Air Quality 2015 Annual Report

Air Quality Annual Report

West Virginia Department of Environmental Protection
Division of Air Quality

601 57th Street S.E.
Charleston, WV 25304

Earl Ray Tomblin
Governor

Randy C. Huffman
Cabinet Secretary

Director's Page

It is my pleasure to present the 2015 Air Quality Annual Report. My hope is that the information on the following pages gives you a better understanding of the work the West Virginia Division of Air Quality is responsible for - to protect the public health and welfare of the citizens of West Virginia and to ensure economic growth and preservation of our existing resources.

In an effort to address the increased volume of natural gas-related permitting actions, in February our Permitting Section developed and then placed out to public notice Class II General Permit G80-A for natural gas production, compressor and/or dehydration facilities. This proposed general permit would incorporate the requirements of two existing general permits into one. In mid-March, a public notice and meeting was held at our headquarters in Charleston and live-streamed on DEP's YouTube channel (www.youtube.com/user/WVEnvironment). This was a first for our office and a step forward in increasing availability for public participation.

After review of the comments received on G80-A, the decision was made to not issue G80-A in its current form, but to update two existing general permits – G70-A for natural gas production facilities and G35-B for natural gas compressor and dehydration facilities. This action prompted two additional public notices and meetings for those general permits in late summer. G70-B was issued on November 2 and G35-C was issued December 18.

On October 23, the EPA finalized the Clean Power Plan (CPP). The CPP established final emission guidelines for states to develop plans to reduce greenhouse gas (GHG) emissions from existing fossil fuel-fired electric power plants. This rule specifically established carbon dioxide (CO_2) emission performance rates, as well as state-specific CO_2 goals and guidelines for the development, submittal and implementation of state plans to meet the state goals.

In 2012, there were 16 coal-fired power plants operating in West Virginia. At the end of 2015, six had been retired. Needless to say for West Virginia, a state where over 95 percent of our net electricity production comes from coal-fired electric power plants, much work has been completed since the original CPP proposal in late 2014, and even more would need to be done in order for us to meet these EPA-mandated state goals.

Also in October, the EPA strengthened the National Ambient Air Quality Standards (NAAQS) for ground-level ozone from 75 parts per billion (ppb) to 70 ppb based upon extensive scientific evidence concerning ozone's effects on public health and welfare. At that time, the EPA also updated the Air Quality Index (AQI) for ozone and the ozone monitoring season to help inform the public about daily air quality. I am happy to report that West Virginia's eight ozone monitoring sites are showing attainment with the new standard.

As we close the books on 2015, there is still much work to be accomplished. As always, if you have suggestions for improvements to this report, we welcome your comments and suggestions.

William Fred Durham
Director

Table of Contents

2015 Highlights

Carbon Dioxide Standards for Power Plants

During the 2015 Legislative Session, the West Virginia Legislature amended W.Va. Code §22-5-20 relating to the development of a state plan regulating carbon dioxide emissions. These changes from existing power plants under Section 111(d) of the Clean Air Act (CAA) prohibited submission of a state plan without authority; required the Department of Environmental Protection (DEP) to study the feasibility of a state plan; required the DEP to submit a report to the Legislature within 180 days after the U. S. Environmental Protection Agency (EPA) finalized a rule under CAA §111(d), determining whether a state plan is feasible; allowed for the development of a proposed state plan; required the state plan to be on a unit-specific basis; allowed for the plan to be either a rate-based or meter-based standard; allowed for legislative review and consideration prior to submission of a state plan to the EPA; and, created exceptions to the legal effect of a state plan.

In August 2015, the EPA finalized carbon dioxide (CO_2) standards for new, modified and reconstructed electric power plants under the authority of CAA §111(b). The new source performance standards (NSPS) established separate standards of performance for fossil fuel-fired electric utility steam generating units (coal-, oil- or natural gas-fired boilers) and fossil fuel-fired stationary combustion turbines (turbines). Newly constructed power plant boilers are required to implement partial carbon capture and storage (CCS), while modified and reconstructed boilers are required to implement the most efficient generation achievable through a combination of best operating practices and equipment upgrades. Newly constructed turbines are required to employ efficient natural gas combined cycle (NGCC) technology for base-load natural gas-fired units and clean fuels for non-base load and multi-fuel-fired units.

In addition, the EPA finalized emission guidelines under CAA §111(d) for states to use in developing plans to limit CO_2 emissions from existing fossil fuel-fired power plants. The EPA established CO_2 emission performance rates representing the best system of emission reduction (BSER) for both boilers and turbines; state-specific CO_2 goals reflecting the application of BSER; and, guidelines for development, submittal and implementation of state plans. States were required to submit plans to the EPA following a schedule set by the guidelines. However, on February 9, 2016, the United States Supreme Court stayed the Clean Power Plan until the D.C. Circuit Court can hear the case. All deadlines in the rule are suspended while the stay is in effect.

Concurrently, the EPA proposed a federal plan to implement the emission guidelines for existing fossil-fuel-fired electric generating units. The proposal presents two approaches to a federal plan for states that do not submit an approvable plan to EPA: a rate-based emission trading program and a mass-based emission trading program. These proposals also constitute model trading rules that states can adopt or tailor for implementation of the final emission guidelines.

