are used to:

- Evaluate compliance with the NAAQS,
- Serve as baseline data so that changes in air quality can be tracked,
- Document current dynamic concentrations of monitored pollutants,
- Support daily forecasting efforts to help mitigate air pollution episodes and provide information to citizens,
- Provide data for local and regional planning efforts,
- Observe trends in the area, and
- Provide a database for research and analytical purposes.

moving resources away from carbon monoxide (CO) monitoring as described in more detail in the CO pollutant section.

Due to extensive quality assurance procedures, pollutant data is not fully certified until May or June of the following year. Therefore, this report reflects data certified through calendar year 2014 with 2015 data that will likely be certified in 2016.

### Site Table and Criteria Pollutants Monitored

Site	CO	NO <sub>2</sub>	O <sub>3</sub>	Pb	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Air Toxics
Clemmons Middle School			X		X			
Hattie Avenue "A"		X	X				X	
Hattie Avenue "B"					X	X		X
Peter's Creek	X							
Shiloh Church			X					
Union Cross			X					

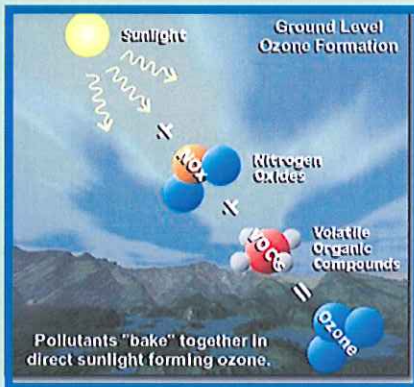




2015 AIR QUALITY REPORT

# OZONE

- ◆ A respiratory irritant that can cause:
  - ◇ Impaired lung function
  - ◇ Throat irritation
  - ◇ Coughing
  - ◇ Lung inflammation
  - ◇ Aggravated asthma
  - ◇ Injured forests
  - ◇ Damaged agricultural crops
  - ◇ Aging of man-made materials



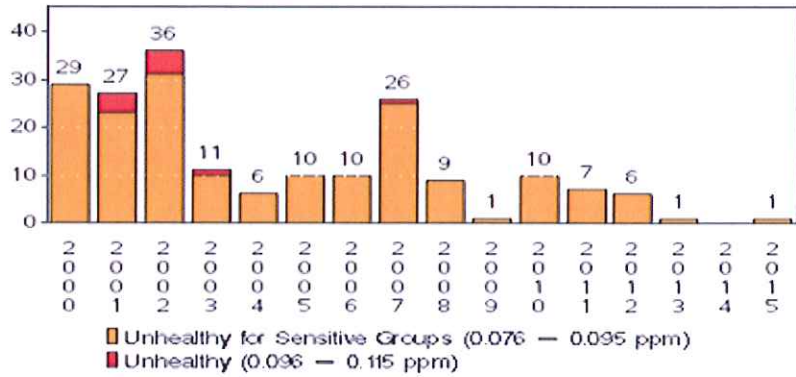
[Click here](#) to learn more about the AQI Index



# Air Quality in Forsyth County 2015

## OZONE (O<sub>3</sub>)

Number of Days 8-hr Ozone Daily Max > 0.075 ppm  
2000-2015  
in Forsyth County, NC



Ground level ozone is created by chemical reactions between oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from mobile sources, industrial facilities and electric utilities, gasoline vapors, and chemical solvents are some of the major sources of NO<sub>x</sub> and VOCs.

Ozone levels have improved in recent years and Forsyth County is now in attainment with the 8-hour ozone standard (.075 ppm). However, new information and susceptibility studies show that ozone concentrations have been found to be harmful to sensitive populations at much lower concentrations when exposed for a longer period of time. Therefore, EPA promulgated a more health-protective ozone standard of 0.070 ppm in 2015, effective for the 2016 Ozone season. FCEAP includes ozone pollution in its [daily AQI forecast](#) (green, yellow, orange, red, purple) to alert the public to potentially unhealthy air quality levels. The Air Quality Index (AQI) will be adjusted accordingly to reflect the new standard in 2016.

