# Air Quality Annual Report

2007

West Virginia Department of Environmental Protection

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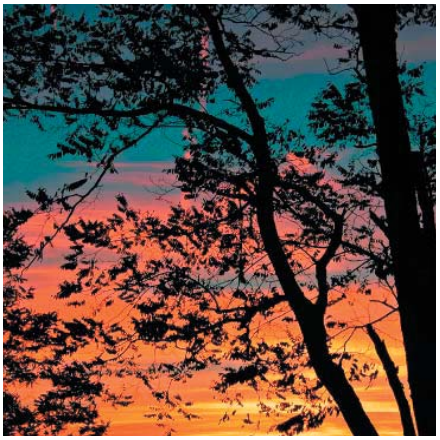
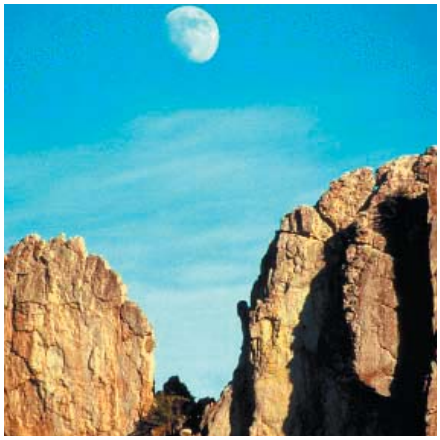

# 2007
# Air Quality Annual Report

West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street S.E.
Charleston, WV 25304

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# Letter From The Director

Compiling the Air Quality Annual Report each year provides a time for reflection on developments and accomplishments and 2007 has proven no different. We hope you will agree that the report has improved since our first edition six years ago. Not only has the format changed, but major environmental milestones have been reached. 2007 embodied the development and implementation of new plans for addressing air quality issues.

Federal rules and standards change with emerging research and technology and states are required to reevaluate their plans for dealing with air quality issues. Ground-level ozone has been one of West Virginia's periodic recurring air pollution problems. For the first time since the federal health-based standards were established, all areas in the state have been designated and approved by the U.S. Environmental Protection Agency as being within attainment, or meeting the current national air quality standards for ozone.

Efforts are now focused on addressing particle pollution issues. Particle pollution, or particulate matter, also known as PM, is a complex mixture of small particles and liquid droplets in the air. A variety of health problems are linked to exposure to this pollutant. Although EPA has regulated PM since 1971, a new 24-hour measure strengthening the standard to protect public health and visibility was implemented in December 2006. EPA has issued a number of rules to help states meet the standards by April 2015. This past year, the DAQ submitted recommendations to EPA to address the six areas of the state identified as being in nonattainment for the annual PM standard. In addition, a state implementation plan (SIP) was developed to address regional haze and protect visibility in West Virginia's Class I wilderness areas, which include Dolly Sods and Otter Creek.

On another note, the DAQ and the West Virginia Department of Education developed an outreach program giving schools no cost "Idle-Free Zone" signs for areas around their schools. By the end of the year, three-fourths of the state's county school systems had requested free signs to post. Although reduction of diesel emissions from school buses was our primary goal, our hope is that parents will also be reminded to turn off their engines to reduce vehicle exhaust emissions.

We encourage each of you to take a look at simple actions you can take to save energy and make a difference in your daily life. Replace some incandescent light bulbs with compact fluorescent bulbs; turn the thermostat down 2° in the winter and up 2° in the summer; buy locally grown produce to reduce transportation costs; cut 10 minutes of idling time each day; and buy products with the ENERGY STAR label. Small changes in behavior can make some big steps toward creating a healthier environment.

Your comments are welcomed so that we might better achieve our mission of "promoting a healthy environment."

John A. Benedict, Director

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# 2007 Highlights

The Division of Air Quality completed several new initiatives in identifying, estimating and developing plans to address pollutant emissions from various sources. Each of the projects are part of an ongoing effort to develop and implement plans to bring all areas of our state into attainment with the National Ambient Air Quality Standards.

## REGIONAL PLANNING

As noted in last year's report, the agency recognizes that air pollution does not respect jurisdictional boundaries. Pollutants and their precursors may be transported across local, state, regional and even national boundaries. Every state is downwind from another state or region, and upwind of others. Therefore, many air pollution problems must be addressed through cooperation and coordination among groups of states. DAQ is a member of two regional organizations that were founded on such collaboration - the Mid-Atlantic Regional Air Management Association and the Visibility Improvement - State and Tribal Association of the Southeast.

The **Mid-Atlantic Regional Air Management Association (MARAMA)** is a voluntary, nonprofit association of 10 state and local air pollution control agencies. MARAMA's mission is to strengthen the skills and capabilities of member agencies and help them work together to reduce and prevent air pollution in the region. MARAMA provides cost-effective approaches to regional collaboration by pooling resources to develop and analyze data, share ideas and train staff to implement common requirements. The following state and local governments are MARAMA members: Delaware, the District of Columbia, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, and the city of Philadelphia and Allegheny county in Pennsylvania.

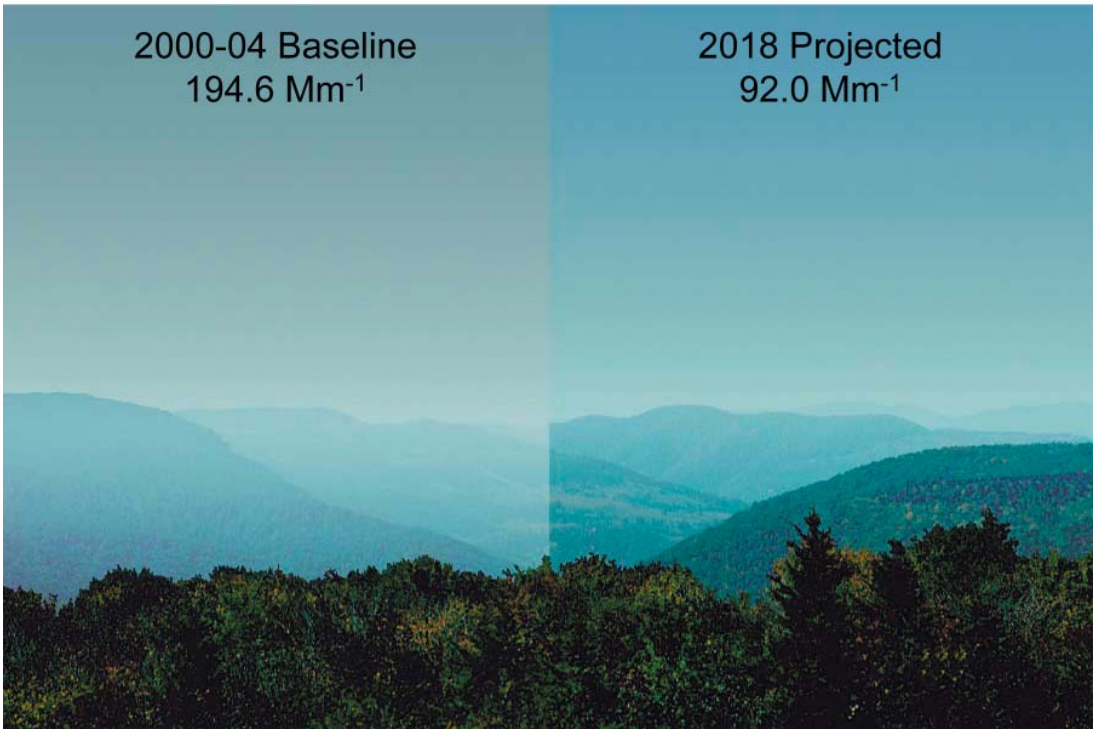
The DAQ has invested significant resources to address visibility problems in national parks and wilderness areas. DAQ joined with other state, local and tribal agencies to continue work on the **Visibility Improvement – State and Tribal Association of the Southeast**, more commonly known as VISTAS, to address regional haze and visibility problems in southeastern United States. Jurisdictions represented by VISTAS members include the Eastern Band of Cherokee Indians; the states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia; and local air pollution control agencies in the states of Alabama, Florida, Kentucky, North Carolina and Tennessee. Workgroups consisting of agency technical and managerial staff, as well as a variety of stakeholders, oversee the performance of technical work designed to address federal regional haze mandates.

West Virginia and the members of VISTAS are also engaged in a parallel effort to assess air pollution in several fine particulate ($PM_{2.5}$) nonattainment areas. The modeling challenges are similar to haze evaluation and require much of the same emissions inventory data. This effort will assist states in developing their attainment SIPs which are due to EPA in April 2008. These SIPs demonstrate how adopted emission controls will bring the areas into compliance with the annual fine particulate standard by 2010 (some areas may take longer).

Beyond regional planning, more and more states, including West Virginia, are becoming involved with Global Warming (also called climate change) issues. We have followed the development of state, regional and national greenhouse gas programs for several years, including the Kyoto protocol. Many reputable scientists predict that climate change may cause a variety of unwanted effects, including droughts, decreases in arctic land and sea ice, and species displacement. Fortunately, these effects are not immediate but they could take place and increase in severity over the next twenty to forty years.

The DAQ appreciates the gravity of the climate change issue. The agency believes that, as an important step, we need to quantify the man-made emissions that are contributing to climate change. Accordingly, the DAQ developed the state's first regulation, 45CSR42, requiring the reporting and inventory of greenhouse gas emissions by stationary sources which emit more than a *de minimis* amount

## Dolly Sods Wilderness, WV




The above photographic simulation shows the expected improvement in visibility at Dolly Sods. Baseline conditions are depicted on the left while improvement anticipated from existing control programs by the year 2018 is shown on the right.

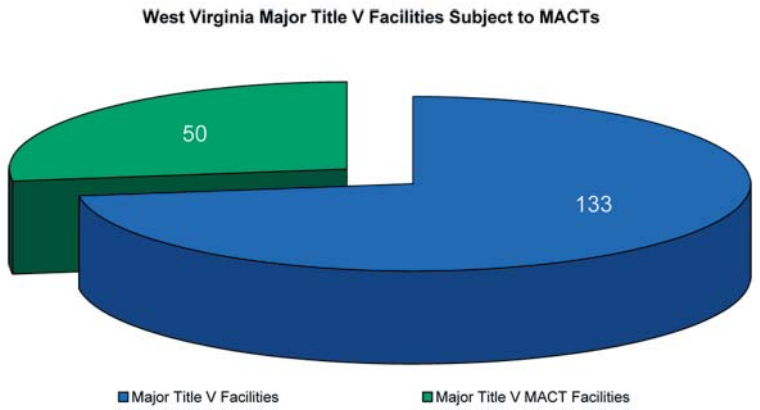
of greenhouse gases. The program will inventory greenhouse gas emissions from stationary, area, mobile and biogenic sources, and account for reductions, capture and sequestration activities. Carbon sequestration refers to the provision of long-term storage of carbon in the terrestrial biosphere, underground, or in the oceans so that the buildup of carbon dioxide (the principal greenhouse gas) concentration in the atmosphere will reduce or slow.

The greenhouse gas rule addresses six primary greenhouse gases; carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

The rule provides for a periodic compilation of a new greenhouse gas emissions inventory, and a determination whether West Virginia is a net sink or emitter of greenhouse gases. The rule also provides for development of a registry for voluntary reductions of greenhouse gas emissions, and a determination whether the reduction, capture and sequestration of green house gas emissions can be developed as an asset for economic development.

## AIR TOXICS

Continued implementation of the federal maximum achievable control technology (MACT) standards has been an on-going effort, including maintaining communications with the regulated community, and keeping internal personnel informed. These MACT standards, established by EPA, regulate emissions of the 187 Hazardous Air Pollutants (HAPs)

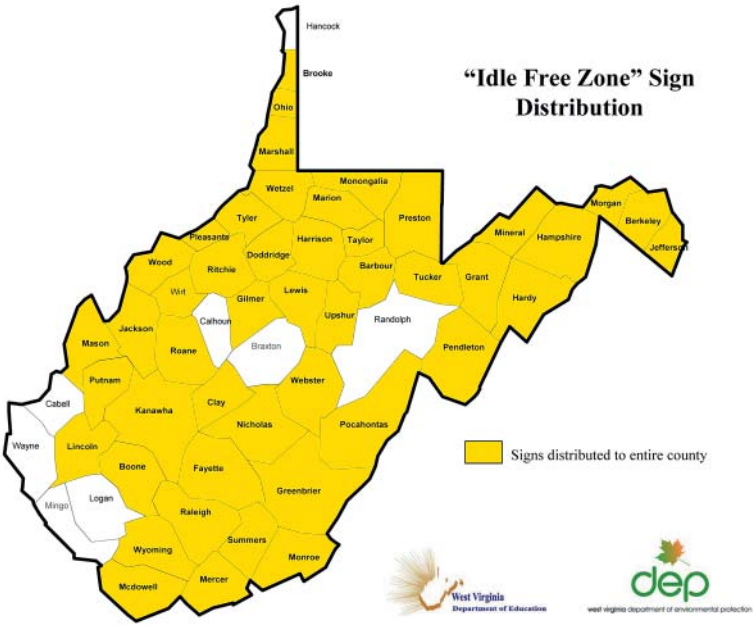


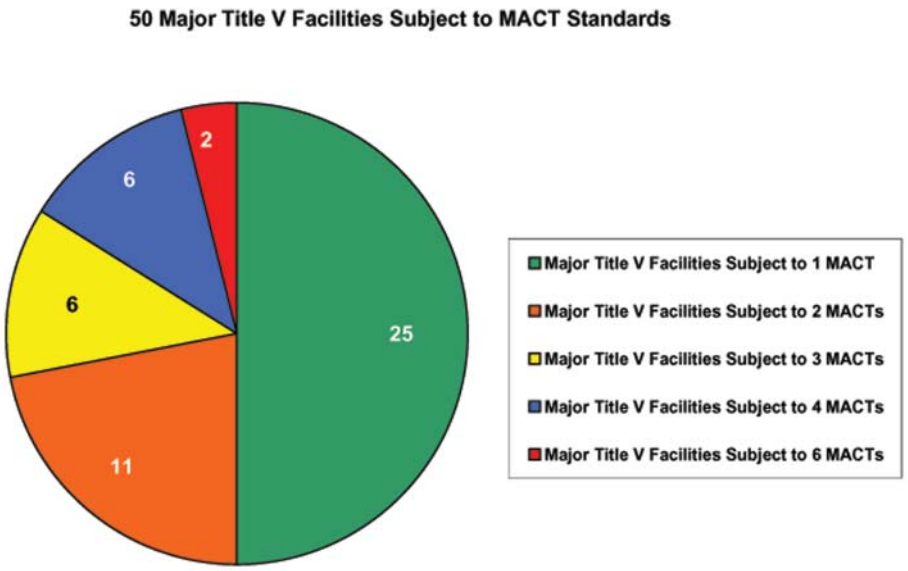

from various industry sources in West Virginia. Until mid-year, when the District of Columbia Circuit Court vacated and remanded the rule to EPA, a major effort had been focused on assisting facilities subject to the Industrial/Commercial/Institutional Boilers and Process Heaters MACT, particularly the health-based compliance alternative risk assessments. Outreach efforts on appropriate testing methodologies also continued with the natural gas sector.

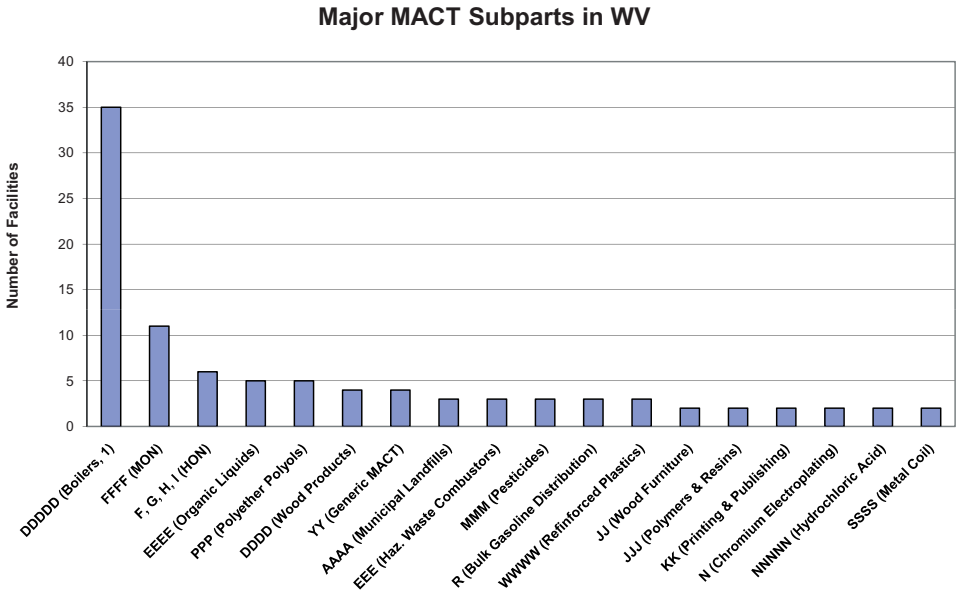
There are 50 major sources of air toxics in the state including chemical plants, metallurgical manufacturers, refineries and surface coaters, that are subject to MACT standards. Some of these major sources are subject to more than one MACT standard (see chart on page 4). Since 1993, EPA has issued nearly 100 MACT standards covering close to 200 categories of large industrial sources. Additionally, there are air toxics standards for smaller facilities in the state, including older standards for dry cleaners, chromium secondary aluminum producers, wood preservers, and newer standards for natural gas transmission facilities with dehydrators. DAQ's Small Business Assistance Program again produced and distributed the annual Dry Cleaner Compliance Calendar to assist this small business community.

An air toxics group made up of liaisons from key sections of DAQ continued to meet and interact, with a goal of more consistently implementing air toxics rules across the agency. DAQ continues to follow its Multi-Year Strategic Air Toxics Plan as submitted to EPA, outlining the various activities DAQ personnel are involved with that incorporate air toxics into the agency's infrastructure.

In March 2007, DAQ began a collaborative project with the West Virginia Department of Education to help promote State Board of Education Policy 4336 to reduce engine idling on school grounds by posting "Idle Free Zone" signs. These signs are available to school administrators upon request at no cost (DAQ is funding this project), and serve to remind school bus drivers, delivery personnel and parents to turn off their engines, thereby






(1) Boiler MACT (40CFR63, Subpart DDDDD) facilities will be subject to case-by-case MACT in the future.