The EPA's promulgation of the emission guidelines under CAA §111(d) triggered the requirement for DEP to conduct the legislative study required by W.Va. Code §22-5-20, as amended. The Division of Air Quality (DAQ) subsequently finalized the feasibility study in April 2016.

2015 Highlights

Ozone

On October 1, 2015, the EPA strengthened both the primary and secondary National Ambient Air Quality Standards (NAAQS) for ground-level ozone to 70 parts per billion (ppb), based on extensive scientific evidence about ozone's effects on public health and welfare. The updated standards are meant to improve public health protection, particularly for at-risk groups including children, older adults, people of all ages who have lung diseases such as asthma, and people who are active outdoors, especially outdoor workers. The EPA also says they will improve the health of trees, plants and ecosystems.

The EPA uses three years of data to determine if an area meets the standards. An area will meet the standards if the fourth highest maximum daily eight-hour ozone concentration each year, averaged over three years, is 70 ppb or below.

The EPA also made revisions to; the data handling conventions for ozone, cut points for the Air Quality Index (AQI), regulations for the prevention of significant deterioration (PSD) program, exceptional events schedules and implementation information for the new standards. Based on the 2013 through 2015 ozone data, all areas of the state meet the new ozone standard of 70 ppb.

Sulfur Dioxide (SO_2)

Air quality in the Cross Creek Tax District of Brooke County and the Clay, Franklin and Washington Tax Districts of Marshall County has seen significant improvement since the areas were designated as nonattainment with the 2010 SO_2 NAAQS of 75 ppb, based on the 2009-2011 design value. Both areas are currently monitoring attainment of the standard, based on 2013-2015 design values. The DAQ has been working with sources in both areas to develop modeled attainment demonstrations and plans to submit modeled attainment demonstrations for both areas in 2016.

On August 21, 2015, the EPA issued the Data Requirements Rule (DRR) for the 2010 SO_2 NAAQS, which established timelines for EPA to complete designations for the 2010 SO_2 NAAQS. Sources with actual SO_2 emissions in 2014 of greater than 2,000 tons will be required to characterize peak one-hour SO_2 concentrations by conducting air quality modeling; installing air quality monitors; limiting emissions to below 2,000 tons per year; or, shutting down by January 2017. There are 10 sources in West Virginia subject to the DRR.

2015 Highlights

NCore Network

NCore is a multi-pollutant air monitoring network that integrates several advanced measurement systems for particles ($PM_{2.5}$, PM_{10}, and continuous $PM_{2.5}$), trace level pollutant gases (SO_2, O_3, NO_x/NO_y, and CO) and meteorology. There are approximately 80 NCore sites across the country and one of those sites was established in Charleston, West Virginia. This site replaces a smaller site that operated in Charleston for many years. The NCore site installation was completed in 2015 and preliminary testing of the systems was conducted. Official monitoring will begin January 1, 2016, and other types of monitors will be consolidated to the NCore site during the first quarter of 2016. The NCore site is the largest, most comprehensive air monitoring site in the state.

Air Monitoring Network Plan

The DAQ is also required by the EPA to post its ambient air monitoring network plan on the web and submit it to the EPA by July 1 every year. The plan may be found at: http://www.dep.wv.gov/daq/airmonitoring/pages/default.aspx.

Environmental Outreach and Education

Youth Environmental Day at North Bend

Morris Creek Water Festival in Montgomery

New River Earth Day Celebration in Fayetteville

Community Involvement Day at Nitro Elementary

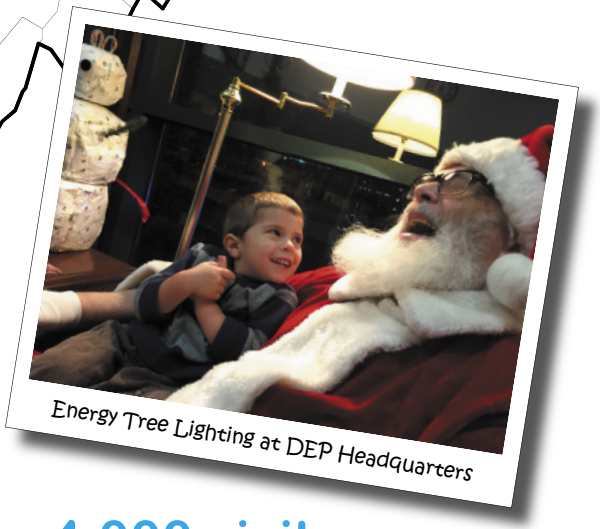
Diamond Electric Safety Day in Eleanor

Environmental Outreach and Education

Earth Day Celebration at the Clay Center

DEP Day at the West Virginia Legislature

South Middle School in Morgantown



Energy Tree Lighting at DEP Headquarters

23 events • 9 counties • more than 4,000 visitors

National Ambient Air Quality Standards

Pollutants with Standards

Criteria Pollutants

The Clean Air Act (CAA) requires the U. S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for criteria pollutants considered to be harmful to public health and the environment. Criteria pollutants are common pollutants that are found all over the United States. The EPA uses these criteria pollutants as indicators of air quality. The federal agency establishes two distinct kinds of NAAQS for acceptable concentrations of specific pollutants in the ambient (outdoor) air. Primary standards establish 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.