The ozone standard is compared to the 4th highest annual value of a monitor averaged over a three year period to determine attainment status. Barring unusual meteorological conditions, the new averaging period (2014-2016) should show that Forsyth County will retain our attainment designation for ozone in 2016. The community will need to continue its efforts to improve air quality to help ensure that increases in population, traffic congestion and economic growth do not degrade air quality and return Forsyth County to a non-attainment status.





2015 AIR  
QUALITY REPORT

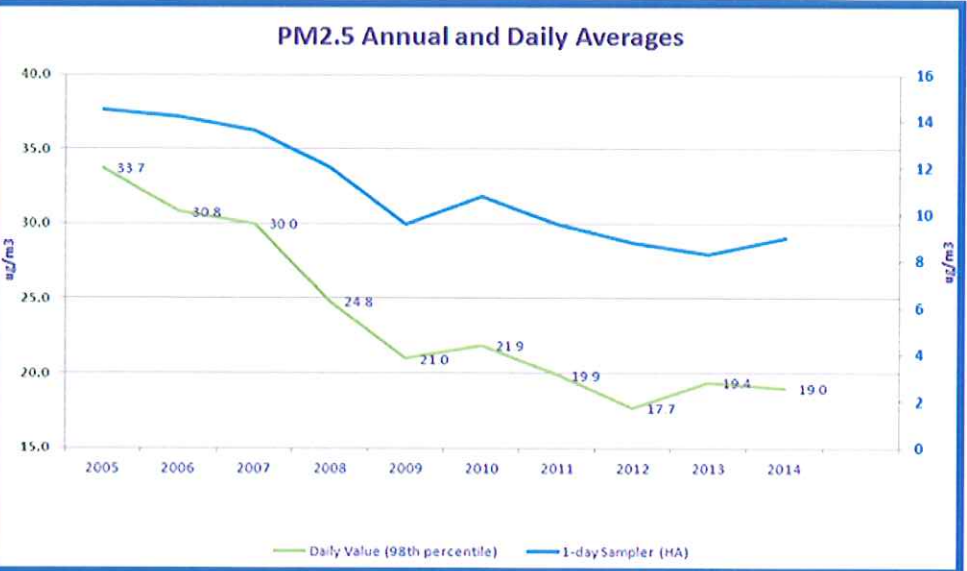
# PARTICULATE MATTER

- Consists of dust, smoke, and solid and liquid particles released from man-made and natural sources
- Increases respiratory disease and causes lung damage
- The smallest of particles (PM<sub>2.5</sub>) can aggravate cardiovascular diseases due to their ability to enter the bloodstream.

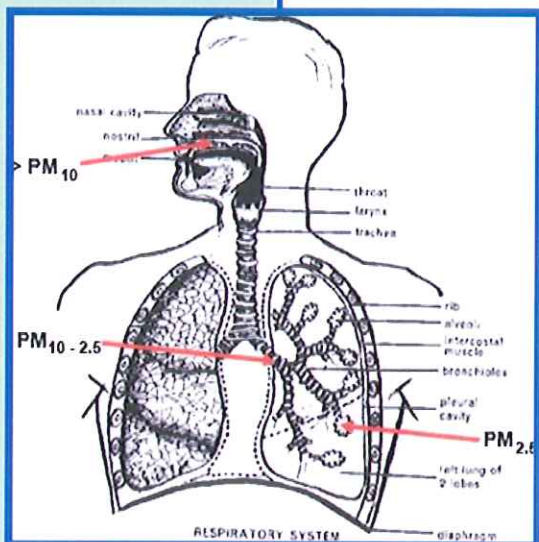
# Air Quality in Forsyth County 2015

## PARTICULATE MATTER (PM<sub>2.5</sub> AND PM<sub>10</sub>)

### PM<sub>2.5</sub> (particles less than 2.5 microns in diameter)



Levels of fine particle pollution (PM<sub>2.5</sub>) have shown a steady decline since local monitoring of the pollutant began in 1999. Much of this decrease can be attributed to the transition to cleaner fuels by industry, stricter control requirements for power plants, and cleaner automobile emissions. Enforcement of local open burning regulations also contributes to reduced PM concentrations, especially at the neighborhood level, and FCEAP's central location in Forsyth County allows for a prompt response to emission problems occurring at regulated facilities.