There are an additional 21 MACTs that only affect one facility each. For example: Aerospace, Marine Vessels, Wool Fiberglass, Coke Ovens, etc.

saving energy, reducing fuel costs, and reducing exposure to exhaust emissions, including diesel particulate which is known to be toxic. As of this report date, 47 of the 55 county public school systems had received these "Idle Free Zone" signs (see map on page 3). Children are more susceptible to air pollution than healthy adults. Their respiratory systems are still developing and they have a faster breathing rate. Diesel exhaust can aggravate respiratory and cardiovascular disease and existing asthma.

The DAQ continues to operate ambient air toxics monitoring stations in Charleston, Wheeling and Morgantown. These monitors collect samples every sixth day. The samples undergo laboratory analysis for volatile organic compounds and metals in particulate matter. Two sites also sample for carbonyls. DAQ's laboratory continues to analyze sampled particulate metals from the West Virginia toxics monitors, the National Air Toxics Trends site in Washington, D.C., and for sites at five other participating EPA Region III state and local agencies.

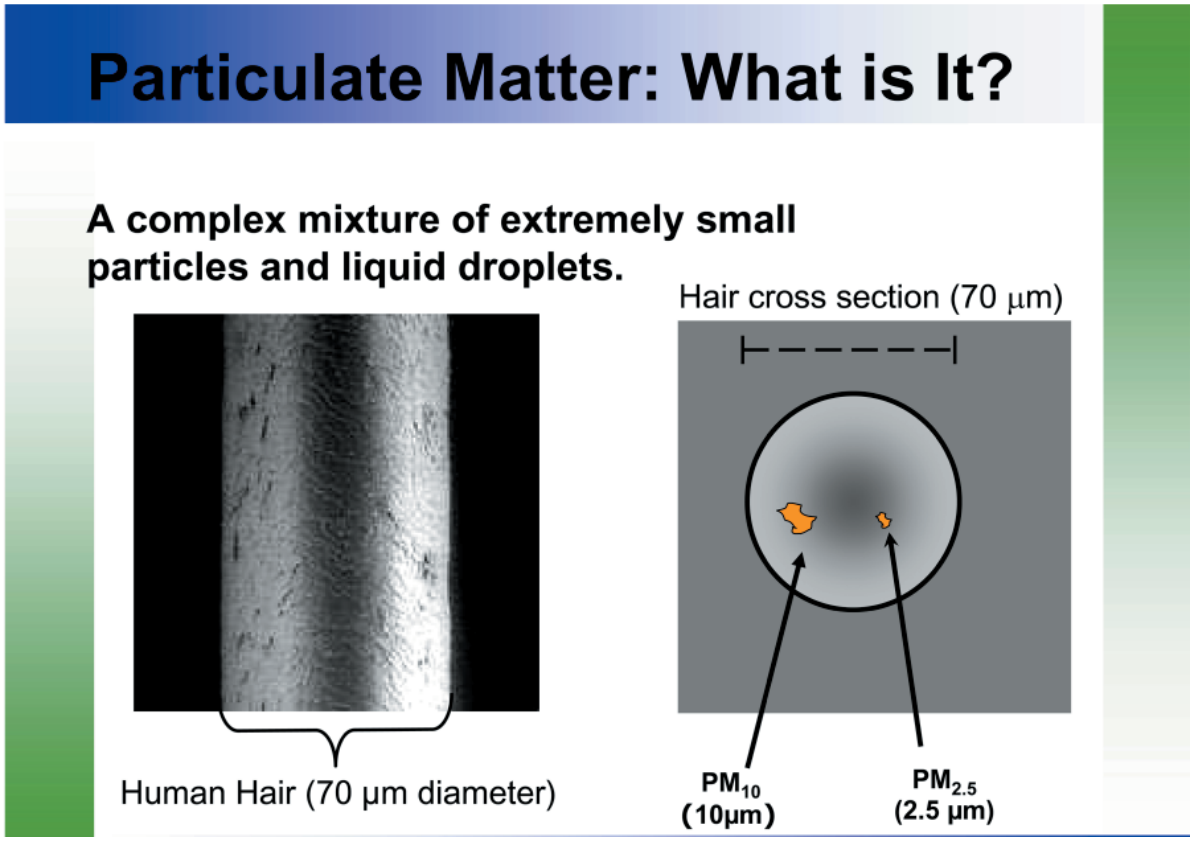
The DAQ also continues to work in collaboration with federal, state and local environmental and health agencies regarding the two new ambient air monitors established to collect data on manganese and other metals. The monitors, located in Vienna and Boaz, began a one-year data collection effort in April 2007 for the Eramet Ferromanganese Community Exposure Project. Based on air dispersion modeling, initial results for manganese have been higher than expected, but are inconclusive until sufficient data to determine an annual average have been obtained. The lead agency in this project, the Agency for Toxics Substances and Disease Registry (ATSDR), launched a web site, where information about the air monitoring investigation, reports, and other interesting facts can be found (http://www.atsdr.cdc.gov/sites/washington_marietta/index.html).

## OZONE & $PM_{2.5}$ STANDARDS

The EPA revised health-based standards in 1997, including one for 8-hour ozone pollution and another for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). When air quality in an area does not meet the NAAQS for a pollutant, EPA may designate that area as a nonattainment area. Nonattainment designations require DAQ to develop and implement a plan to improve the air quality in that area. The comprehensive plan, known as a state implementation plan (SIP), identifies emission sources that contribute to the problem and describes state actions and programs that will be implemented to reduce emissions.

After protracted litigation, EPA finalized the ozone designations in April 2004 and the $PM_{2.5}$ designations in April 2005. These two actions initiated dead lines for the state to develop and implement plans that will bring the affected areas back into attainment and ensure that they stay clean for at least 10 years thereafter.

The last two consecutive periods (three years each) of air monitoring data show that all previously designated West Virginia 8-hour nonattainment areas have met, and are continuing to meet, the ozone standards. These include the Charleston, Huntington, Parkersburg, Weirton and Wheeling metropolitan areas, comprising nine West Virginia counties (Kanawha, Putnam, Cabell, Wayne, Wood, Brooke, Hancock, Marshall and Ohio). DAQ developed 10-year maintenance plans for the Charleston and Huntington areas and formally requested that EPA redesignate the areas to attainment for the ozone standard. EPA approved the Charleston request in July 2006, and subsequently approved the Huntington request in September 2006. DAQ developed similar plans for the remaining ozone nonattainment areas in West Virginia, culminating in the final submittal for Parkersburg in September 2006. EPA subsequently approved the DAQ plans and, by June 2007, had redesignated all the former nonattainment areas to attainment. The reductions in monitored ozone values may be attributed to the control of oxides of nitrogen ($NO_x$) emissions from electrical generating units and other large industrial sources as a result of EPA's $NO_x$ SIP Call.




Although not formally designated, EPA identified the Eastern Panhandle (Berkeley and Jefferson counties) as a potential nonattainment area. It continues to be deferred from a nonattainment designation because the area voluntarily entered a program to address its ozone problems more expeditiously. The program, called an Early Action Compact, requires areas to identify and implement control strategies earlier than would otherwise be required under the Clean Air Act and subsequent amendments. DAQ planning staff have continued assisting local officials in Berkeley and Jefferson counties, as well as the city of Martinsburg, to meet the program requirements on schedule.

EPA has established two $PM_{2.5}$ standards: one averaged over 24 hours and another averaged annually over a three-year period. The entire state meets the 24-hour standard, but problems with the annual standard exist statewide. Areas in the state that EPA identified as not meeting the $PM_{2.5}$ standard include all of the previously listed ozone areas except Jefferson county. EPA also identified part of Mason and Pleasants counties as contributing to nonattainment in adjacent areas. These counties contain power plants that EPA believes contribute to nearby nonattainment problems. No voluntary program exists in this area for the deferment from nonattainment for the particulate matter standard. DAQ conducted rule-making to adopt controls on power plants pursuant to the federal Clean Air Interstate Rule (CAIR) that is, in part, a successor to the $NO_X$ SIP Call. These controls will reduce $SO_2$ and $NO_X$, which contribute to the formation of $PM_{2.5}$.

In final rulemaking promulgated September 21, 2006, and effective December 18, 2006, EPA strengthened the 24-hour fine particle standard from the

1997 level of 65 μg/m$^3$ to 35 μg/m$^3$, and retained the current annual fine particle standard of 15 μg/m$^3$. It is anticipated that states will make recommendations for areas to be designated attainment or nonattainment in late 2008.

Beyond the known adverse health effects, $PM_{2.5}$ is also strongly implicated in visibility (regional haze) problems in national parks and wilderness areas.

Throughout the year, DAQ significantly expanded its activities in working cooperatively with other southeastern states on regional air quality issues. As previously mentioned, the primary collective mission is to mitigate visibility impairment in federal Class I areas. However, many of the pollutants and pollutant precursors that contribute to regional haze also contribute to $PM_{2.5}$ issues. The emissions inventories, monitoring data and potential control strategies being developed for regional haze should help all of us in understanding and reducing $PM_{2.5}$ concentrations.

## ANNUAL AIR MONITORING NETWORK REVIEW

In 2007, the first annual network design plan was made available for public comment on the WVDEP website. The annual network plans will be available on the web for a 30 day public review period during May or June each year. We will also be conducting more detailed ambient monitoring network assessments every five years beginning in 2010.

# National Ambient Air Quality Standards

# Pollutants with Standards (criteria pollutants)

The Clean Air Act, which was amended in 1990, requires that EPA set NAAQS for pollutants considered to be harmful to public health and the environment. Two kinds of standards were established for acceptable concentrations of specific pollutants in the ambient (outdoor) air. Primary standards set limits to protect public health, including the health of sensitive populations such as children, the elderly and those with asthma. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation and buildings.

Six principal pollutants currently have NAAQS: ground-level ozone ($O_3$), particulate matter ($PM_{10}$ and $PM_{2.5}$), sulfur dioxide ($SO_2$), carbon monoxide (CO), nitrogen dioxide ($NO_2$) and lead (Pb). These are commonly called the criteria pollutants.

Health effects of air pollution vary greatly, depending on the exposure level, duration and pollutant. The air quality standard is expressed as an average concentration over a specific time period (an hour, a day or a year) to account for the fact that the concentration of a pollutant in the air varies over time. The concentration is expressed in parts per million (ppm) or micrograms of pollutant per cubic meter of air ($\mu g/m^3$).

The standard also specifies whether the limit applies to an annual average concentration, a specific percentile, or a number of times the level can be exceeded during the calendar year.

EPA must periodically review the standards and determine whether the standards should be revised. For example, because levels of lead in the atmosphere have been significantly reduced as a result of the formulation of unleaded gasoline, West Virginia no longer monitors for this pollutant. Nitrogen oxides are not monitored individually, but are accounted for in the measurement of ground-level ozone. Ozone is formed by a photochemical reaction involving $NO_X$, volatile organic compounds (VOCs) and sunlight.

West Virginia maintains a statewide network of monitoring stations as shown in Appendix A, page 33. The network monitors the air quality. If the air quality fails to meet any of the NAAQS, EPA designates the region as a nonattainment area. DAQ is then required to develop a state implementation plan to achieve and maintain air quality standards in that area. State implementation plans must be approved by EPA.

# Ozone ($O_3$)

Ozone is a highly reactive gaseous molecule that occurs in two levels of the atmosphere — in the Earth's upper atmosphere and at ground level. Ozone can be "good" or "bad" for your health and the environment, depending on its location in the atmosphere.

Good ozone, or the naturally occurring stratospheric ozone (commonly referred to as the ozone layer), exists in the upper portion of the atmosphere (from about 10 to 30 miles) and protects life on Earth from the sun's harmful ultraviolet rays. This protective ozone layer is affected by man-made chemicals. Even though we have reduced or eliminated the use of many of these ozone-depleting substances, their use in the past still affects the thinning of this layer today. Ozone depletion can cause increased amounts of ultraviolet radiation to reach the Earth, which can lead to more cases of skin cancer, cataracts and impaired immune systems. Monitoring and observation of the good ozone is accomplished using satellite measurements, which is much more technical and involved than our monitoring system.

The ozone monitors DAQ maintains and operates measure the ground-level, or bad, ozone pollution. This ozone can be a hazard rather than a benefit. It is a colorless gas which is not emitted directly into the atmosphere from sources but is formed by complex chemical reactions involving two pollutants — nitrogen oxides and volatile organic compounds — in the presence of sunlight. Nitrogen oxides are formed as a by-product of combustion from motor vehicles, boilers, incinerators and power plants. Sources of volatile organic compounds include motor vehicle exhaust, dry cleaning, paint solvents and evaporation of gasoline from storage and transfer facilities.

| | |
|---|---|
| **PRIMARY NAAQS:** | Maximum 8-hour average concentration of 0.08 ppm (based on 3-year average of the annual fourth highest daily maximum 8-hour averages). |
| **SECONDARY NAAQS:** | Same as primary standard. |

Bad ozone is of most concern during the summer months because strong sunlight and hot weather can result in harmful ozone concentrations in the air we breathe. Ozone concentrations usually peak during afternoon hours when sunlight is strongest. Many urban and suburban areas throughout the United States have high levels of bad ozone. Many rural areas of the country are also subject to high ozone levels as winds carry emissions hundreds of miles away from their original sources.

Ground-level ozone is a strong irritant to the eyes and upper respiratory system and can be particularly harmful to people with asthma and circulatory problems. Ground-level ozone also causes damage to trees and vegetation and is the primary ingredient in smog.

Ozone levels fluctuate depending on weather conditions. In West Virginia, the ozone monitoring season runs from April 1 to October 31. Hot, dry weather and stagnant air favor the formation of ozone and the greatest number of exceedance days typically occurs during the hottest and driest summers. Ozone levels usually begin to rise in the late morning hours and may peak at their most unhealthy levels during the evening rush hour. In most areas, ozone levels decrease after sunset. However, if there is little movement of air masses and the hot air continues, high ozone levels can continue over several days. West Virginia's mountainous topography can add to levels by capturing air in the valleys, limiting air dispersion.

The former 8-hour ozone nonattainment areas are listed on page 11. West Virginia is now considered in attainment with the 8-hour ozone standard with the exception of the Eastern Panhandle, which is considered nonattainment-deferred. This means that EPA will defer the area's nonattainment status as long as the commitments in the Early Action Compact are met on schedule.

By being proactive, the Eastern Panhandle avoided a nonattainment designation by committing to achieve the 8-hour ozone standard earlier

than otherwise required. The area is monitoring satisfactory ozone levels, though compliance with the standard was not required until the end of 2007.

Ground-level ozone is one of West Virginia's recurring air pollution problems. Controlling ozone is a complex problem due to the variety of sources for nitrogen oxides and VOCs and the long-distance transport of ozone and its precursors. A historical summary of monitored ozone data is located on page 12.

On June 20, 2007, EPA proposed to strengthen the national ambient air quality standards for ground-level ozone, the primary component of smog. The proposed revisions reflect new scientific evidence about ozone and its effects on people and public welfare. EPA's proposal would revise both ozone standards: the primary standard, designed to protect human health; and the secondary standard, designed to protect welfare (such as vegetation and crops).

EPA proposed to set the primary (health) standard to a level within the range of 0.070-0.075 ppm (70 -75 ppm). The Agency also requested comments on alternative levels of the 8-hour primary ozone standard, within a range from 0.060 ppm up to and including retention of the current standard (0.084 ppm). EPA also proposed to specify the level of the primary standard to the third decimal place, because today's monitors can detect ozone that accurately.

EPA proposed two options for the secondary standard: One option would establish a new form of the standard designed specifically to protect sensitive plants from damage caused by repeated ozone exposure throughout the growing season.

This cumulative standard would add daily ozone concentrations across a three-month period.

The other option would follow the current practice of making the secondary standard identical to the proposed primary 8-hour standard.

**FORMER 8-HOUR OZONE NONATTAINMENT AREAS**

Charleston, W.Va. MSA*
- including Kanawha and Putnam counties, W.Va.
**(Redesignated to attainment on 8-10-06)**

Huntington, W.Va, Ashland, Ky., Ironton, Ohio MSA*
- Including Cabell and Wayne counties, W.Va.
**(Redesignated to attainment on 10-16-06)**

Parkersburg, W.Va., Marietta, Ohio MSA*
- including Wood county, W.Va.
**(Redesignated to attainment on 6-7-07)**

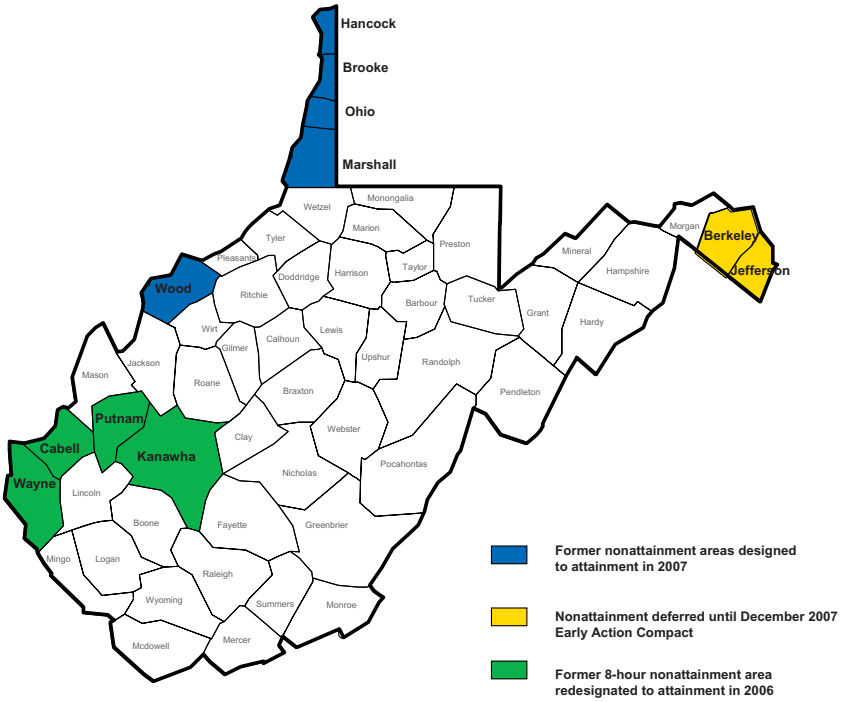
Steubenville, Ohio, Weirton, W.Va. MSA*
- including Brooke and Hancock counties, W.Va.
**(Redesignated to attainment on 6-13-07)**