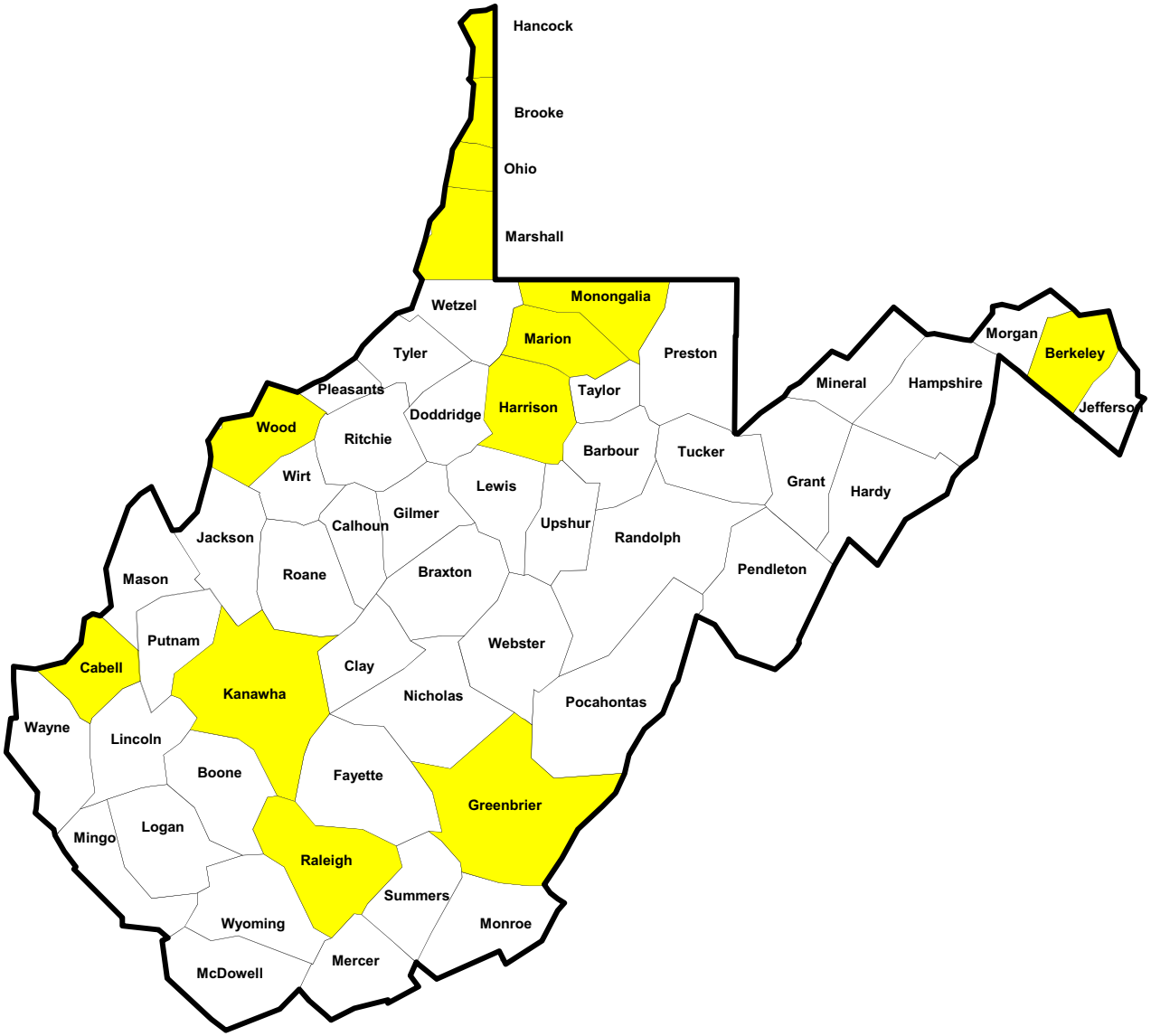
NAAQS standards have been established for six principal pollutants:

- ground-level ozone (O_3)
- particulate matter (PM_{10} and $PM_{2.5}$)
- sulfur dioxide (SO_2)
- carbon monoxide (CO)
- nitrogen dioxide (NO_2)
- lead (Pb)

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 ($\mu g/m^3$). To help put the terms in perspective, one part per million (ppm) would be equivalent to about one inch compared to 15.8 miles, or equivalent to one second in nearly two years. Some standards may be expressed in parts per billion (ppb). It takes 1,000 ppb to equal 1 ppm. 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.

West Virginia maintains a statewide network of monitoring stations as shown on page 39. The network takes samples and measures (monitors) the air quality. If the air quality fails to meet any of the NAAQS, the EPA designates the region as a nonattainment area. The Division of Air Quality (DAQ) is then required to develop a state implementation plan (SIP) to achieve and maintain air quality standards in that area. SIPs must be approved by the EPA.