Compliance with the 24-hour NAAQS (35 µg/m<sup>3</sup>) is demonstrated by the average of the 98th percentile of the daily averages, averaged over 3 years. As the PM<sub>2.5</sub> chart above shows, the 98th percentile averages have declined significantly since 2005. Additionally, Forsyth County data demonstrates that the annual average of PM<sub>2.5</sub> (shown by the 1-day sampler at Hattie Avenue) is declining and is well below the annual PM<sub>2.5</sub> annual NAAQS of 15 µg/m<sup>3</sup>. Based on this data, Forsyth County is expected to remain in attainment with the current PM<sub>2.5</sub> standard through 2016 and beyond.





## 2015 AIR QUALITY REPORT

### PARTICLE POLLUTION- WOOD SMOKE AND OPEN BURNING



For alternatives to burning and information about composting, see our webpage by [clicking here](#).

For information concerning burning wood properly in woodstoves, check out the video [shown here](#).

For more information about residential open burning in Forsyth County see our webpage by [clicking here](#).

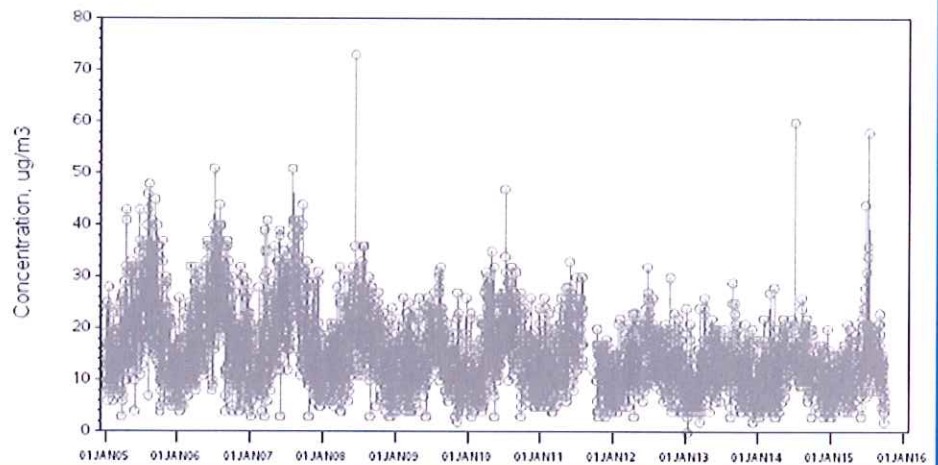
# Air Quality in Forsyth County 2015

## PM<sub>2.5</sub> (cont.)

Despite lower annual averages, daily levels of PM<sub>2.5</sub> can still approach or potentially exceed the standard. For this reason, FCEAP includes particle pollution in its daily Air Quality Index (AQI) forecast to alert the public to potentially unhealthy air quality levels. Additionally, as National Ambient Air Quality Standards (NAAQS) come up for review every 5 years as required under the Clean Air Act, further strengthening of standards may be warranted based on epidemiological evidence showing adverse health impacts.

### Daily Mean PM<sub>10</sub> Concentrations from 01/01/05 to 12/31/15

Parameter PM10 Total 0-10um STP (Applicable standard is 150 ug/m<sup>3</sup>)  
CBSA Winston-Salem, NC  
County Forsyth  
State North Carolina  
AQS Site ID 37-067-0022, poc 1



## PM<sub>10</sub> (particles 10 microns or greater)

The NAAQS for PM<sub>10</sub> is a 24 hour average of 150 µg/m<sup>3</sup>. As the above chart shows, concentrations of PM<sub>10</sub> have rarely exceeded 50 µg/m<sup>3</sup> and are continuing to trend lower over time. Going forward, there is little doubt that Forsyth County will remain in attainment with the current PM<sub>10</sub> standard.