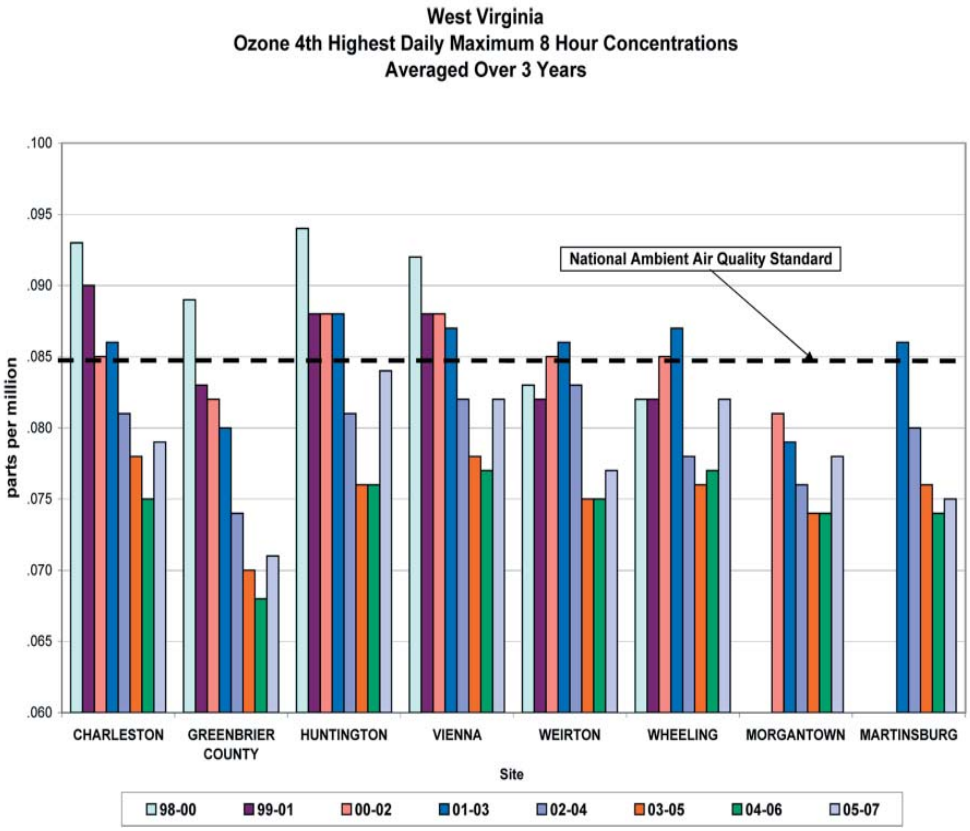
Wheeling, W.Va., Ohio MSA*
- including Marshall and Ohio counties, W.Va. and Belmont county, Ohio
**(Redesignated to attainment on 6-14-07)**

Berkeley and Jefferson counties have been designated by EPA as nonattainment deferred subject to the provisions of an Early Action Compact

*Metropolitan Statistical Area

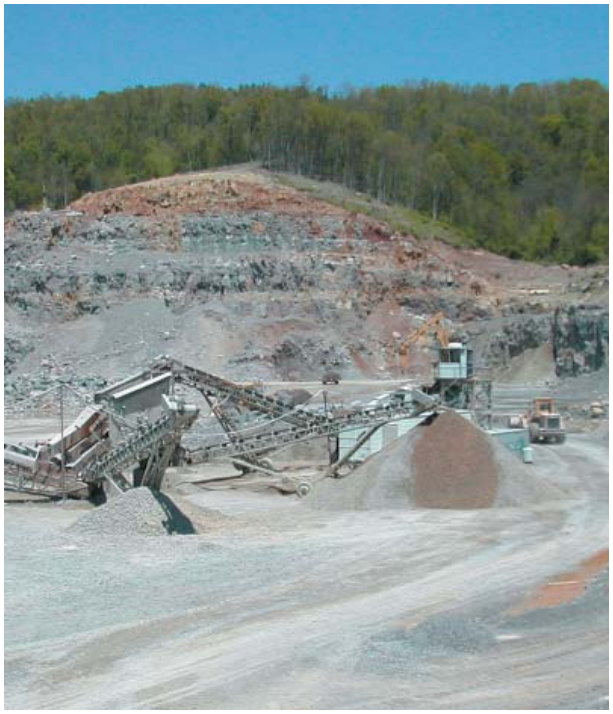
# Ozone ($O_3$) 8-Hour Maintenance Areas



# Particulate Matter ($PM_{10}$)

Particulate matter (PM) consists of the solid particles and liquid droplets found in the air. These particles and droplets come in a wide range of sizes. Individually, they are invisible to the naked eye. Collectively, however, the particles can appear as clouds or a fog-like haze. Particulates result from many different sources including wind-blown dust, wood-burning stoves, leaf burning, vehicle exhaust, utility plants, incinerators, construction, vehicles traveling on paved and unpaved roads, materials handling, crushing as well as grinding operations.



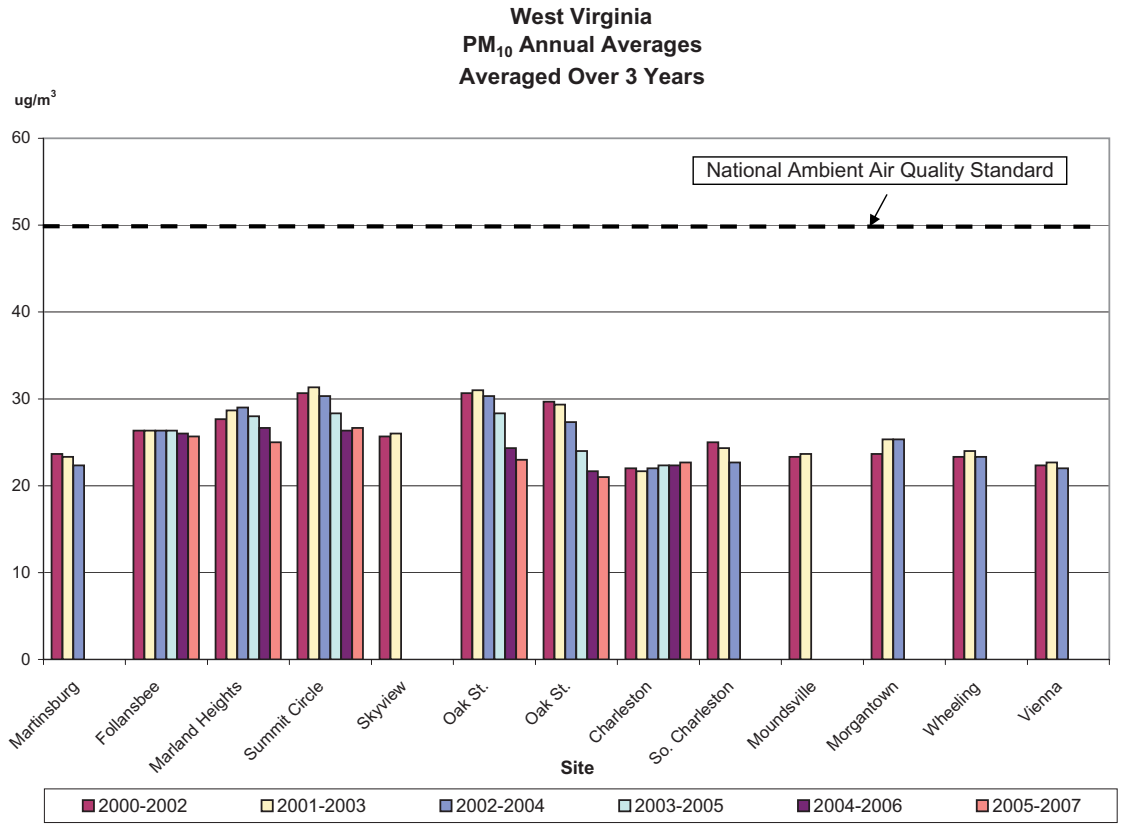
The environmental and health effects of PM can vary depending on the size of the particles. Larger particles rapidly settle out of the air due to gravity and pose a limited health risk. Particles between 10 and 50 micrometers rarely penetrate deeply into the human respiratory system, but are trapped and removed by the body's natural defenses. Smaller particles are less heavy, stay in the air longer and travel farther, contributing to haze. These particles also can be inhaled more deeply into human lungs, increasing the potential for severe health effects. In addition, smaller particles generally include more toxic substances than larger particles.

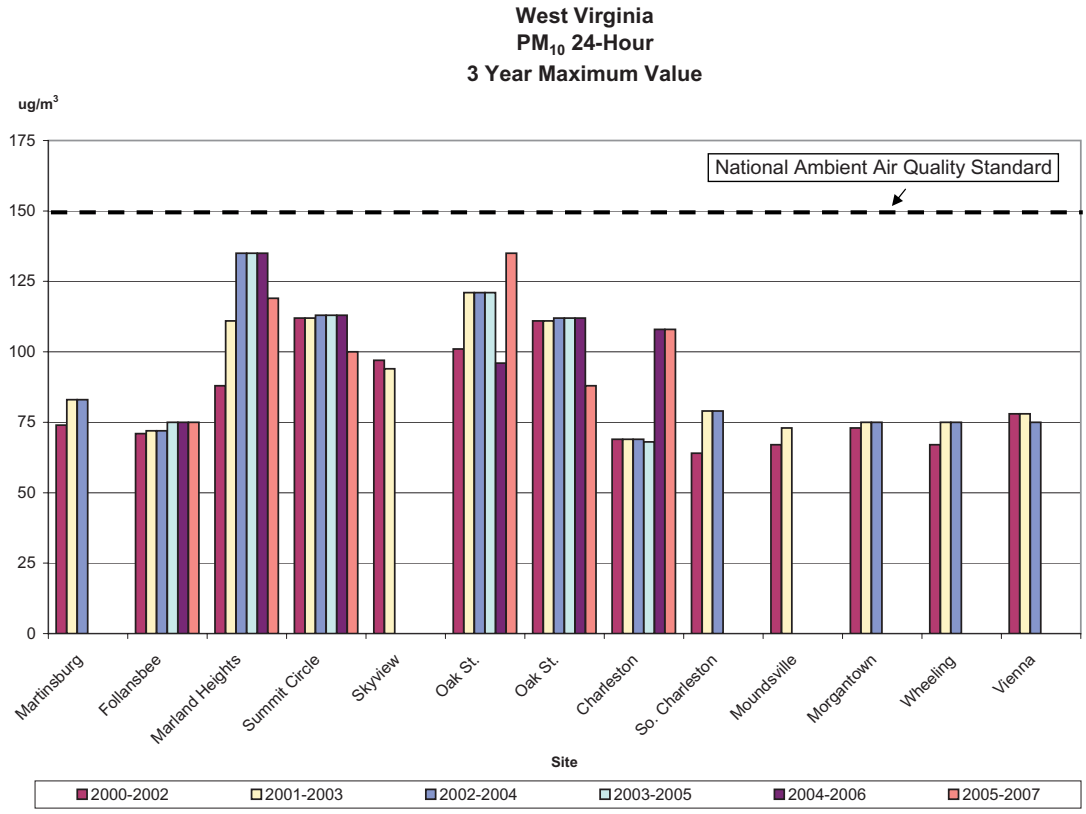
| | |
|---|---|
| **PRIMARY NAAQS:** | 24 hour average not to exceed 150 µg/m$^3$. Average number of expected exceedances per year not to exceed 1.0 over last three years. |
| **SECONDARY NAAQS:** | Same as primary standard. |

Because of these differences, EPA maintains two separate ambient air quality standards for particulate matter. One standard addresses $PM_{10}$ particles that are relatively coarse, but equal to or less than 10 micrometers in diameter. The other standard addresses levels of fine particulate matter (known as $PM_{2.5}$), which contains particles equal to or less than 2.5 micrometers in diameter. In comparison, a human hair is about 70 micrometers in diameter. Adverse health effects have been associated with exposures to $PM_{2.5}$ over both short periods (such as a day) and longer periods (a year or more). Particles in the $PM_{10}$ range are small enough to evade the body's natural defense systems and penetrate into the lungs, where tissue is damaged and the immune system is weakened. As a result of research on fine particulate matter, EPA adopted a $PM_{10}$ standard in 1987, replacing a previous total suspended particulate standard. In a 2006 revision, EPA retained the current 24-hour PM ambient air quality standard. However, EPA revoked the annual standard, meaning that the standard is no longer in effect.

DAQ's monitoring network measures $PM_{10}$ at five sites in three counties across West Virginia. $PM_{10}$ is monitored at a sixth site in Ohio county, to provide data for the air quality index. Monitors are jointly located at Oak Street in Weirton for quality assurance and quality control purposes. All monitoring sites have shown consistent averaged values that are well below the current 24-hour and the former annual NAAQS.

A historical summary of monitored $PM_{10}$ data is located on page 14.


West Virginia
PM10 Annual Averages
Averaged Over 3 Years
ug/m3
60
50
40
30
20
10
0
National Ambient Air Quality Standard
Martinsburg
Follansbee
Marland Heights
Summit Circle
Skyview
Oak St.
Oak St.
Charleston
So. Charleston
Moundsville
Morgantown
Wheeling
Vienna
Site
2000-2002
2001-2003
2002-2004
2003-2005
2004-2006
2005-2007


West Virginia
PM10 24-Hour
3 Year Maximum Value
ug/m3
175
150
125
100
75
50
25
0
National Ambient Air Quality Standard
Martinsburg
Follansbee
Marland Heights
Summit Circle
Skyview
Oak St.
Oak St.
Charleston
So. Charleston
Moundsville
Morgantown
Wheeling
Vienna
Site
2000-2002
2001-2003
2002-2004
2003-2005
2004-2006
2005-2007

# Particulate Matter ($PM_{2.5}$)

Medical and scientific research on the health effects of particulate matter continued after the adoption of the $PM_{10}$ standard. As a result of further research, it was determined that very fine particles in the 2.5 microns and less size range have the most adverse effects on human health. Fourteen $PM_{2.5}$ monitoring sites were operated in West Virginia in 2007. A special filter-weighing laboratory was designed and installed to analyze filters from these monitors.

**DESIGNATED ANNUAL $PM_{2.5}$ NONATTAINMENT AREAS**

Charleston, W.Va. MSA*
- including Kanawha and Putnam counties, W.Va.

Huntington, W.Va., Ashland, Ky., Ironton, Ohio MSA*
- Including Cabell and Wayne and part of Mason counties, W.Va.

Parkersburg, W.Va., Marietta, Ohio MSA*
- including Wood and part of Pleasants counties, W.Va.

Steubenville, Ohio, Weirton, W.Va. MSA*
- including Brooke and Hancock counties, W.Va.

Wheeling, W.Va., Ohio MSA*
- including Ohio and Marshall counties, W.Va. and Belmont county, Ohio

W.Va. Eastern Panhandle
- including Berkeley county, W.Va.

*Metropolitan Statistical Area

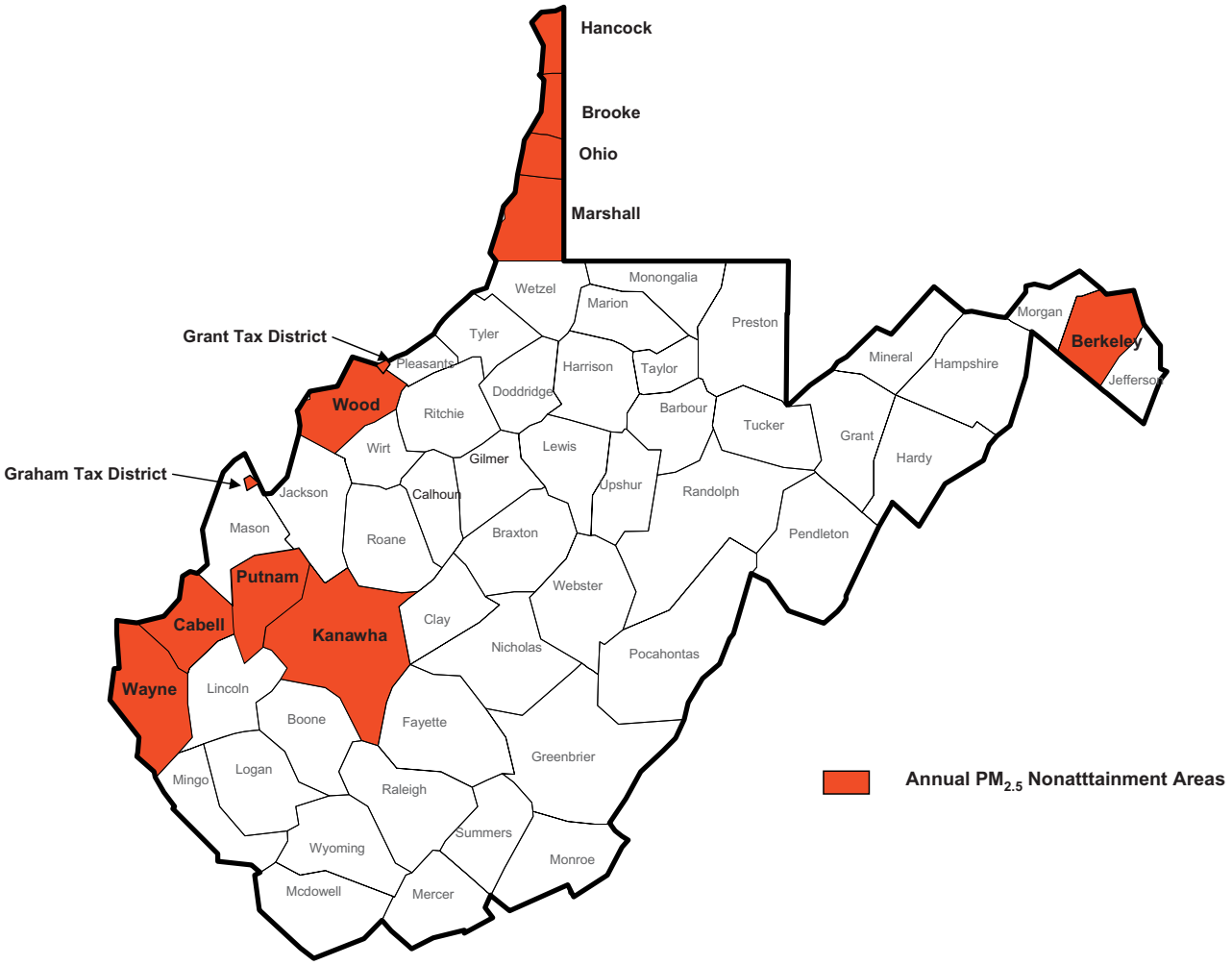
Based on the 2002-2004 data, the annual $PM_{2.5}$ nonattainment areas, as published by EPA on April 5, 2005, for the state are shown above. The rest of the state is considered in attainment for the annual $PM_{2.5}$ standard. These identified areas are based upon the 1997 NAAQS for $PM_{2.5}$. In December 2006, EPA strengthened the 24-hour fine particle standard from the 1997 level of 65 µg/m$^3$ to 35 µg/m$^3$, and retained the current annual fine particle standard at 15 µg/m$^3$. West Virginia submitted