West Virginia Counties with Air Monitoring Sites



Ozone (O_3)

Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. At both layers, ozone has the same chemical composition (O_3). However, ozone can be "good" or "bad" for your health and the environment, depending on its location in the atmosphere. In the stratosphere, six to 30 miles above the Earth, ozone protects us from the sun's harmful ultraviolet (UV) rays. But in the troposphere, which generally extends from the ground to a level about six miles up, ozone is harmful to breathe and is a key component of smog. It also damages trees and plants. The table on page 23 identifies the typical sources and the health and environmental effects of O_3 emissions.

Ozone forms from nitrogen oxides (NO_x) and volatile organic compounds (VOCs) as they "cook" in the sun. Cars, trucks, buses, engines, industries, power plants and products, such as solvents and paints, are among the major man-made sources of ozone-forming emissions.

PRIMARY AIR QUALITY STANDARDS:	Maximum 8-hour average concentration of 0.070 ppm based on 3-year average of the annual fourth highest daily maximum 8-hour averages.
SECONDARY NAAQS:	Same as primary standard.

Ozone levels fluctuate depending on weather conditions and air emissions. In West Virginia, the ozone monitoring season runs from April 1 to October 31. The 2015 ozone NAAQS revision rule requires that the West Virginia ozone monitoring season be extended by one month, from March 1 to October 31, beginning in 2017. The rule also requires that starting January 1, 2017, ozone must be monitored at the NCore site year round. While there are some exceptions, hot, dry weather and stagnant air favor the formation of ozone and most exceedences typically occur during the hottest and driest summers. But, this isn't always the case. In parts of the western United States with high levels of local VOC and NO_x emissions and unique meteorological conditions, ozone has been high when snow is on the ground.

Ozone, and the pollutants that form it, can travel long distances on the wind. For this reason, even rural areas or areas such as national parks that are far from pollution sources can have high levels of ozone.

In most areas, ozone levels decrease after sunset. However, if there is little movement of air masses and the heat continues, high ozone levels can continue over several days. West Virginia's mountainous topography can add to ozone levels by capturing air in the valleys, limiting air dispersion.

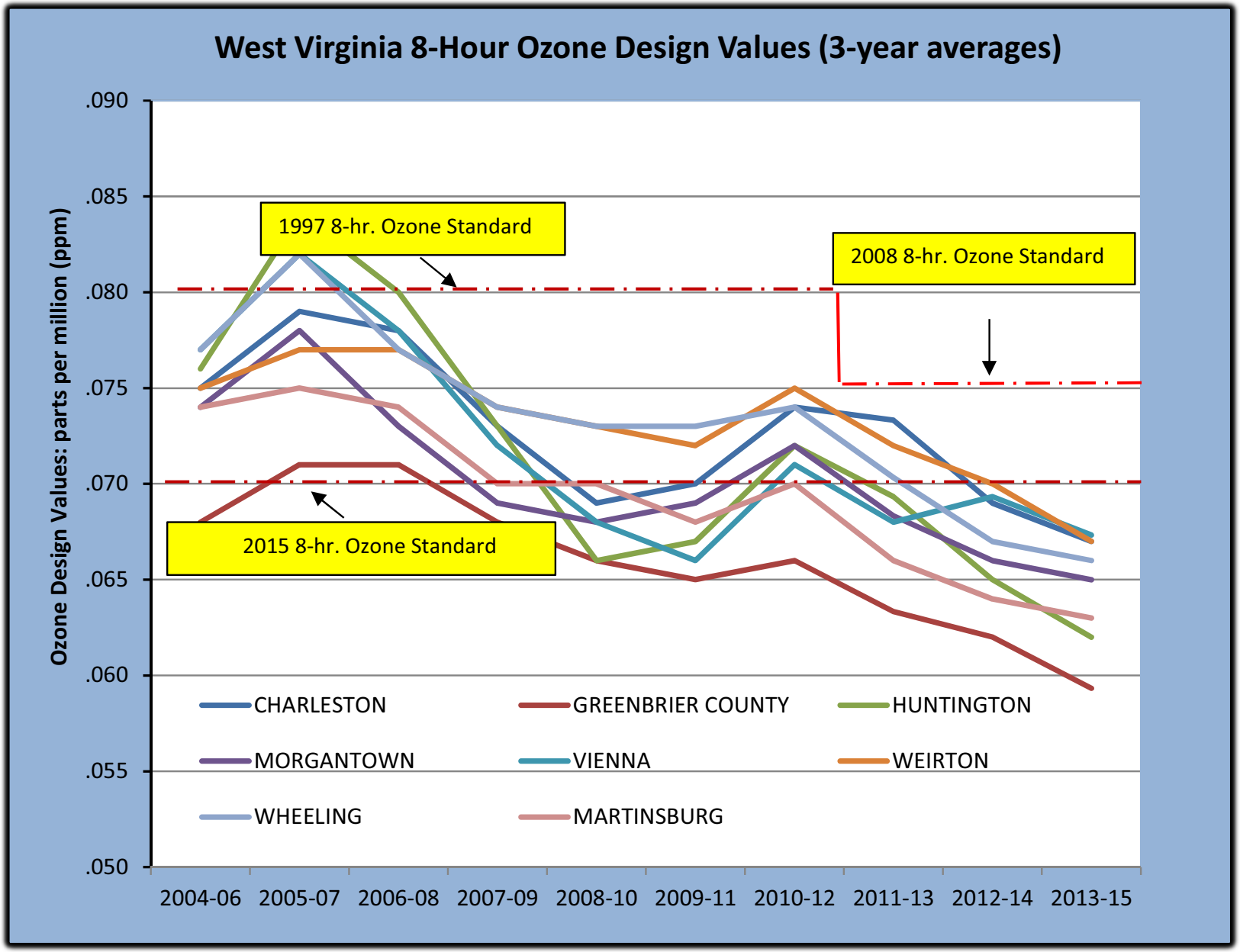
Ground-level ozone is a complex problem due to the variety of sources for NO_x and VOCs and the long-distance transport of ozone and its precursors. A summary of monitored ozone data is shown on page 9.