## 2015 AIR QUALITY REPORT

### SULFUR DIOXIDE

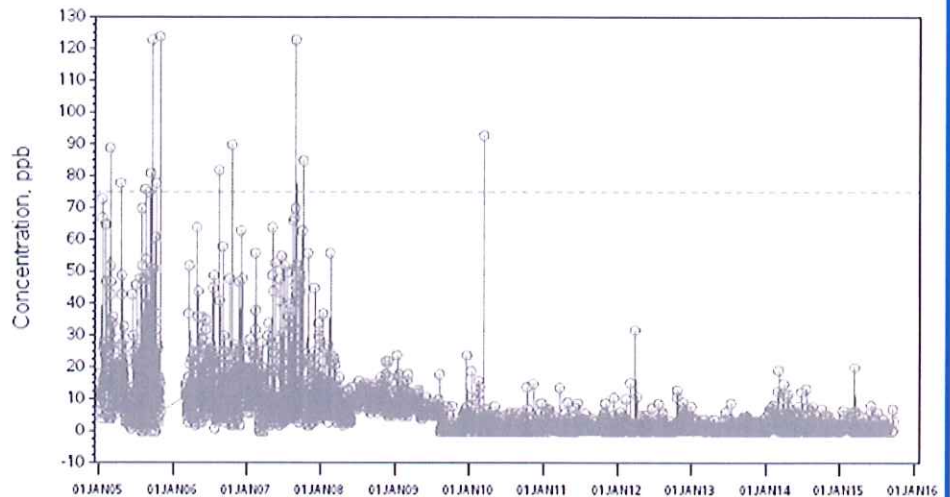
- Emitted from furnaces, boilers and power plants utilizing fossil fuels as well as other chemical and combustion processes;
- Harms vegetation and materials, acidifies rain, reduces visibility, puts asthmatics at risk.
- Also contributes to particle pollution through the formation of sulfates.

# Air Quality in Forsyth County 2015

## SULFUR DIOXIDE (SO<sub>2</sub>)

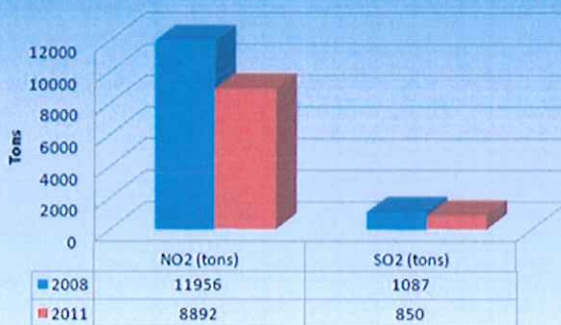
### Daily Max 1-hour SO<sub>2</sub> Concentrations from 01/01/05 to 12/31/15

Parameter Sulfur dioxide (Applicable standard is 75 ppb)  
 CBSA Winston-Salem, NC  
 County Forsyth  
 State North Carolina  
 AQS Site ID 37-067-0022, poc 1



As shown above, local emissions of SO<sub>2</sub> have significantly decreased since 2008 following the national trend. Much of the reduction in Forsyth County is attributed to lower emissions at industrial facilities as well as implementation of North Carolina's Clean Smokestack Act in 2005, requiring electrical utilities (esp. Belews Creek Power Plant) to reduce SO<sub>2</sub> by 73% by 2013. In fact, Forsyth County industry reduced its SO<sub>2</sub> emissions almost tenfold between 2008 and 2011 with the transition from coal to cleaner fuels and by implementing energy efficiency and pollution prevention measures. Forsyth County will most likely maintain low SO<sub>2</sub> emissions and remain in attainment with the current SO<sub>2</sub> standard.