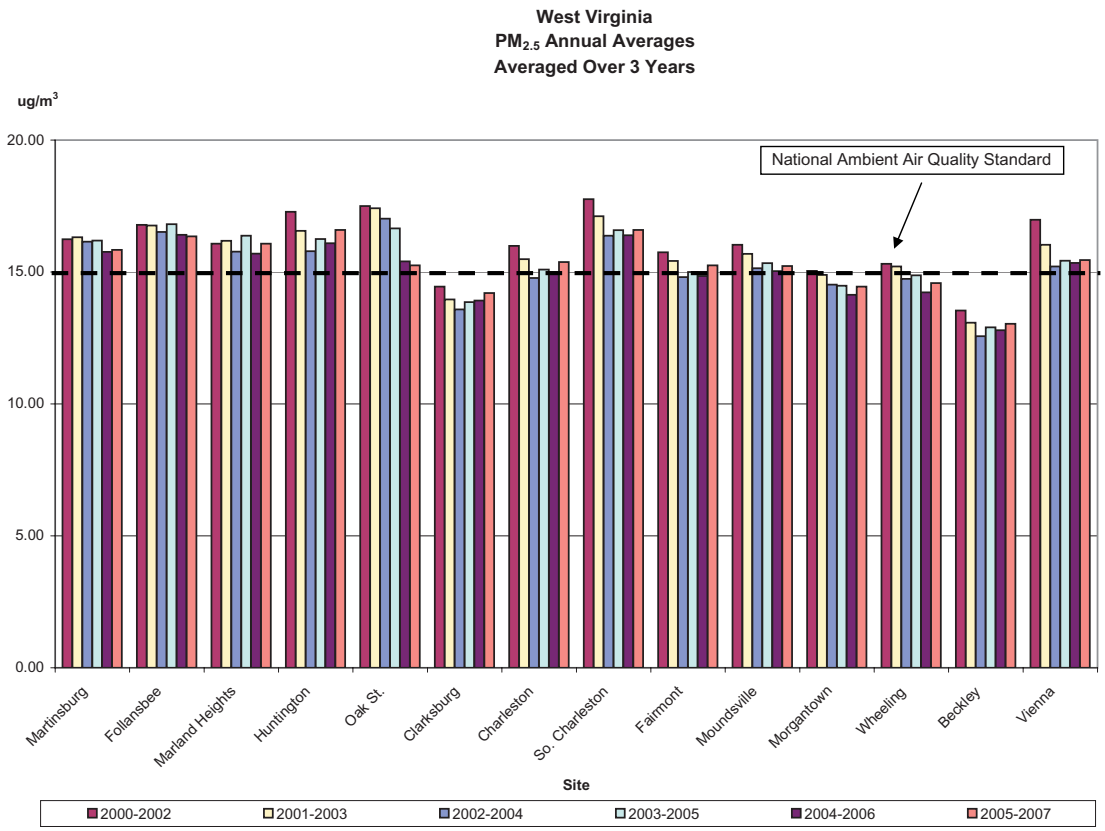
recommendations to EPA for areas to be designated attainment (meets the standards) and nonattainment with the 24 hour NAAQS (does not meet the standards) in December 2007. EPA is expected to make final designations in December 2008. A historical summary of monitored $PM_{2.5}$ data is located on page 17.

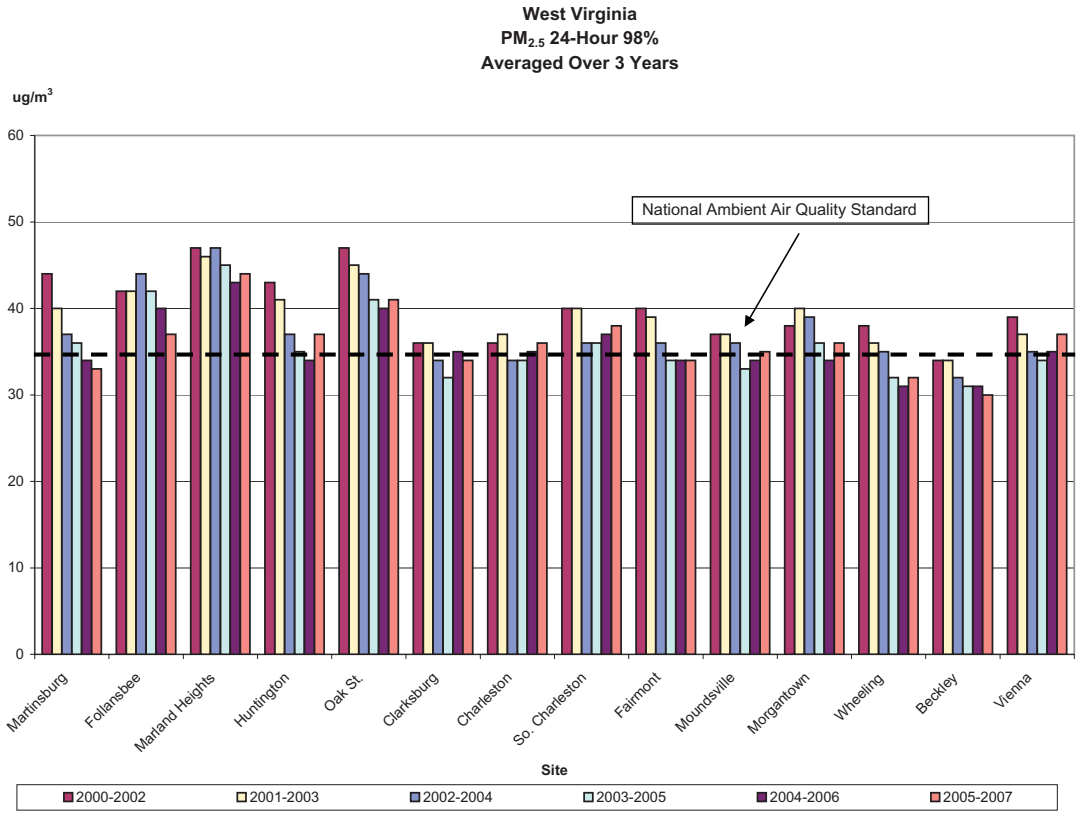
The DAQ operates three $PM_{2.5}$ speciation monitors to help determine the chemical makeup of fine particles. The monitors are located in the Kanawha Valley at South Charleston, the Guthrie Agricultural Center north of Charleston and at Moundsville in the Northern Panhandle. Samples collected by these monitors are analyzed for anions (particulate sulfate and nitrate), cations (particulate ammonium, sodium and potassium), trace elements, total carbonaceous material and fine particulate mass. An example of the type of data provided by the speciation monitors can be found in Appendix A, page 41.

| | |
|---|---|
| **PRIMARY NAAQS:** | Annual arithmetic mean not to exceed 15 µg/m$^3$ (based on a 3-year average). 24-hour concentration 35 µg/m$^3$. (3 year average of the 98 percentile) |
| **SECONDARY NAAQS:** | Same as primary standard. |

# Annual Particulate Matter ($PM_{2.5}$) Nonattainment Areas




West Virginia
PM2.5 Annual Averages
Averaged Over 3 Years
ug/m3
20.00
15.00
10.00
5.00
0.00
National Ambient Air Quality Standard
Martinsburg
Follansbee
Marland Heights
Huntington
Oak St.
Clarksburg
Charleston
So. Charleston
Fairmont
Moundsville
Morgantown
Wheeling
Beckley
Vienna
Site
2000-2002
2001-2003
2002-2004
2003-2005
2004-2006
2005-2007


West Virginia
PM2.5 24-Hour 98%
Averaged Over 3 Years
ug/m3
60
50
40
30
20
10
0
National Ambient Air Quality Standard
Martinsburg
Follansbee
Marland Heights
Huntington
Oak St.
Clarksburg
Charleston
So. Charleston
Fairmont
Moundsville
Morgantown
Wheeling
Beckley
Vienna
Site
2000-2002
2001-2003
2002-2004
2003-2005
2004-2006
2005-2007

# Sulfur Dioxide ($SO_2$)

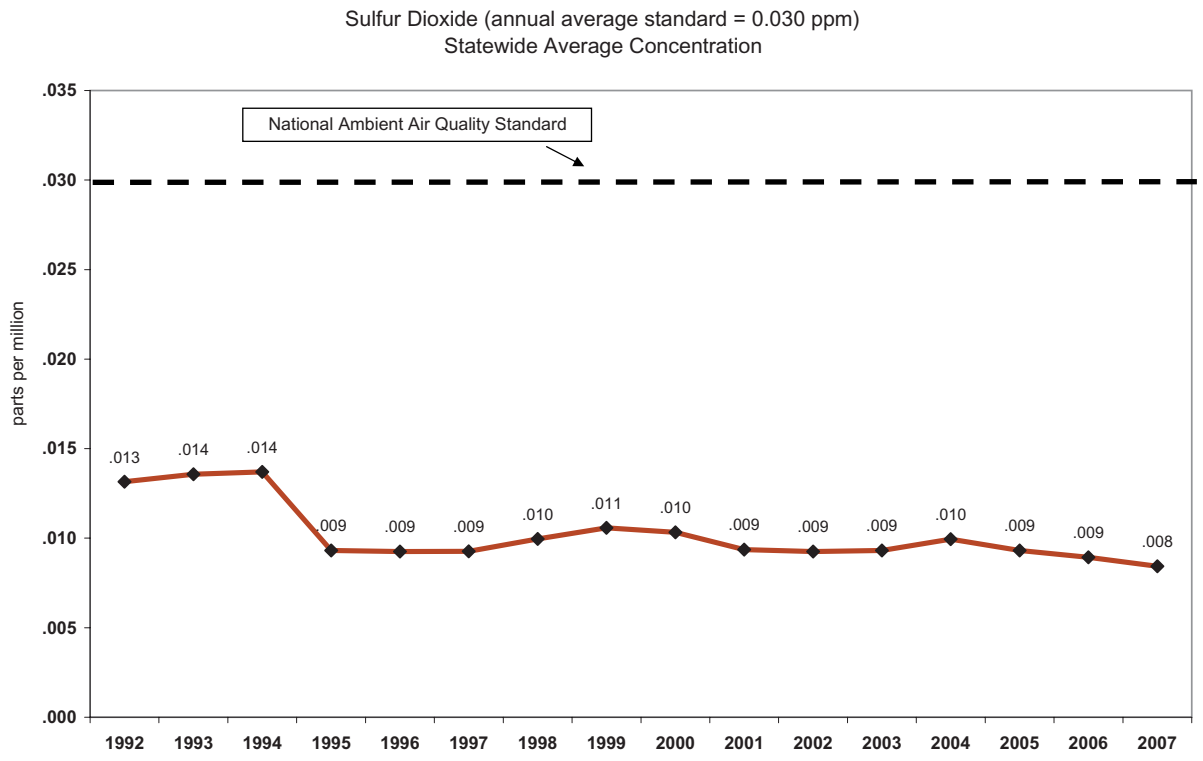
Sulfur dioxide is a colorless gas that has a pungent odor. $SO_2$ can bind to dust particles and aerosols in the atmosphere, traveling long distances on prevailing winds. It can also combine with moisture in the atmosphere to form sulfuric acid ($H_2SO_4$), which is a component of acid precipitation (also known as acid rain) that causes acidification of soil and water and the erosion of building surfaces. Sulfur compounds contribute to visibility degradation in many areas and can damage the foliage of trees and agricultural crops.

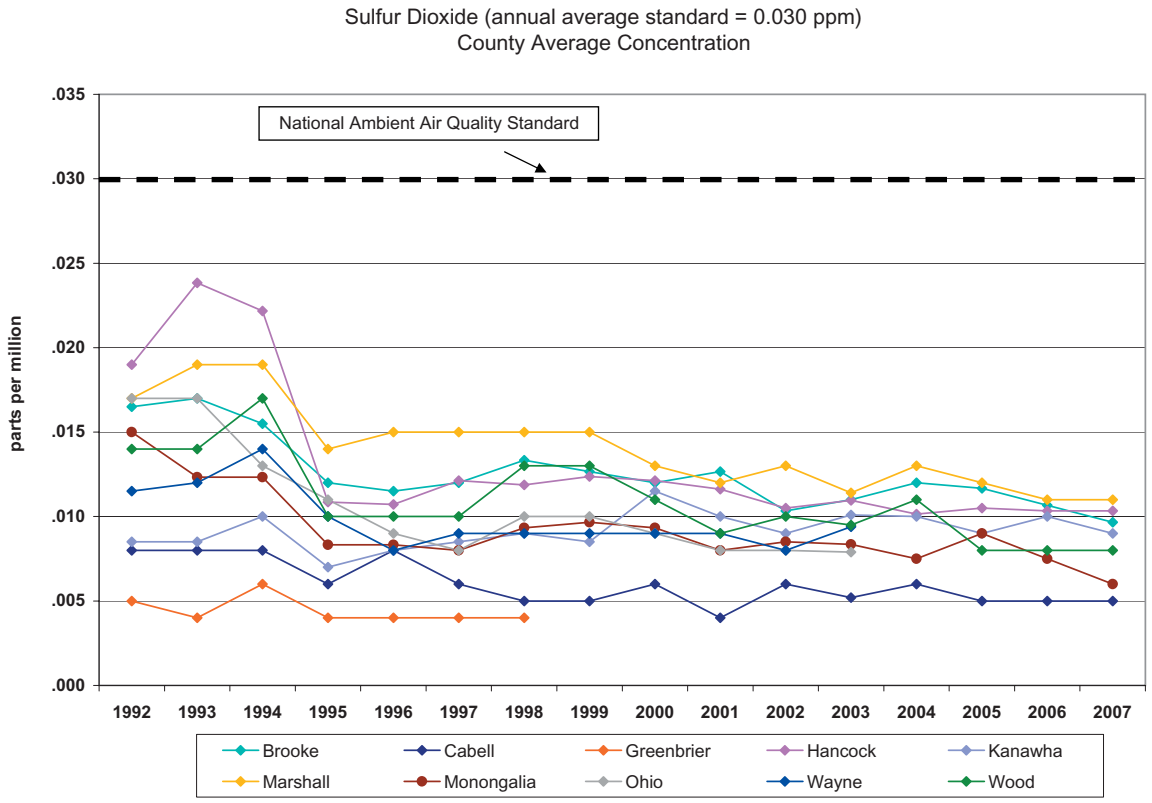
| | |
|---|---|
| **PRIMARY NAAQS:** | Annual arithmetic mean not to exceed 0.03 ppm.<br>24-hour concentration not to exceed 0.14 ppm more than once per year. |
| **SECONDARY NAAQS:** | 3-hour concentration not to exceed 0.50 ppm more than once per year. |

The main sources of $SO_2$ are combustion of coal and oil, refineries, smelters and industrial boilers. Nationally, two-thirds of all $SO_2$ emissions are from power plants.

$SO_2$ is an irritant that can interfere with normal breathing functions even at low levels. It also aggravates pre-existing respiratory, cardiovascular and pulmonary diseases. Over the last decade, the annual average $SO_2$ level in the ambient air has been well below the standard. Statewide and regional $SO_2$ levels have declined since the mid-90s, largely in part to the success of the federal Acid Rain Program curbing $SO_2$ emissions from power plants.

A historical summary of monitored $SO_2$ data is located on page 19.


Sulfur Dioxide (annual average standard = 0.030 ppm)
Statewide Average Concentration
National Ambient Air Quality Standard
parts per million
.035
.030
.025
.020
.015
.010
.005
.000
.013
.014
.014
.009
.009
.009
.010
.011
.010
.009
.009
.009
.010
.009
.009
.008
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007


Sulfur Dioxide (annual average standard = 0.030 ppm)
County Average Concentration
National Ambient Air Quality Standard
parts per million
.035
.030
.025
.020
.015
.010
.005
.000
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Brooke
Cabell
Greenbrier
Hancock
Kanawha
Marshall
Monongalia
Ohio
Wayne
Wood

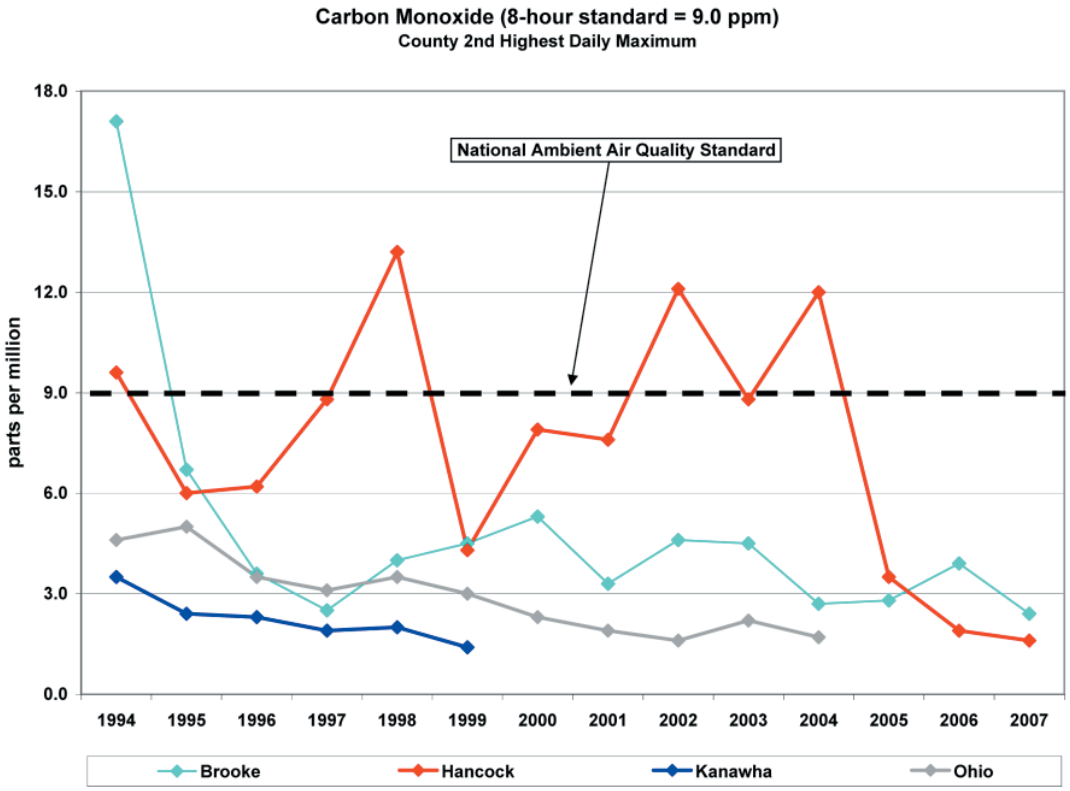
# Carbon Monoxide (CO)