Ozone can inflame the airways, causing symptoms such as chest pain, coughing, wheezing and shortness of breath - even in healthy people. The EPA issues two standards, as required by the CAA; a primary standard, to protect public health; and, a secondary standard, to protect the public welfare (in this case, trees, plants and ecosystems).

Breathing air containing ozone can reduce lung function and increase respiratory symptoms, thereby aggravating asthma or other respiratory conditions. Ozone exposure also has been associated with increased susceptibility to respiratory infections, medication use by asthmatics, doctor and emergency room visits, and hospital admissions for individuals with respiratory disease. According to the EPA, ozone exposure may also contribute to premature death, especially in people with heart and lung disease.

The EPA has identified environmentally protective standards under the CAA for ozone and instituted a variety of multi-faceted programs to meet these standards. Additional programs are in place to reduce NO_x and VOC emissions from vehicles, industrial facilities and electric utilities. Programs are also aimed at reducing pollution by reformulating fuels and consumer/commerical products, such as paints and chemical solvents, that contain VOCs.

Ozone (O_3)


West Virginia 8-Hour Ozone Design Values (3-year averages)
Ozone Design Values: parts per million (ppm)
.090
.085
.080
.075
.070
.065
.060
.055
.050
1997 8-hr. Ozone Standard
2008 8-hr. Ozone Standard
2015 8-hr. Ozone Standard
CHARLESTON
GREENBRIER COUNTY
HUNTINGTON
MORGANTOWN
VIENNA
WEIRTON
WHEELING
MARTINSBURG
2004-06
2005-07
2006-08
2007-09
2008-10
2009-11
2010-12
2011-13
2012-14
2013-15

Particulate Matter (PM_{10}) Less than 10 microns in diameter

Particulate matter (PM) consists of 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, electric power plants, incinerators, construction, vehicles traveling on paved and unpaved roads, materials handling and crushing, as well as aggregate grinding operations. Water sprays and other dust suppressants are often used to reduce PM emissions from stockpiles and haul roads. The table on page 23 identifies the typical sources and the health and environmental effects of PM emissions.

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 microns in diameter 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 significant adverse health effects. In addition, smaller particles generally are comprised of more toxic substances than larger particles.

PRIMARY AIR QUALITY STANDARDS:	24-hour average not to exceed 150 µg/m^3. Average number of expected exceedances per year not to exceed 1.0.
SECONDARY NAAQS:	Same as primary standard.