### SO<sub>2</sub> and NO<sub>2</sub> Emission Trends in Forsyth County



In 2015, EPA established requirements for air agencies to provide SO<sub>2</sub> modeling or monitoring data to characterize emissions of SO<sub>2</sub> from sources emitting 2000 tons of SO<sub>2</sub> or more to inform future designation decisions. Since 2011, the total combined emissions of SO<sub>2</sub> from all permitted facilities in Forsyth County are less than this threshold for a single facility.





## 2015 AIR QUALITY REPORT

### NITROGEN DIOXIDE

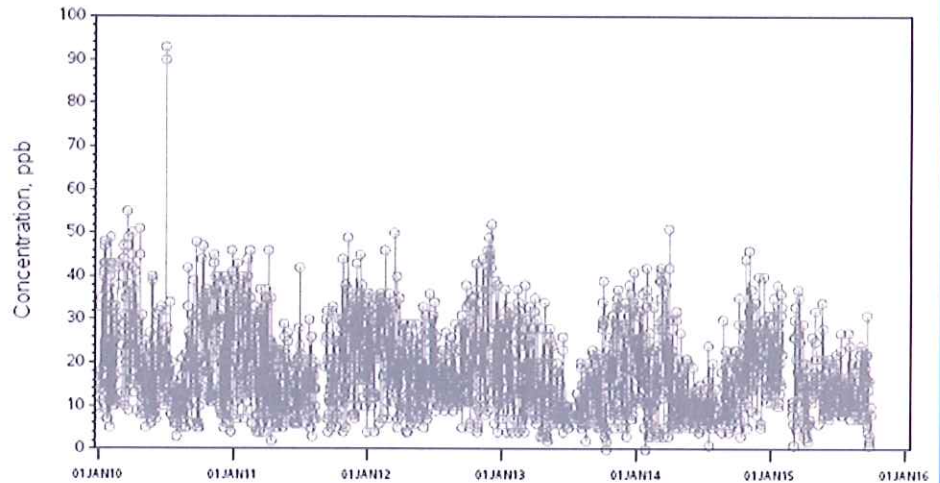
- Reacts with hydrocarbons in the presence of sunlight to produce Ozone;
- Reacts with hydroxyl radicals to produce nitric acid, resulting in acidic precipitation;
- Created by combustion in automobiles, burning of fossil fuels and biomass by industry and utilities and other combustion processes.

# Air Quality in Forsyth County 2015

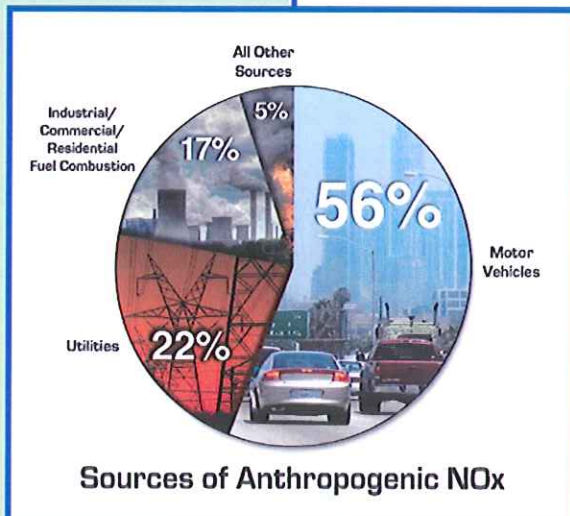
## NITROGEN DIOXIDE (NO<sub>2</sub>)

### Daily Max 1-hour NO<sub>2</sub> Concentrations from 01/01/10 to 12/31/15

Parameter: Nitrogen dioxide (NO<sub>2</sub>) (Applicable standard is 100 ppb)  
 CBSA: Winston-Salem, NC  
 County: Forsyth  
 State: North Carolina  
 AQS Site ID: 37-067-0022, poc 1



The NAAQS for NO<sub>2</sub> include a 1 hour standard of 100 ppb (98 percentile averaged over 3 years) and an annual standard of 53 ppb (annual mean). Monitored levels of NO<sub>2</sub> have shown a slight decrease over the past 5 years with no hourly data exceeding the 1 hour standard. The current annual mean (2015) is below 10 ppm which is less than 20% of the annual standard. There is optimism that levels will remain low due to cleaner standards for cars, plus efforts by industry and government to become more energy efficient. FCEAP sees no evidence that NO<sub>2</sub> levels will exceed the current standards.