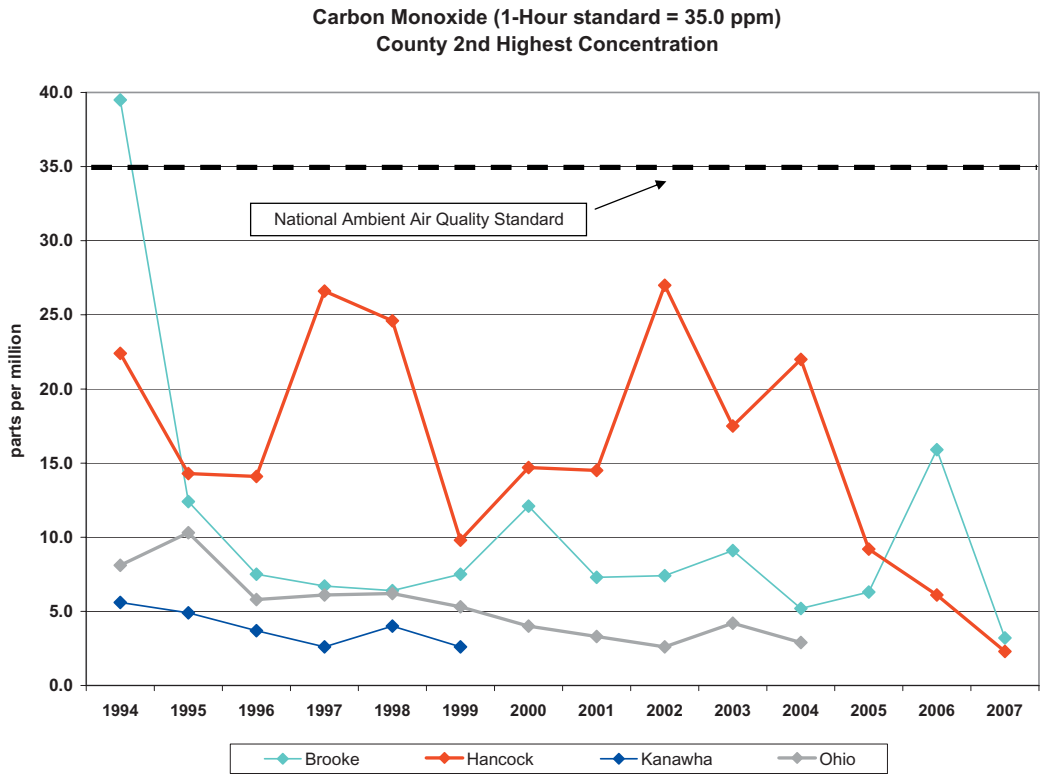
Carbon monoxide is an odorless, colorless, poisonous gas produced by incomplete combustion of fuels. The primary source of carbon monoxide is the exhaust from motor vehicles, which includes highway and non-road vehicles, such as construction equipment. Concentrations are usually highest along heavily traveled highways, but industrial sources can also cause levels to rise. Other sources include incinerators, kerosene and wood stoves, furnaces and some industrial processes.

In most areas, carbon monoxide levels have declined well below the standard primarily due to improved controls on motor vehicles. In the past decade, monitoring sites that reported continuously low levels were removed. Two Hancock county and one Brooke county monitoring sites measured carbon monoxide levels through 2007. In 2007, all sites reported levels below the 1-hour and 8-hour standards. A historical summary of monitored carbon monoxide data is located on page 21.

The main health effect of carbon monoxide is its tendency to reduce the oxygen carrying-capacity of the blood. Depending on the level of exposure, CO can cause fatigue, headaches, and impaired vision and reflexes at moderate concentrations. Unconsciousness and even death may occur at high concentrations. The severity of the effects is related to the length of exposure and concentration level of CO.

| | |
|---|---|
| **PRIMARY NAAQS:** | 8-hour average not to exceed 9 ppm more than once per year.<br>1-hour average not to exceed 35 ppm more than once per year. |
| **SECONDARY NAAQS:** | Same as primary. |


Carbon Monoxide (8-hour standard = 9.0 ppm)
County 2nd Highest Daily Maximum
National Ambient Air Quality Standard
parts per million
18.0
15.0
12.0
9.0
6.0
3.0
0.0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Brooke
Hancock
Kanawha
Ohio


Carbon Monoxide (1-Hour standard = 35.0 ppm)
County 2nd Highest Concentration
National Ambient Air Quality Standard
parts per million
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Brooke
Hancock
Kanawha
Ohio

# Criteria Pollutants

| Pollutant | Sources | Health Effects | Environmental Effects |
|---|---|---|---|
| **Ozone ($O_3$)** Chemical reaction of nitrogen oxides and volatile organic compound emissions (primary component of smog) | Gasoline vapors, chemical solvents, combustion products of various fuels, consumer products | Reduces lung function, induces respiratory inflammation, asthma, chest pain, coughing, nausea, pulmonary congestion | Damage to plants and trees, reduced visibility due to smog, permanent structural damage to the lungs of animals |
| **Nitrogen Dioxide ($NO_2$)** From the nitrogen oxide family, forms when fuel is burned at high temperatures | Burning of gasoline, natural gas, coal, oil, etc. (Diesel trucks, wood stoves, power plants, cars) | Irritates the lungs, lowers resistance to respiratory infections, increases incidence of acute respiratory illness in children | Contributes to acid rain and eutrophication (a reduced amount of oxygen) in coastal waters, which is destructive to fish and other animal life |
| **Particulate Matter (PM10, $PM_{2.5}$)** Solid or liquid particles found in the air, originates from a variety of mobile and stationary sources | Burning of wood, diesel, and other fuels (diesel trucks, wood stoves, power plants), agriculture (plowing and burning of fields), unpaved roads | Effects on breathing and respiratory system, damage to lung tissue, nose and throat irritation, cancer, premature death | Reduced visibility, damage to manmade materials when acidic |
| **Sulfur Dioxide ($SO_2$)** From the sulfur oxide family, forms when fuel containing sulfur is burned | Burning of coal and oil, industrial processes (metal smelting, paper, oil refining) | Effects on breathing, respiratory illness, alterations in pulmonary defenses, aggravation of existing cardiovascular disease | Damage to the foliage of trees and agricultural crops, acidification of lakes and streams, accelerated corrosion of buildings and monuments, reduced visibility |
| **Carbon Monoxide (CO)** Colorless odorless poisonous gas, formed when carbon in fuels is not burned completely | Burning of gasoline, wood, natural gas, coal, oil, etc. (motor vehicle exhaust, industrial processes, fuel combustion) | Reduces oxygen delivery to the body's organs and tissues, causes visual impairment, and reduces work capacity, manual dexterity, and learning ability | A precursor to ozone and a useful tracer of combustion-derived pollutants |
| **Lead (Pb)** Solid metallic element | Paint, smelters, battery plants | May cause anemia, kidney disease, reproductive disorders, behavioral disorders, neurological impairments (seizures, mental retardation) | Harmful to wildlife |

# Air Quality Index

## WHAT IS THE AIR QUALITY INDEX?

The Air Quality Index (AQI) is an index for reporting daily air quality. It tells you how clean or polluted your air is, and the associated health concerns. The AQI focuses on health effects that can happen within a few hours or days after breathing polluted air. EPA uses the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect against harmful health effects.

## HOW DOES THE AQI WORK?

You can think of the AQI as a ruler that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health danger. For example, an AQI value of 50 represents good air quality and little potential to affect public health. An AQI value of over 300 represents hazardous air quality.

An AQI value of 100 generally corresponds to the national air quality standard for the pollutant and is thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy for certain sensitive groups of people, then for everyone as AQI values rise.

## HOW DO I FIND THE AQI FOR WEST VIRGINIA?

The AQI for eight areas in West Virginia can be accessed by going to www.wvdep.org. Choose “Offices” from the top menu bar, then select Division of Air Quality and click on the AQI icon. The index may also be accessed by calling the DEP’s hotline at (866) 568-6649, Ext. 274.

The AQI is reported for Charleston, Huntington, Morgantown, Parkersburg, Weirton and Wheeling year round. The reported index is the calculated value for the past 24 hours and is updated daily, Monday through Friday, at approximately 8:30 a.m. During ozone season, April 1 through October 31, updates are made in the morning and also mid-afternoon as needed. Ozone data from Greenbrier County and Martinsburg monitoring sites are also included.

Due to computer security restraints, the AQI must be manually updated by DAQ staff and is not available on the weekends. However, our monitoring sites are linked with EPA’s AirNOW network at www.airnow.gov, which provides an hourly update from 9 a.m. to 9 p.m. daily during the ozone season.

## UNDERSTANDING THE AQI

The purpose of the AQI is to help you understand what local air quality means to your health. To make the AQI as easy to understand as possible, EPA has divided the AQI scale into six levels of health concern and what they mean:

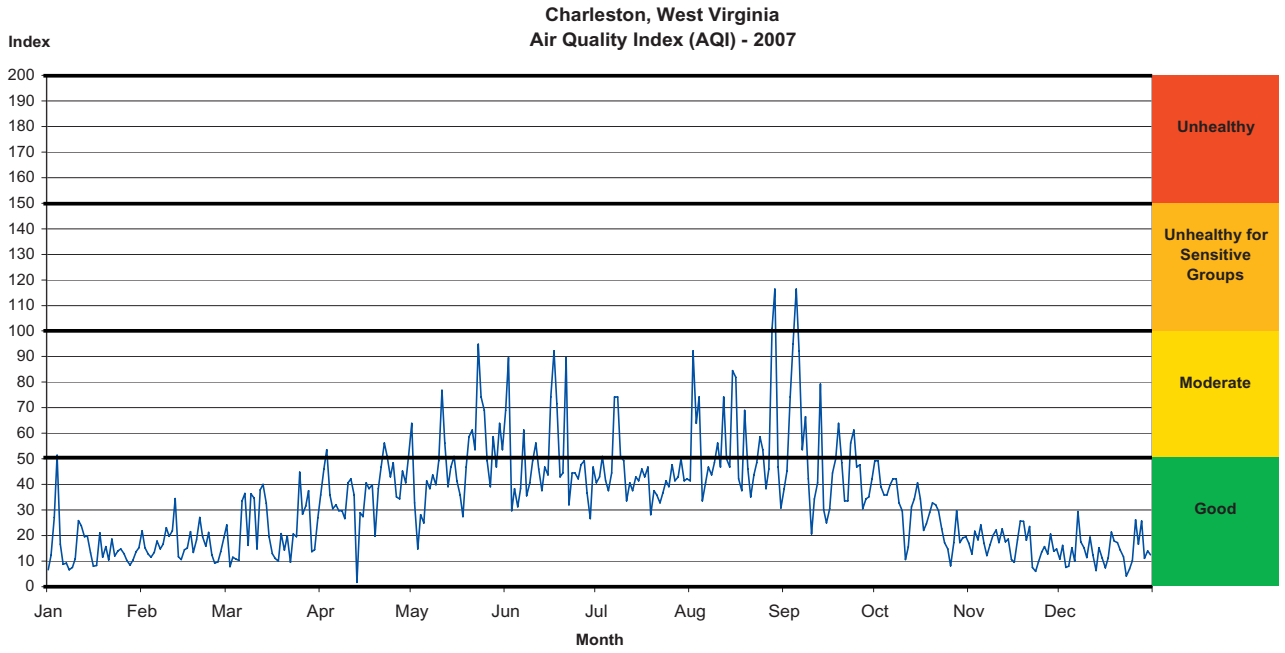
- ◊ GOOD - The AQI value for your community is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- ◊ MODERATE - The AQI for your community is between 51 and 100. Air quality is acceptable.
- ◊ UNHEALTHY FOR SENSITIVE GROUPS - Certain groups of people are particularly sensitive to the harmful effects of certain air pollutants. This means they are likely to be affected at lower levels than the general public. Some people may be sensitive to more than one pollutant. When AQI values are between 101 and 150, members of sensitive groups may experience health effects. The general public is not likely to be affected when the AQI is in this range.
- ◊ UNHEALTHY - AQI values are between 151 and 200. Everyone may begin to experience health effects. Members of sensitive groups may experience more serious health effects.
- ◊ VERY UNHEALTHY - AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- ◊ HAZARDOUS - AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

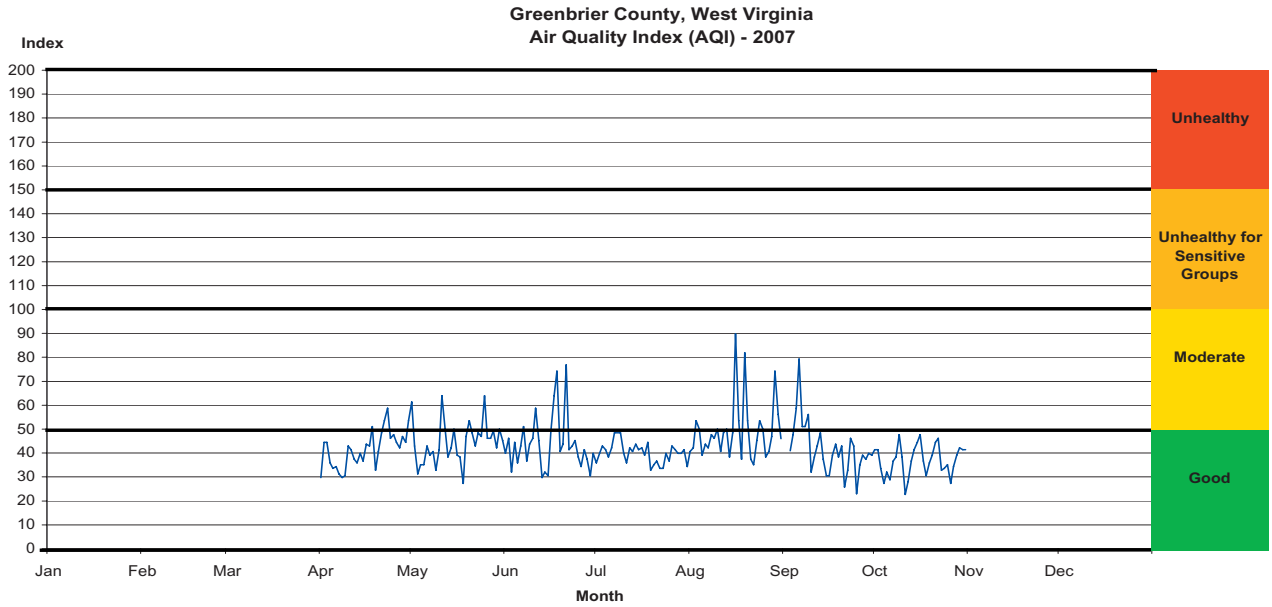
# Air Quality Index

| Air Quality Index Levels of Health Concern | Numerical Value | Meaning |
|---|---|---|
| Good | 0-50 | Air quality is considered satisfactory, and air pollution poses little or no risk. |
| Moderate | 51-100 | Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution. |
| Unhealthy for Sensitive Groups | 101-150 | Members of sensitive groups may experience health effects. The general public is not likely to be affected. |
| Unhealthy | 151-200 | Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects. |
| Very Unhealthy | 201-300 | Health alert. Everyone may experience more serious health effects. |
| Hazardous | >300 | Health warnings of emergency conditions. The entire population is more likely to be affected. |

| Location | Highest AQI Value | 2007 - Days in each category: | | | | Pollutants Considered |
|---|---|---|---|---|---|---|
| | | Good | Moderate | Unhealthy for Sensitive Groups | Unhealthy | |
| Charleston | 116 | 313 | 49 | 3 | 0 | $SO_2$, $O_3$, $PM_{10}$ |
| Greenbrier County | 90 | 186 | 26 | 0 | 0 | $O_3$ |
| Huntington | 124 | 286 | 66 | 8 | 0 | $SO_2$, $O_3$ |
| Martinsburg | 109 | 182 | 26 | 1 | 0 | $O_3$ |
| Morgantown | 95 | 335 | 30 | 0 | 0 | $SO_2$, $O_3$ |
| Vienna | 114 | 314 | 49 | 2 | 0 | $SO_2$, $O_3$ |
| Weirton | 97 | 324 | 41 | 0 | 0 | CO, $SO_2$, $O_3$, $PM_{10}$ |
| Wheeling | 92 | 300 | 52 | 0 | 0 | $O_3$, $PM_{10}$ |

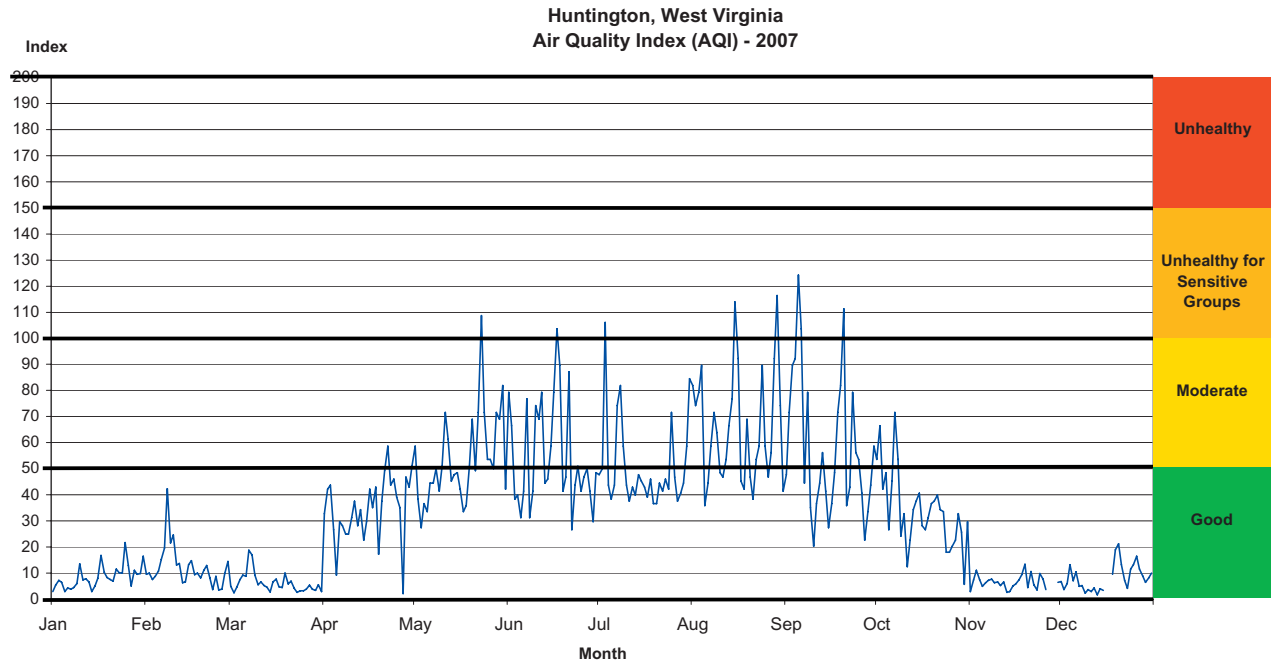
# Air Quality Index (AQI data)