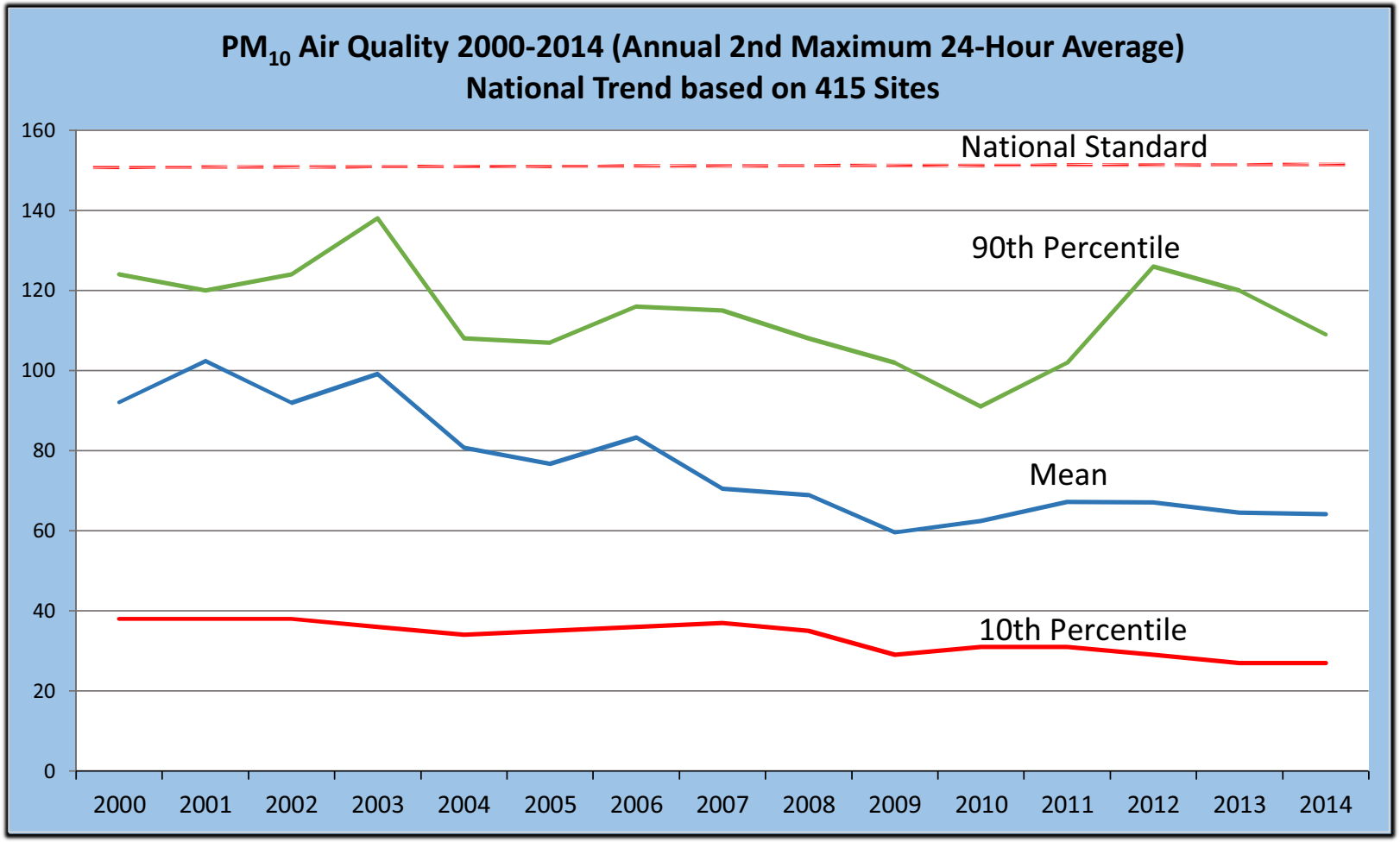
Because of these differences, the EPA maintains two separate national ambient air quality standards for particulate matter. One standard addresses PM_{10} particles that are equal to or less than 10 microns in diameter. The other standard addresses levels of very fine particulate matter (known as $PM_{2.5}$), which contains particles equal to or less than 2.5 microns in diameter. In comparison, a human hair is about 70 microns in diameter. Adverse health effects have been associated with exposures to PM_{10} over short periods (such as a day). Particles in the PM_{10} range are small enough to invade 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 particulate matter, the EPA adopted a PM_{10} standard in 1987, replacing a previous total suspended particulate standard. In a 2006 revision, the EPA established the current 24-hour PM_{10} ambient air quality standard. However, the EPA revoked the annual standard, meaning the standard is no longer in effect. The federal agency has determined that the short-term 24-hour standard makes the annual standard unnecessary.

The DAQ's monitoring network measures PM_{10} at four different sites in three counties across West Virginia. Monitors are jointly located at Follansbee in Brooke County 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, as shown on the chart on page 11.

Nationally, PM_{10} concentrations have decreased 39 percent since 1990. Programs aimed at reducing direct emissions of particles have played an important role in reducing PM_{10} concentrations. Some examples of PM_{10} controls include paving previously unpaved roads, replacing wood and coal with cleaner-burning fuels, such as natural gas, and using best management practices for dust sources at material handling and gricultural facilities.

Additionally, the EPA's Acid Rain Program has substantially reduced SO_2 emissions from power plants since 1995 in the eastern United States, contributing to lower PM concentrations. Direct emissions of PM_{10} have decreased approximately 58 percent nationally since 1980.

Particulate Matter (PM_{10}) Less than 10 microns in diameter



Particulate Matter ($PM_{2.5}$) Less than 2.5 microns in diameter

Medical and scientific research on the health effects of PM continued after the implementation of the PM_{10} standard. As a result of further research, it was determined that very fine particles in the 2.5 microns diameter and less size range ($PM_{2.5}$) have the most adverse effects on human health. Discussion of $PM_{2.5}$ standards may sometimes be confusing because separate but overlapping sets of standards were adopted in 1997, 2006 and 2012. Each set has an annual standard and a 24-hour standard. After each standard was established, the EPA designated areas as meeting (attainment) or not meeting (nonattainment) the standard. Therefore, each area could be designated as nonattainment for the 1997 standard but designated as attainment for the 2006 standard. The 2012 standard is the most stringent and all monitored areas in West Virginia are meeting that standard. Thirteen $PM_{2.5}$ monitoring sites were operated in West Virginia in 2015. The Weirton Oak Street site was discontinued at the end of 2014 and the $PM_{2.5}$ monitor was relocated to Weirton Summit Circle. It began sampling in 2015. A special filter-weighing laboratory is used to analyze filters from these monitors.

PRIMARY AIR QUALITY STANDARDS:	Annual arithmetic mean not to exceed 12 µg/m^3 (based on a 3-year average). 24-hour concentration 35 µg/m^3. (3-year average of the 98th percentile)
SECONDARY NAAQS:	Same as primary standard.