NO<sub>2</sub> is a major precursor to the production of ozone (smog) and, along with SO<sub>2</sub>, a contributor to acid precipitation. Though levels of NO<sub>2</sub> are well below the NAAQS, its contribution to smog formation warrants consistent efforts by the community to find ways to reduce fuel combustion. This includes the reduction in energy usage and switching to cleaner fuels and technology. These efforts will help Forsyth County's development efforts without the restrictions that would occur should ozone levels exceed the national standards putting Forsyth County into non-attainment.





## 2015 AIR QUALITY REPORT

### CARBON MONOXIDE

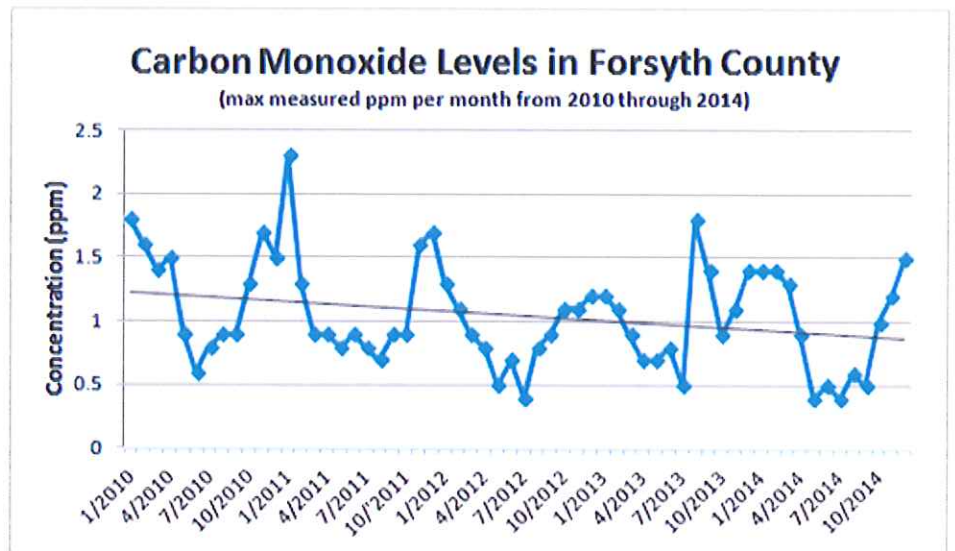
- Created through incomplete combustion, primarily from transportation related activities;
- Interferes with the body's ability to absorb oxygen, stressing the heart, lungs, and nervous system;
- Due to cleaner and improving fuel combustion in cars, CO is becoming more of an indoor air problem for residents burning fuels in enclosed areas.

For more about CO levels in your home or vehicle, [click here](#).



# Air Quality in Forsyth County 2015

## CARBON MONOXIDE (CO)



Since 1995, Forsyth County and the entire Triad area has been classified by the USEPA as a maintenance area for Carbon Monoxide (CO). As shown in the above graph, air quality levels of CO have declined significantly and remain well below the 9 ppm 8-hour NAAQS. In fact, there has not been a measured 8-hour value for CO that has exceeded 2.5 ppm in the past 5 years. Forsyth County is no longer designated as a maintenance area for CO, effective in November of 2015 as historical data provides confidence that CO levels will remain well below the NAAQS. Beginning in January 2016, FCEAD stopped monitoring CO levels and reallocated resources towards more meaningful efforts, including increased quality assurance, monitoring equipment maintenance, and public education and outreach. If situations occur where the Director determines further analysis is needed, FCEAD has trained staff able to perform modeling analysis to determine the impact of CO on public health in our community. If the project is centered at a facility where major emissions of CO may occur, rules are in place requiring modeling and adequate controls to ensure residents and visitors in the area are protected.