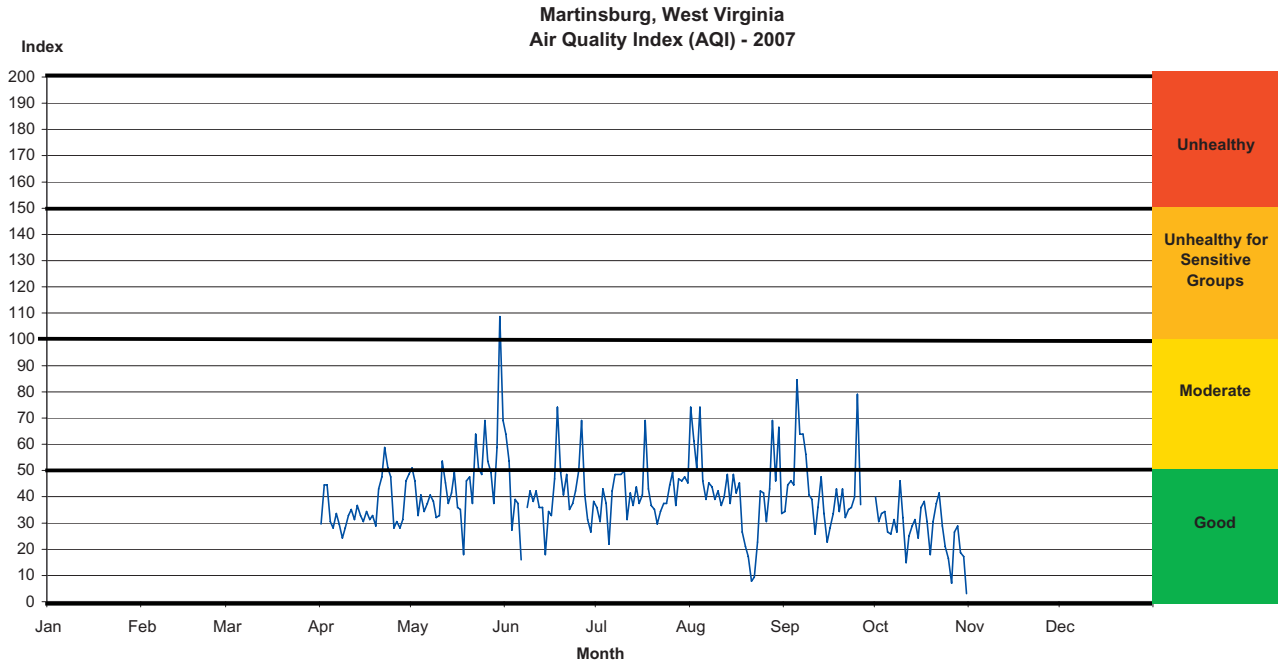



Ozone Monitoring Season is from April thru October.

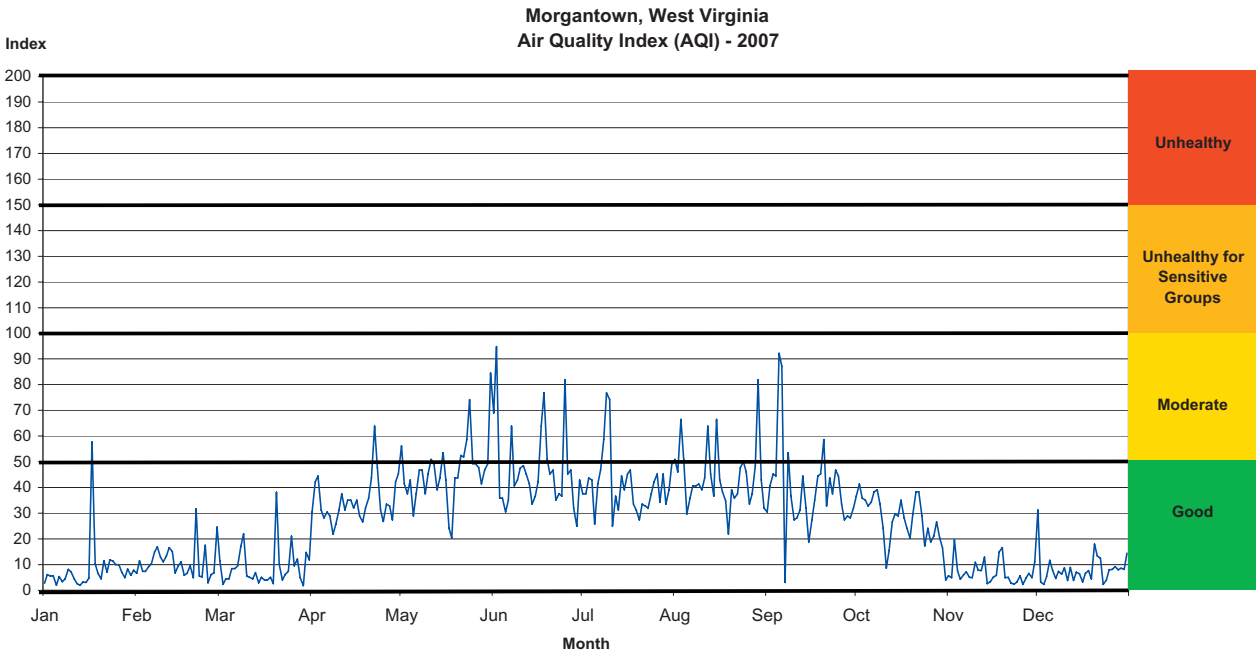
# Air Quality Index (AQI data)

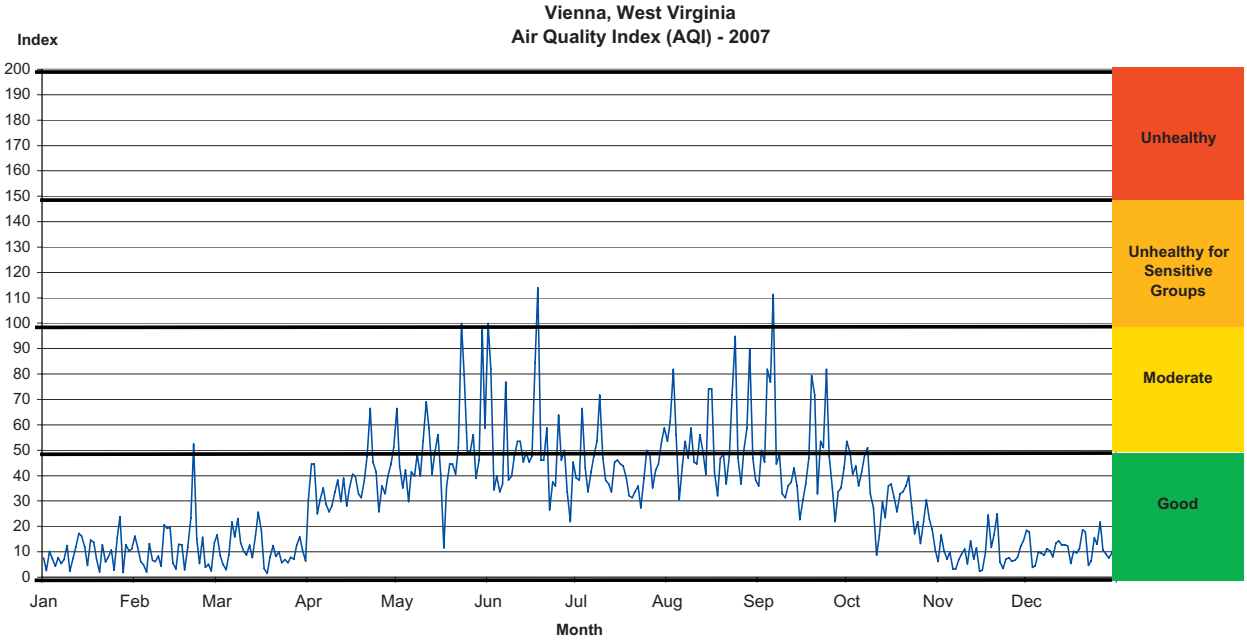


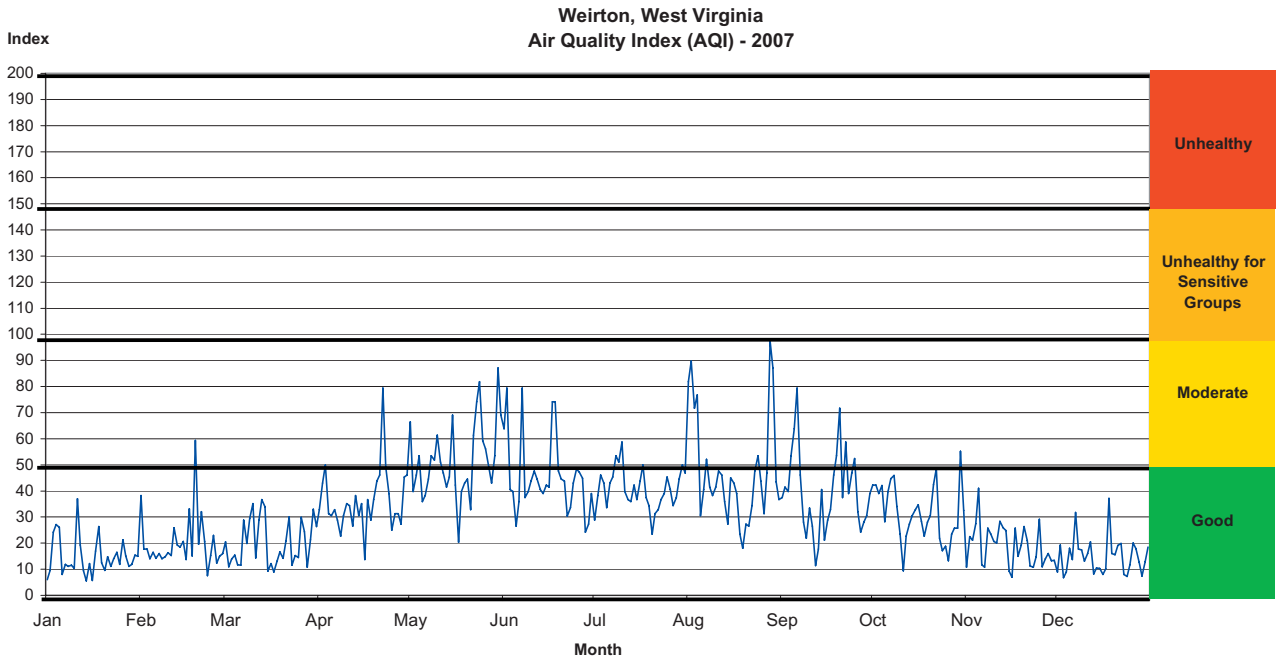

Ozone Monitoring Season is from April thru October.

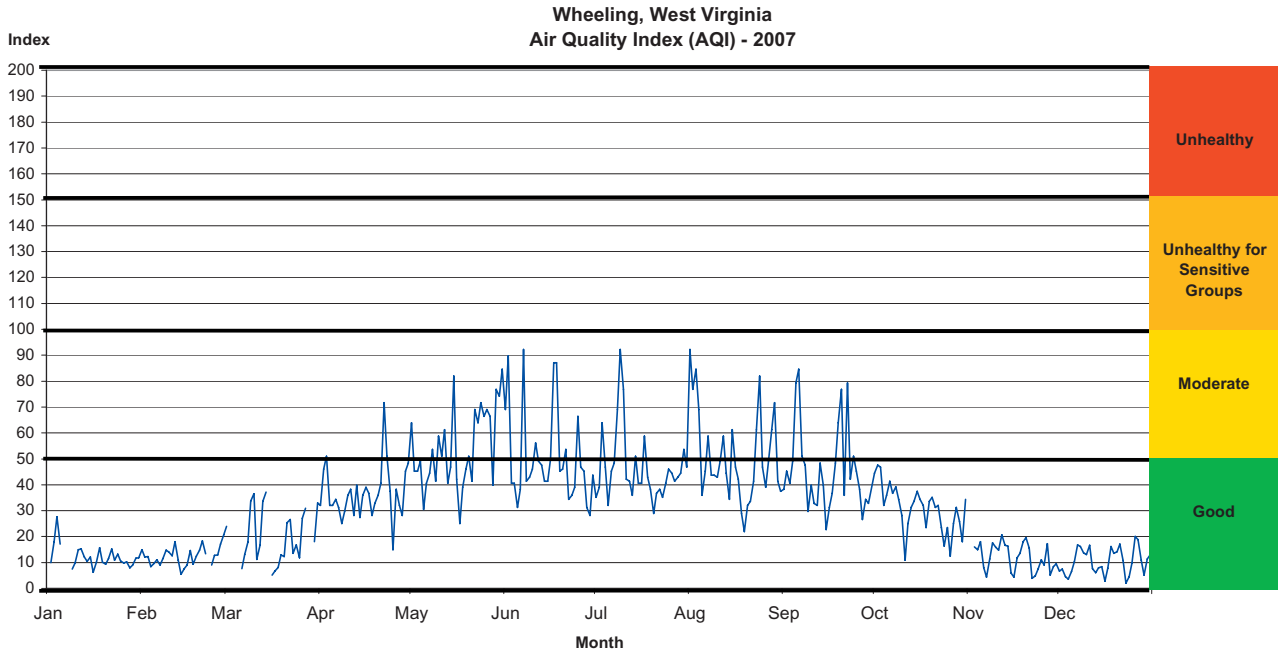
# Air Quality Index (AQI data)

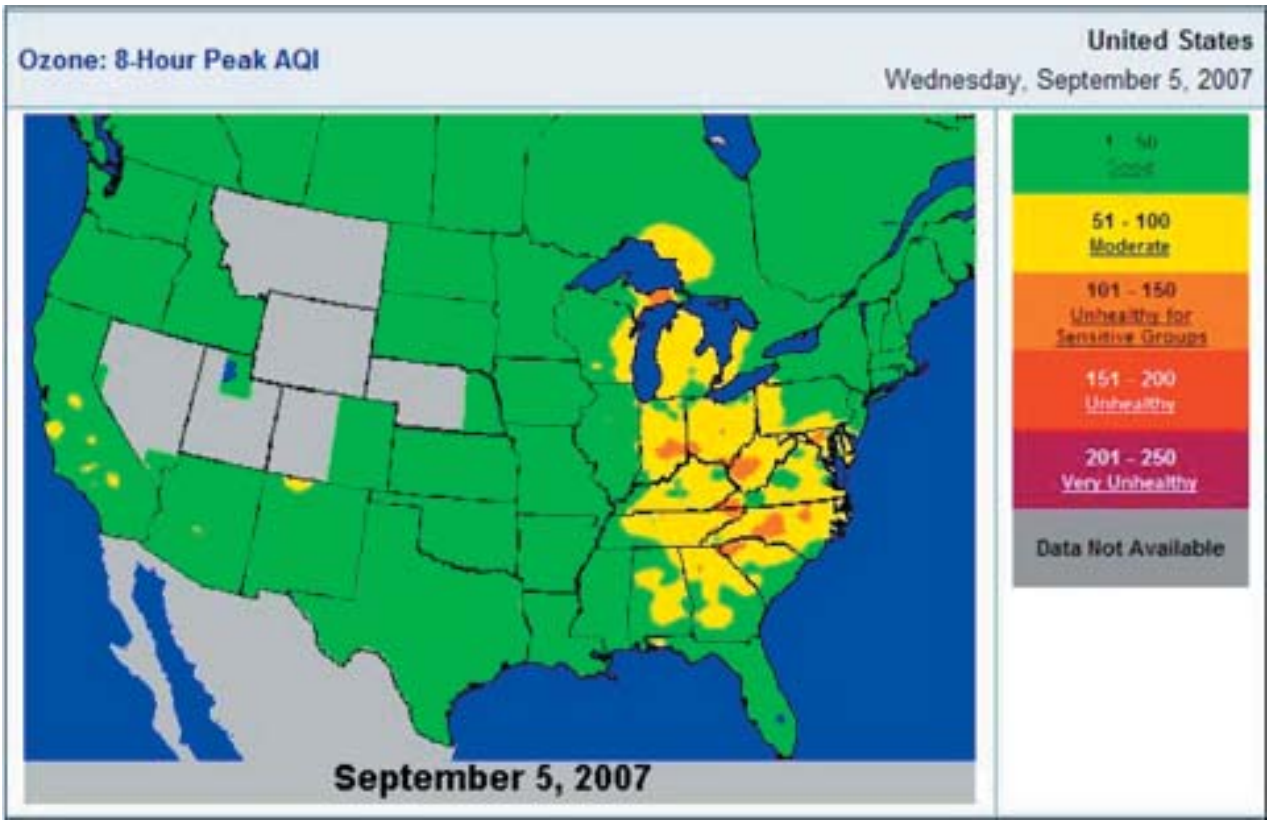


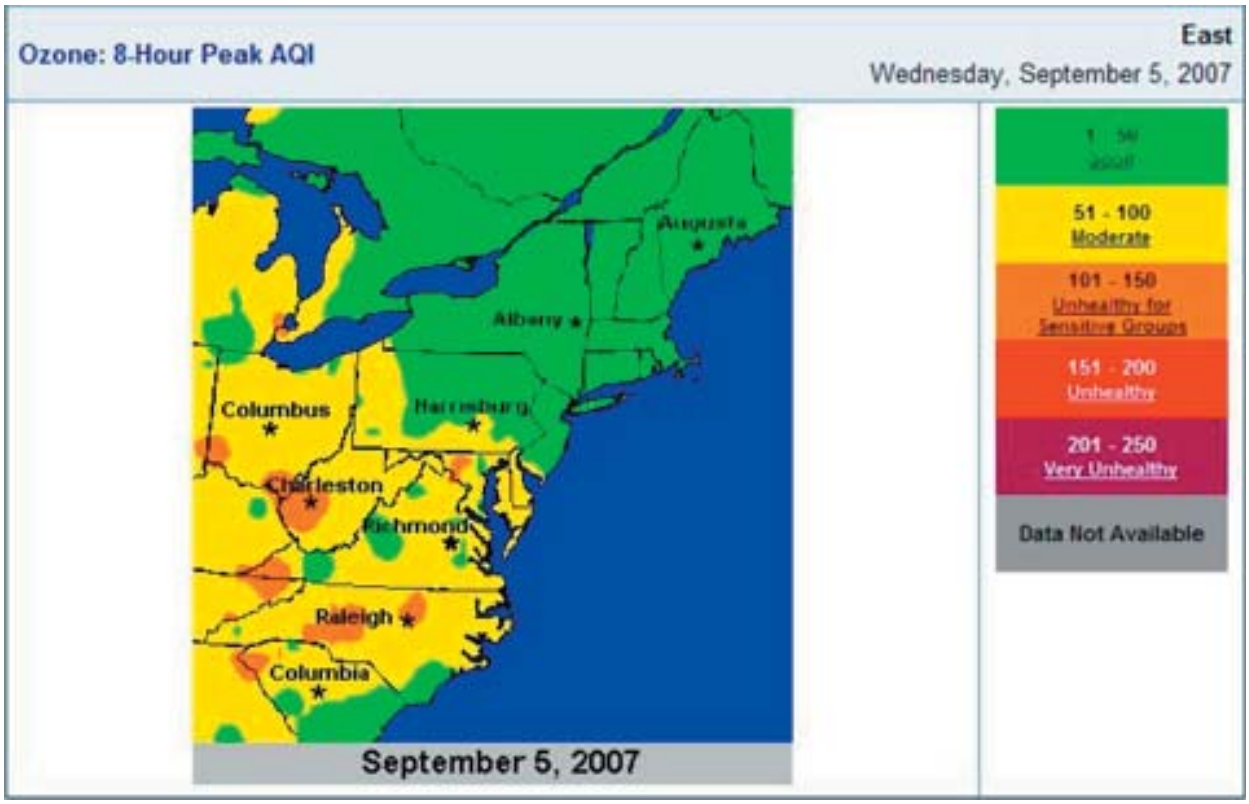
# Air Quality Index (AQI data)