In April 2005, based on 2002-2004 data, EPA designated the areas shown in the chart on page 13 as nonattainment with the 1997 annual $PM_{2.5}$ standard of 15 $\mu g/m^3$. The rest of the state was considered to be in attainment for the annual $PM_{2.5}$ standard. The DAQ successfully redesignated the Huntington area to attainment in December 2012. Parkersburg and Wheeling were redesignated to attainment in September 2013. In 2015, Charleston and Weirton were redesignated to attainment in March and Martinsburg in November.

In December 2006, the EPA strengthened the 24-hour $PM_{2.5}$ standard from the 1997 level of 65 $\mu g/m^3$ to 35 $\mu g/m^3$, and retained the annual $PM_{2.5}$ standard at 15 $\mu g/m^3$. The EPA issued final designations in November 2009. Except for the Charleston and Weirton areas, the entire state was designated attainment/unclassifiable. Both areas later monitored compliance with the 24-hour standard and were redesignated to attainment in March 2015.

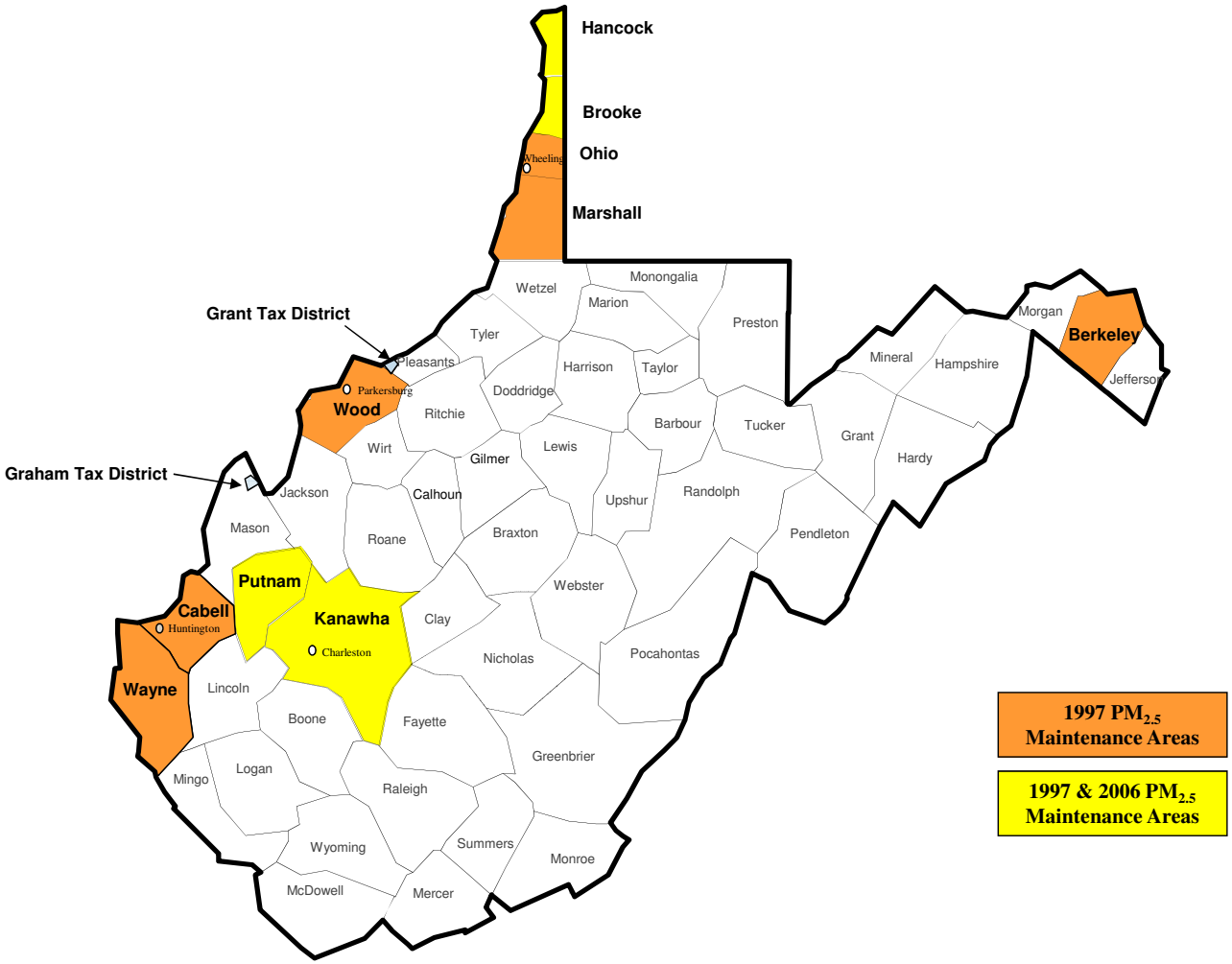
In December 2012, the EPA again tightened the annual standard to 12 $\mu g/m^3$. Although the standard is significantly more stringent than the previous one, the EPA designated the entire state attainment/unclassifieable. The charts on pages 14 - 15 show annual trends for $PM_{2.5}$ concentrations.