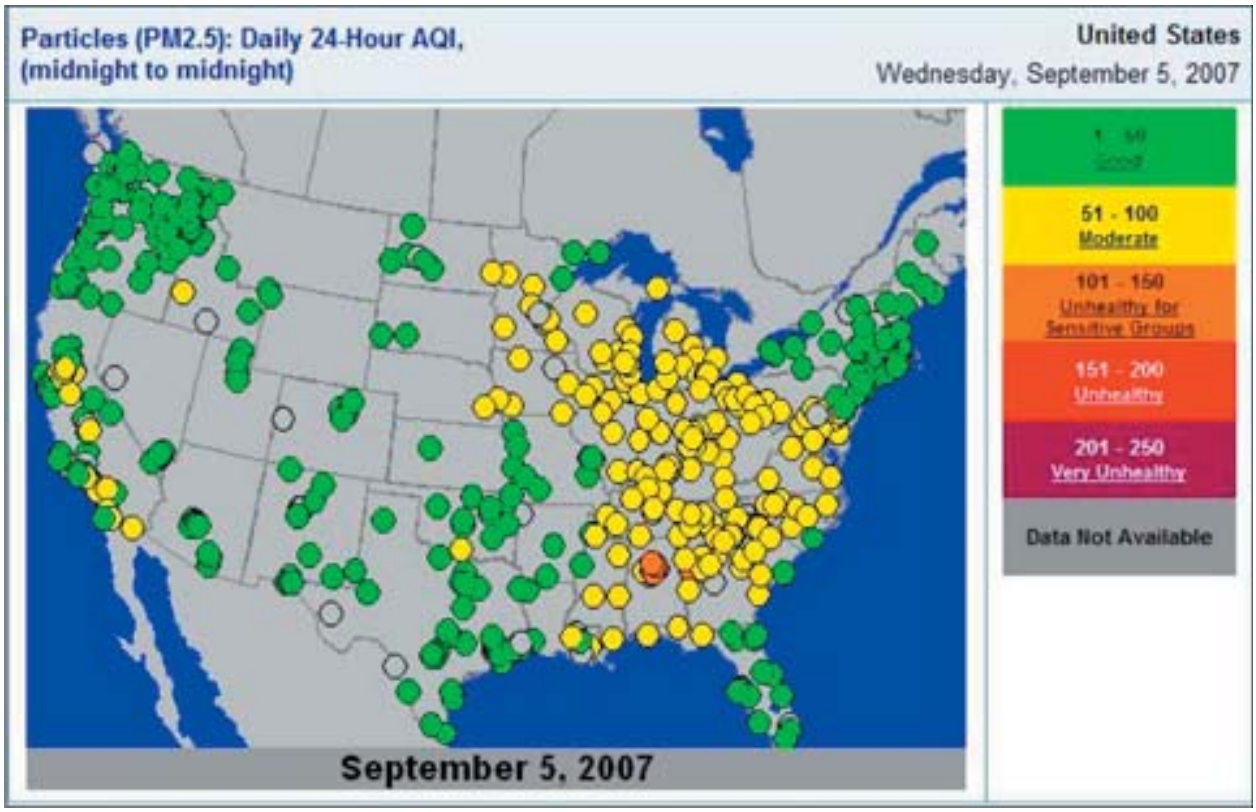



High temperatures, calm winds and high humidity in the summer of 2007 contributed to higher AQI values and a higher than average number of days in the “Unhealthy for Sensitive Groups” category. Fortunately, even with such conditions, no monitoring sites recorded values close to the “Unhealthy” category. A total of 14 values were recorded in the “orange” or “UFSG” category from four of the eight monitoring stations. Except for one value recorded in June at Martinsburg, all others were recorded at stations in Charleston, Huntington and Vienna.




The maps for September 5 depict particularly high AQI values for ozone across our neighboring states, especially to the west, resulting in the highest values of the year recorded at monitoring sites in Huntington and Charleston. Climatological data recorded by the National Weather Service indicated consecutive days with temperatures in the mid-90s, no precipitation and calm winds. Similar conditions also contributed to seven additional "orange" days in Huntington from late-May through late-September. These episodes, along with natural topography, combine to result in elevated levels of pollutants in the air. These same conditions did not impact $PM_{2.5}$ as severely in urban areas across the region as shown on the map on the following page.

# Air Quality Index (AQI data)




These national and regional maps reflect the reality that air pollutants are transported across local, state, regional and even national boundaries. Every state is downwind or upwind from others. These maps are from EPA's AirNOW network, www.airnow.gov. The website was developed to provide the public with easy access to national air quality information. The network provides an hourly update for ozone data from 9 a.m. to 9 p.m. from May through September and all other pollutants on a year round basis.

Particle pollution, also called particulate matter or PM, is a complex mixture of extremely small particles and liquid droplets in the air. When breathed in, these particles can reach the deepest regions of the lungs and can contribute to health problems, ranging from aggravated asthma to premature death in people with heart and lung disease. Particle pollution is also the main cause of visibility problems (regional haze) in the nation's cities and national parks.

# APPENDIX A

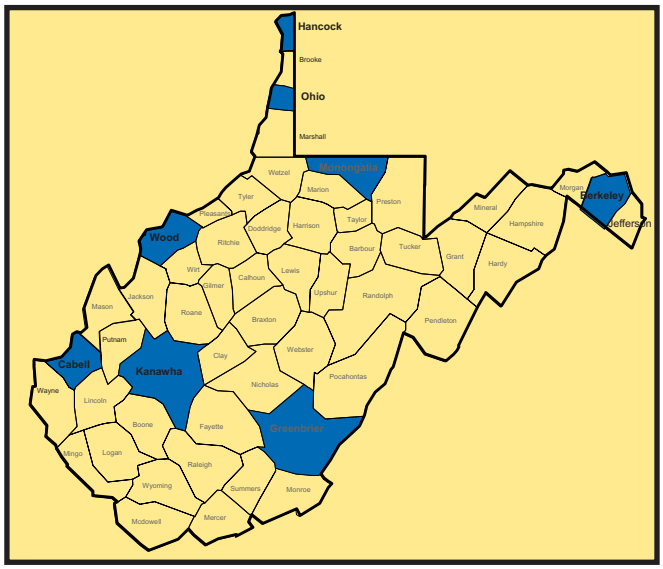
# Technical Information Ambient Monitoring

## West Virginia Division of Air Quality - Monitoring Network

### CY 2007

| County | $PM_{10}$ | $PM_{2.5}$ | CO | $SO_2$ | $O_3$ | MET | $PM_{2.5}$ SPECIATION |
|---|---|---|---|---|---|---|---|
| Berkeley | | 1 | | | 1 | | |
| Brooke | 2 | 2 | 1 | 3 | | | |
| Cabell | | 1 | | 1 | 1 | | |
| Greenbrier | | | | | 1 | | |
| Hancock | 2 | 1 | 2 | 6 | 1 | 2 | |
| Harrison | | 1 | | | | | |
| Kanawha | 1 | 2 | | 1 | 1 | 1 | 2 |
| Marion | | 1 | | | | | |
| Marshall | | 1 | | 1 | | | 1 |
| Monongalia | | 1 | | 1 | 1 | | |
| Ohio | 1 | 1 | | | 1 | | |
| Raleigh | | 1 | | | | | |
| Wood | | 1 | | 1 | 1 | | |
| Total Sites | 6 | 14 | 3 | 14 | 8 | 3 | 3 |

# OZONE




**Criteria Pollutant Summary Report - 2007**

**Pollutant:** Ozone
**Monitoring Season:** April 1 - October 31
**Data Interval:** Hourly
**Units:** Parts-per-million (PPM)

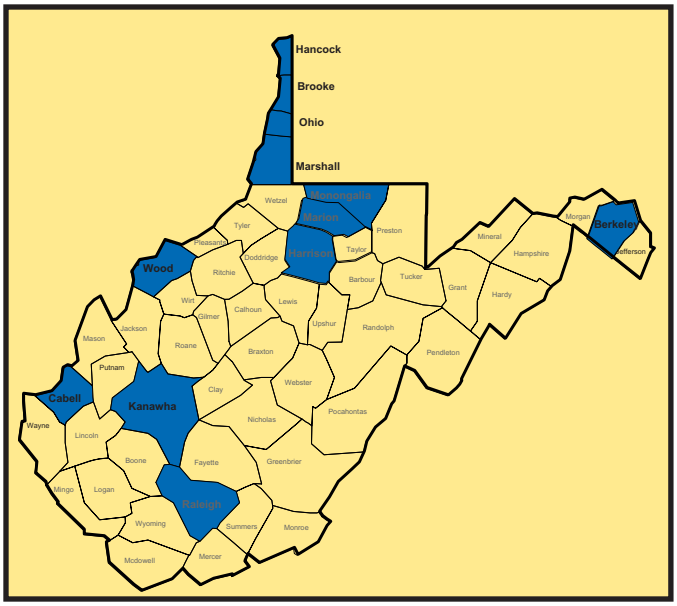
**National Ambient Air Quality Standards (NAAQS)**

**Primary NAAQS:** 8-Hour (3-year average of 4th max.) 0.085 PPM

**Secondary NAAQS:** Same as Primary Standard

| County | Site | EPA-ID | # Valid Days | 8-Hour Averages | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs >0.08 | 1st Max | 2nd Max | 3rd Max | 4th Max | '05-'07 4th Max |
| Berkeley | Martinsburg | 54-003-0003 | 205 | 1 | .088 | .078 | .074 | .074 | .075 |
| Cabell | Huntington | 54-011-0006 | 211 | 8 | .094 | .091 | .090 | .089 | .084 |
| Greenbrier | Sam Black Church | 54-025-0003 | 206 | 0 | .080 | .077 | .076 | .075 | .071 |
| Hancock | Weirton | 54-029-1004 | 211 | 0 | .083 | .080 | .079 | .079 | .077 |
| Kanawha | Charleston | 54-039-0010 | 211 | 3 | .091 | .091 | .085 | .082 | .079 |
| Monongalia | Morgantown | 54-061-0003 | 212 | 0 | .082 | .081 | .079 | .078 | .078 |
| Ohio | Wheeling | 54-069-0010 | 214 | 0 | .081 | .081 | .081 | .080 | .082 |
| Wood | Vienna | 54-107-1002 | 212 | 2 | .090 | .089 | .084 | .084 | .082 |

# PARTICULATE MATTER($PM_{2.5}$)




Criteria Pollutant Summary Report - 2007

| | | |
|---|---|---|
| Pollutant: | Particulate Matter $PM_{2.5}$ | |
| Monitoring Season: | January 1 - December 31 | |
| Data Interval: | 24-Hour | |
| Units: | Micro-grams per cubic meter ($ug/m^3$) | |

National Ambient Air Quality Standards (NAAQS)

| | | |
|---|---|---|
| Primary NAAQS: | Annual Arithmetic Mean (3yr average) | 15 $ug/m^3$ |
| | 24-Hour Average (3yr average 98th percentile) | 35 $ug/m^3$ |
| Secondary NAAQS: | Same as Primary Standard | |

| County | Site | EPA-ID | # Obs | Annual Mean | 24-Hour Average | | | | 3 Year Average | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Obs > 35 | 98% | 1st Max | 2nd Max | Annual | 24-Hr 98% |
| Berkeley | Martinsburg | 54-003-0003 | 118 | 15.61 | 1 | 31.4 | 41.1 | 34.6 | 15.84 | 33.4 |
| Brooke | Follansbee | 54-009-0005 | 118 | 16.40 | 4 | 40.0 | 46.0 | 43.2 | 16.35 | 37.0 |
| Brooke | Weirton | 54-009-0011 | 121 | 16.35 | 6 | 49.7 | 50.5 | 50.1 | 16.07 | 43.8 |
| Cabell | Huntington | 54-011-0006 | 119 | 16.65 | 5 | 39.4 | 43.2 | 42.6 | 16.59 | 36.7 |
| Hancock | Weirton | 54-029-1004 | 116 | 15.73 | 6 | 44.9 | 52.8 | 49.7 | 15.25 | 40.8 |
| Harrison | Clarksburg | 54-033-0003 | 121 | 14.12 | 1 | 31.5 | 38.2 | 32.0 | 14.20 | 33.5 |
| Kanawha | Charleston | 54-039-0010 | 109 | 15.51 | 1 | 33.5 | 43.6 | 34.0 | 15.38 | 35.5 |
| Kanawha | South Charleston | 54-039-1005 | 360 | 16.50 | 8 | 36.5 | 42.7 | 42.2 | 16.59 | 37.8 |
| Marion | Fairmont | 54-049-0006 | 118 | 15.30 | 2 | 33.5 | 39.7 | 39.0 | 15.25 | 33.6 |
| Marshall | Moundsville | 54-051-1002 | 351 | 14.99 | 10 | 37.9 | 47.5 | 46.2 | 15.23 | 34.9 |
| Monongalia | Morgantown | 54-061-0003 | 118 | 14.78 | 3 | 39.8 | 43.4 | 41.5 | 14.45 | 36.3 |
| Ohio | Wheeling | 54-069-0010 | 117 | 15.20 | 5 | 37.2 | 50.7 | 38.8 | 14.58 | 32.0 |
| Raleigh | Beckley | 54-081-0002 | 115 | 13.20 | 1 | 28.8 | 44.0 | 32.9 | 13.04 | 30.0 |
| Wood | Vienna | 54-107-1002 | 116 | 15.25 | 4 | 38.8 | 41.0 | 39.3 | 15.45 | 36.7 |

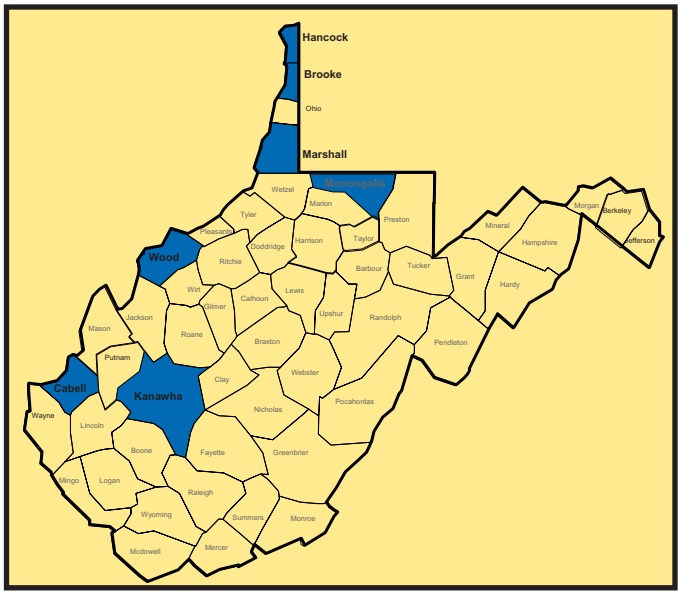
## PARTICULATE MATTER ($PM_{10}$)

Criteria Pollutant Summary Report - 2007

| | | |
|---|---|---|
| Pollutant: | Particulate Matter $PM_{10}$ | |
| Monitoring Season: | January 1 - December 31 | |
| Data Interval: | 24-Hour | |
| Units: | Micro-grams per cubic meter ($ug/m^3$) | |
| National Ambient Air Quality Standards (NAAQS) | | |
| Primary NAAQS: | 24-Hour Average | 150 $ug/m^3$ |
| Secondary NAAQS: | Same as Primary Standard | |

| County | Site | EPA-ID | # Obs | Annual Mean | 24-Hr Average | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Obs > 150 | 1st Max | 2nd Max | 3rd Max | 4th Max |
| Brooke | Follansbee | 54-009-0005 | 115 | 25.0 | 0 | 70 | 59 | 59 | 55 |
| Brooke | Weirton | 54-009-0011 | 8503 | 25.2 | 0 | 119 | 85 | 82 | 81 |
| Hancock | Weirton | 54-029-0009 | 8663 | 30.4 | 0 | 87 | 84 | 80 | 76 |
| Hancock | Weirton | 54-029-1004 | 58 | 23.5 | 0 | 135 | 65 | 56 | 43 |
| Hancock | Weirton | 54-029-1004 | 8546 | 23.1 | 0 | 88 | 83 | 83 | 74 |
| Kanawha | Charleston | 54-039-0010 | 6928 | 23.4 | 0 | 56 | 53 | 52 | 52 |

# SULFUR DIOXIDE ($SO_2$)

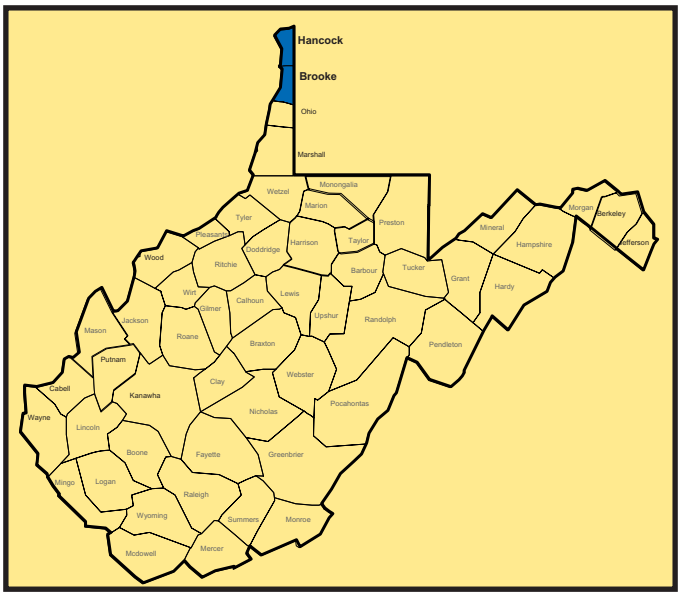



Criteria Pollutant Summary Report - 2007

| | | |
|---|---|---|
| Pollutant: | Sulfur Dioxide | |
| Monitoring Season: | January 1 - December 31 | |
| Data Interval: | Hourly | |
| Units: | Parts-per-million (PPM) | |
| National Ambient Air Quality Standards (NAAQS) | | |
| Primary NAAQS: | Annual Arithmetic Mean | 0.03 PPM |
| | 24-Hour Average | 0.14 PPM |
| Secondary NAAQS: | 3-Hour Average | 0.50 PPM |

| County | Site | EPA-ID | # Obs | Annual Mean | 24-Hr Average | | | 3-Hr Average | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Obs >0.14 | 1st Max | 2nd Max | Obs >0.50 | 1st Max | 2nd Max |
| Brooke | Follansbee | 54-009-0005 | 8716 | .0092 | 0 | .041 | .031 | 0 | .137 | .133 |
| Brooke | Weirton | 54-009-0007 | 8669 | .0102 | 0 | .055 | .044 | 0 | .141 | .117 |
| Brooke | Weirton | 54-009-0011 | 8694 | .0104 | 0 | .046 | .041 | 0 | .148 | .134 |
| Cabell | Huntington | 54-011-0006 | 8559 | .0048 | 0 | .029 | .017 | 0 | .043 | .037 |
| Hancock | New Manchester | 54-029-0005 | 8708 | .0118 | 0 | .096 | .060 | 0 | .264 | .178 |
| Hancock | New Cumberland | 54-029-0007 | 8664 | .0098 | 0 | .050 | .048 | 0 | .187 | .141 |
| Hancock | Chester | 54-029-0008 | 8711 | .0078 | 0 | .046 | .037 | 0 | .086 | .079 |
| Hancock | Weirton | 54-029-0009 | 8683 | .0113 | 0 | .057 | .054 | 0 | .146 | .120 |
| Hancock | Lawrenceville | 54-029-0015 | 8677 | .0098 | 0 | .038 | .038 | 0 | .140 | .089 |
| Hancock | Weirton | 54-029-1004 | 8609 | .0106 | 0 | .053 | .044 | 0 | .137 | .120 |
| Kanawha | Charleston | 54-039-0010 | 8408 | .0088 | 0 | .036 | .030 | 0 | .086 | .075 |
| Marshall | Moundsville | 54-051-1002 | 8712 | .0105 | 0 | .041 | .039 | 0 | .105 | .098 |
| Monongalia | Morgantown | 54-061-0003 | 8529 | .0061 | 0 | .050 | .038 | 0 | .171 | .168 |
| Wood | Vienna | 54-107-1002 | 8646 | .0078 | 0 | .038 | .026 | 0 | .090 | .080 |

# CARBON MONOXIDE

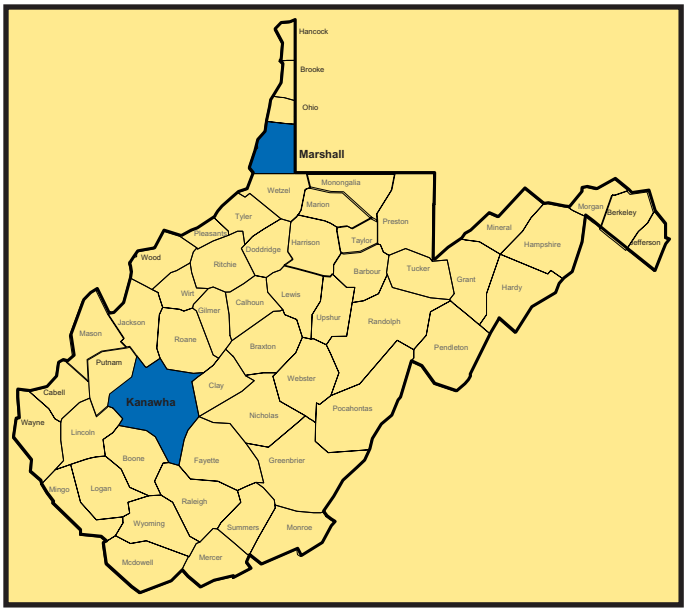



Criteria Pollutant Summary Report - 2007

| | | |
|---|---|---|
| Pollutant: | Carbon Monoxide | |
| Monitoring Season: | January 1 - December 31 | |
| Data Interval: | Hourly | |
| Units: | Parts-per-million (PPM) | |
| National Ambient Air Quality Standards (NAAQS) | | |
| Primary NAAQS: | 1-Hour Average | 35 PPM |
| | 8-Hour Average | 9 PPM |
| Secondary NAAQS: | Same as Primary Standard | |

| County | Site | EPA-ID | # Obs | 1-Hr Average | | | 8-Hr Average | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Obs >35.0 | 1st Max | 2nd Max | Obs >9.0 | 1st Max | 2nd Max |
| Brooke | Weirton | 54-009-0011 | 8246 | 0 | 3.5 | 3.2 | 0 | 2.5 | 2.4 |
| Hancock | Weirton | 54-029-0009 | 8659 | 0 | 2.0 | 1.9 | 0 | 1.5 | 1.4 |
| Hancock | Weirton | 54-029-1004 | 8687 | 0 | 2.6 | 2.3 | 0 | 1.7 | 1.6 |

# PM $_{2.5}$ SPECIATION DATA SUMMARY



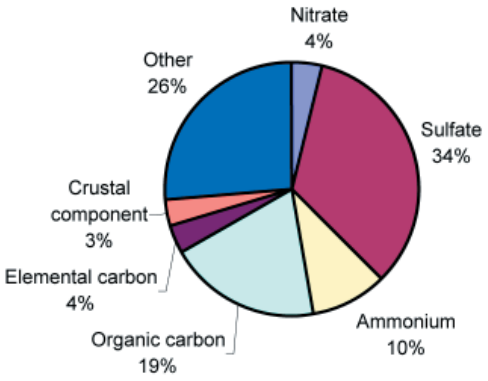

PM2.5 Speciation Data Summary - 2007

Monitoring Season: January 1 - December 31
Data Interval: 24-Hour

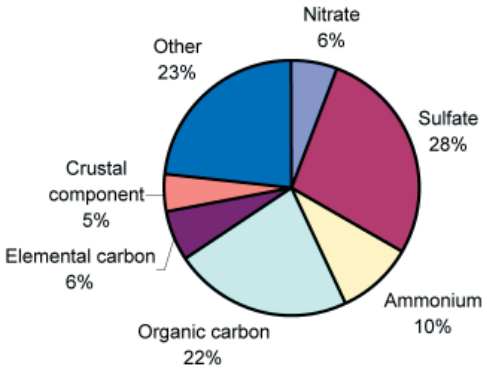
| County | Site | EPA-ID | # Obs |
|---|---|---|---|
| Kanawha | Guthrie | 54-039-0011 | 106 |
| Kanawha | South Charleston | 54-039-1005 | 53 |
| Marshall | Moundsville | 54-051-1002 | 59 |

# PM $_{2.5}$ SPECIATION DATA SUMMARY

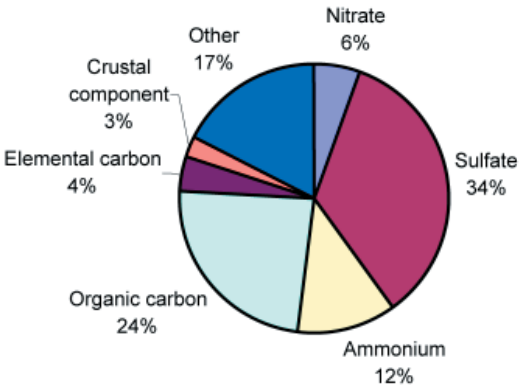
Guthrie
AIRS Code 540390011 POC 5 (ROUTINE)
Date(s): 1/3/2007 - 12/29/2007
Average Concentration = 14.06 (µg/m³)




South Charleston
AIRS Code 540391005 POC 5 (ROUTINE)
Date(s): 1/6/2007 - 12/26/2007
Average Concentration = 19.07 (µg/m³)




Moundsville
AIRS Code 540511002 POC 5 (ROUTINE)
Date(s): 1/6/2007 - 12/26/2007
Average Concentration = 16.24 (µg/m³)



# APPENDIX B

# Definitions, Terms and Acronyms

# Definitions, Terms and Acronyms

***Acid precipitation or acid rain***
Water falling in drops condensed from vapor in the atmosphere with acidic qualities. Principal components typically include nitric and sulfuric acid with water vapor.

**Air pollutants**
Solids, liquids, or gases which, if discharged into the air, may result in statutory air pollution.

**Air pollution**
Statutory air pollution has the meaning ascribed to it in West Virginia Code §22-5-2.

**Ambient air**
Generally, the atmosphere; outdoors.

**Anions**
Negatively charged molecule, such as sulfate and nitrate. In combination with hydrogen, these molecules act as strong acids.

**Annual arithmetic mean**
The numerical average of the data for the year.

**AQI**
Air Quality Index.

**Attainment**
EPA designation that an area meets the National Ambient Air Quality Standards.

**24-hour average**
The average concentration for a 24-hour period.

**CAA**
Clean Air Act.

**CAIR**
Clear Air Interstate Rule.

**Carbon Sequestration**
The physical process by which emissions of a greenhouse gas are directly captured for storage in a reservoir, or the biologic process by which a greenhouse gas is indirectly removed from the atmosphere for storage in a sink.

**Cations**
Positively charged ions, such as magnesium, sodium, potassium and calcium, that increase pH of water (make it less acidic) when released to solution through mineral weathering and exchange reactions.

**CO**
Carbon monoxide.

**Criteria pollutant**
An air pollutant for which certain levels of exposure have been determined to injure health, harm the environment and cause property damage. EPA-developed National Ambient Air Quality Standards, using science-based guidelines as the basis for setting acceptable levels.

**DAQ**
Division of Air Quality - Department of Environmental Protection office that administers West Virginia's air quality management program for the protection of public health, welfare, and the environment.

**DEP**
Department of Environmental Protection - West Virginia's regulatory agency charged with protecting and promoting a healthy environment.

**De minimis**
Refers to a level which is considered to be insignificant.

**EAC**
Early Action Compact.

**Elements**
Chemicals, such as hydrogen, iron, sodium, carbon, nitrogen, or oxygen, whose distinctly different atoms serve as the basic building blocks of all matter. There are 92 naturally occurring elements. Another 15 have been made in laboratories. Two or more elements combine to form compounds that make up most of the world's matter.

**Emissions**
Air pollutants exhausted from a unit or source into the atmosphere.

**Exceedance**
An incident occurring when the concentration of a pollutant in the ambient air is higher than the National Ambient Air Quality Standards.

**EPA or U.S. EPA**
Environmental Protection Agency, federal agency that oversees the protection of the environment.

**Fossil fuels**
Natural gas, petroleum, coal or any form of solid, liquid or gaseous fuel derived from such material.

**Greenhouse gas**
The gaseous compounds: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF6).
.

**HAP**
Hazardous Air Pollutant.

**MACT**
Maximum Achieveable Control Technology.

**Mercury**
A naturally occurring element that is found in air, water and soil. It exists in several forms, elemental or metallic mercury, inorganic mercury compounds, and organic mercury compounds. Elemental or metallic mercury is a shiny, silver-white metal and is liquid at room temperature.

**MSA**
Metropolitan Statistical Area.

**NAAQS**
National Ambient Air Quality Standards, set by EPA to protect human health and welfare.

**Nonattainment**
EPA designation that an area does not meet the National Ambient Air Quality Standards.

**$NO_x$**
Nitrogen oxides.

**$O_3$**
Ozone.

**Ozone season**
The period beginning April 1 and ending on September 30 of the same year.

**Pb**
Lead.

**PM**
Particulate Matter.

**Particulate Matter**
Any material, except uncombined water, that exists in a finely divided form as a liquid or solid.

**ppb**
Parts per billion by volume.

**ppm**
Parts per million by volume.

**Precursor**
A substance that is the source of or aids in the formation of another substance.

**Regulated air pollutant**
Any air pollutant subject to a standard or other requirement promulgated under section 112 of the Clean Air Act, or any air pollutant for which a National Ambient Air Quality Standard has been promulgated including particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone and lead or lead compounds.

**Sinks**
any process, activity or mechanism which removes a greenhouse gas from the atmosphere. Forests are considered sinks because they remove carbon dioxide through photosynthesis.

**SIP**
State Implementation Plan. Plan to attain and maintain the National Ambient Air Qualiity Standards for criteria pollutants.

**$SO_2$**
Sulfur dioxide.

**Source or stationary source**
Any governmental, institutional, commercial or industrial structure, installation, plant, building or facility that emits or has the potential to emit any regulated air pollutant under the Clean Air Act.

**Statutory Air Pollution**
The discharge into the air by the act of man, of substances (liquid, solid, gaseous, organic or inorganic) in a locality, manner and amount as to be injurious to human health or welfare, animal or plant life, or property, or which would interfere with the enjoyment of life or property.

**$\mu g/m^3$**
Micrograms per cubic meter.

**VISTAS**
Visibility Improvement - State and Tribal Association of the Southeast.

**VOC**
Volatile organic compound.

# AIR QUALITY RELATED INTERNET SITES

West Virginia Department of Environmental Protection - Division of Air Quality
http://www.wvdep.org/daq

Environmental Protection Agency
http://www.epa.gov/

Air Quality Data
EPA Office of Air and Radiation - Air Quality Planning and Standards
AIRS Web - Access to national and state air pollution and emissions data
http://www.epa.gov/air/data/

Air Explorer - Collection of user-friendly visualization tools for air quality analysis
http://www.epa.gov/airexplorer/

Air Monitoring - Provides information for evaluating the status of the atmosphere as compared to clean air standards and historical information
http://www.epa.gov/oar/oaqps/montring.html

Air Now - Ozone mapping, AQI and real time data
http://www.airnow.gov/

Air Quality and Emissions Trends Reports - Trends Reports are EPA's "report card" on the status of air quality and air pollutant emissions
http://www.epa.gov/airtrends/reports.html

National Institute of Chemical Studies
http://www.nicsinfo.org/

Nonattainment area descriptions
http://www.epa.gov/oar/oaqps/greenbk/

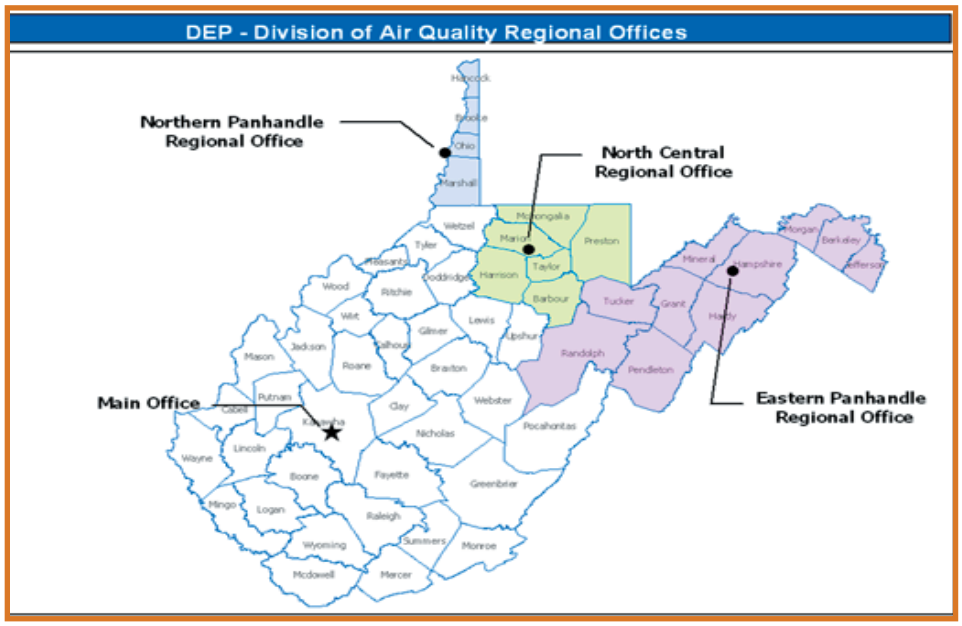
EPA Technology Transfer Network (TTN Web)

| | |
|---|---|
| Air Quality Monitoring | http://www.epa.gov/ttn/amtic/ |
| NAAQS Information | http://www.epa.gov/ttn/naaqs/ |

Education
Links for educational resources
http://www.epa.gov/epahome/educational.htm

Provides links to outreach efforts about technical air training, upcoming conferences and environmental education
http://www.epa.gov/air/oaqps/eog/

# Contact Information




| | |
|---|---|
| Charleston Office: | 601 57th Street, SE<br>Charleston, WV 25304<br>Telephone: (304) 926-0475<br>Fax: (304) 926-0479 |
| Eastern Panhandle Regional Office: | HC 63, Box 2545<br>Romney, WV 26757<br>Telephone: (304) 822-7266<br>Fax: (304) 822-3535 |
| North Central Regional Office: | 2031 Pleasant Valley Road<br>Suite #1<br>Fairmont, WV 26554<br>Telephone: (304) 368-3910<br>Fax: (304) 368-3959 |
| Northern Panhandle Regional Office: | 131A Peninsula Street<br>Wheeling, WV 26003<br>Telephone: (304) 238-1220<br>Fax: (304) 238-1136 |
| Guthrie Lab: | 4900 Brenda Lane<br>Building 14<br>Charleston, WV 25312<br>Telephone: (304) 558-4323<br>Fax: (304) 558-1192 |
| Small Business Assistance Program: | Telephone: (866) 568-6649, ext. 1245 |
| Daily AQI: | Telephone: (866) 568-6649, ext. 274<br>www.wvdep.org/daq |