The EPA conducted an assessment of the national $PM_{2.5}$ Chemical Speciation Network (CSN) to address a budget shortfall due to increasing contract laboratory and shipping costs. As a result, 38 CSN sites across the country were defunded and discontinued in 2015, including the site in South Charleston. The DAQ continues to operate two $PM_{2.5}$ speciation monitors to help determine the chemical makeup of fine particles. The monitors are located at the Guthrie Agricultural Center and Moundsville in the Northern Panhandle. The Guthrie site is part of 52 long term national trends sites and will be relocated to the NCore site in 2016. Samples collected by these monitors are analyzed for anions (particulate sulfate and nitrate), cations (particulate ammonium, sodium and potassium), trace elements and organic elemental carbon.

Particulate Matter ($PM_{2.5}$) Less than 2.5 microns in diameter

$PM_{2.5}$ Maintenance Areas

These areas are considered attainment with approved Maintenance Plans.



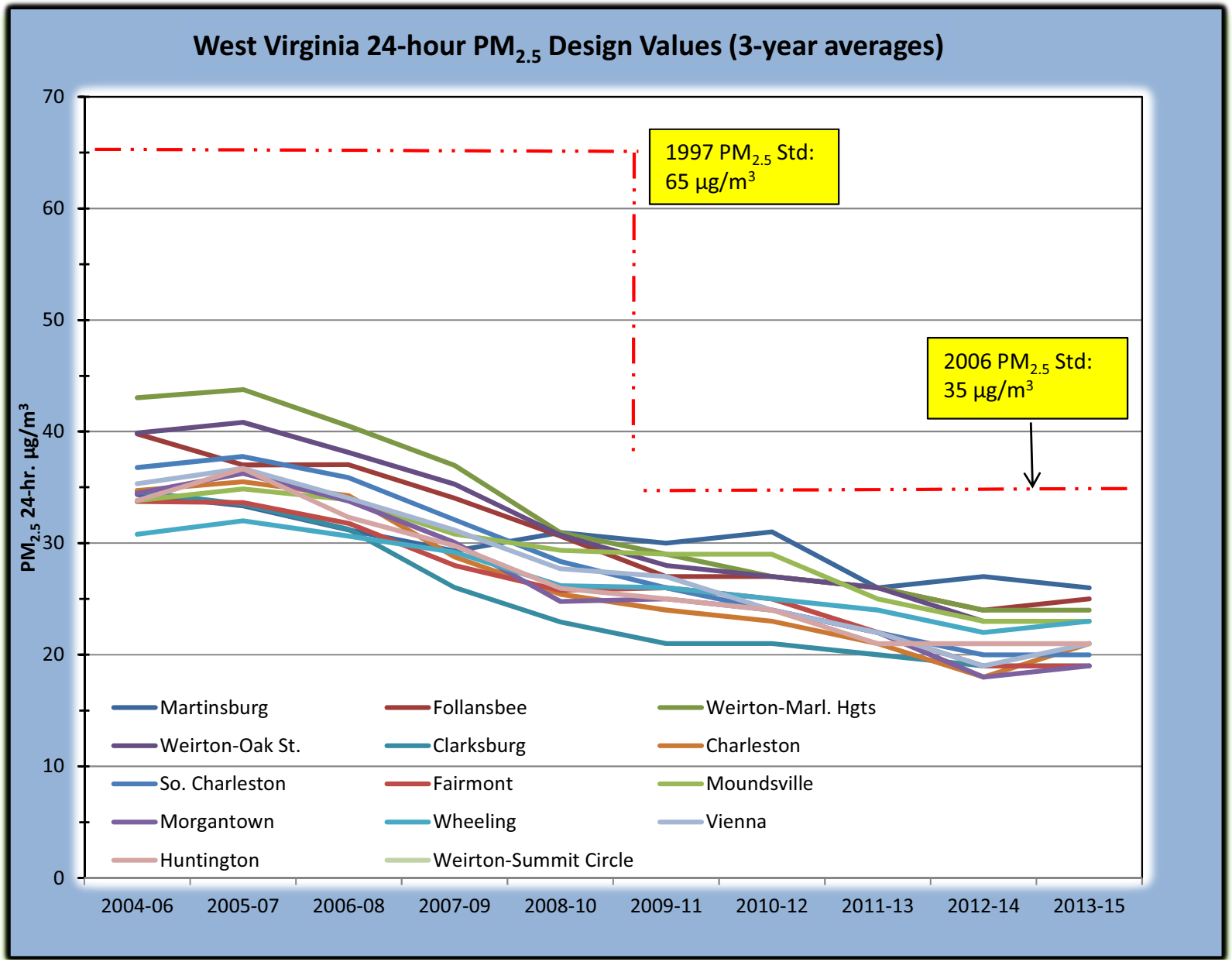
1997 $PM_{2.5}$ Maintenance Areas

Charleston (Kanawha and Putnam counties)
Huntington (Cabell and Wayne counties,
Graham Tax District in Mason county)
Parkersburg (Wood county, Grant Tax
District in Pleasants county)
Martinsburg (Berkeley county)
Weirton (Brooke and Hancock counties)
Wheeling (Marshall and Ohio counties)

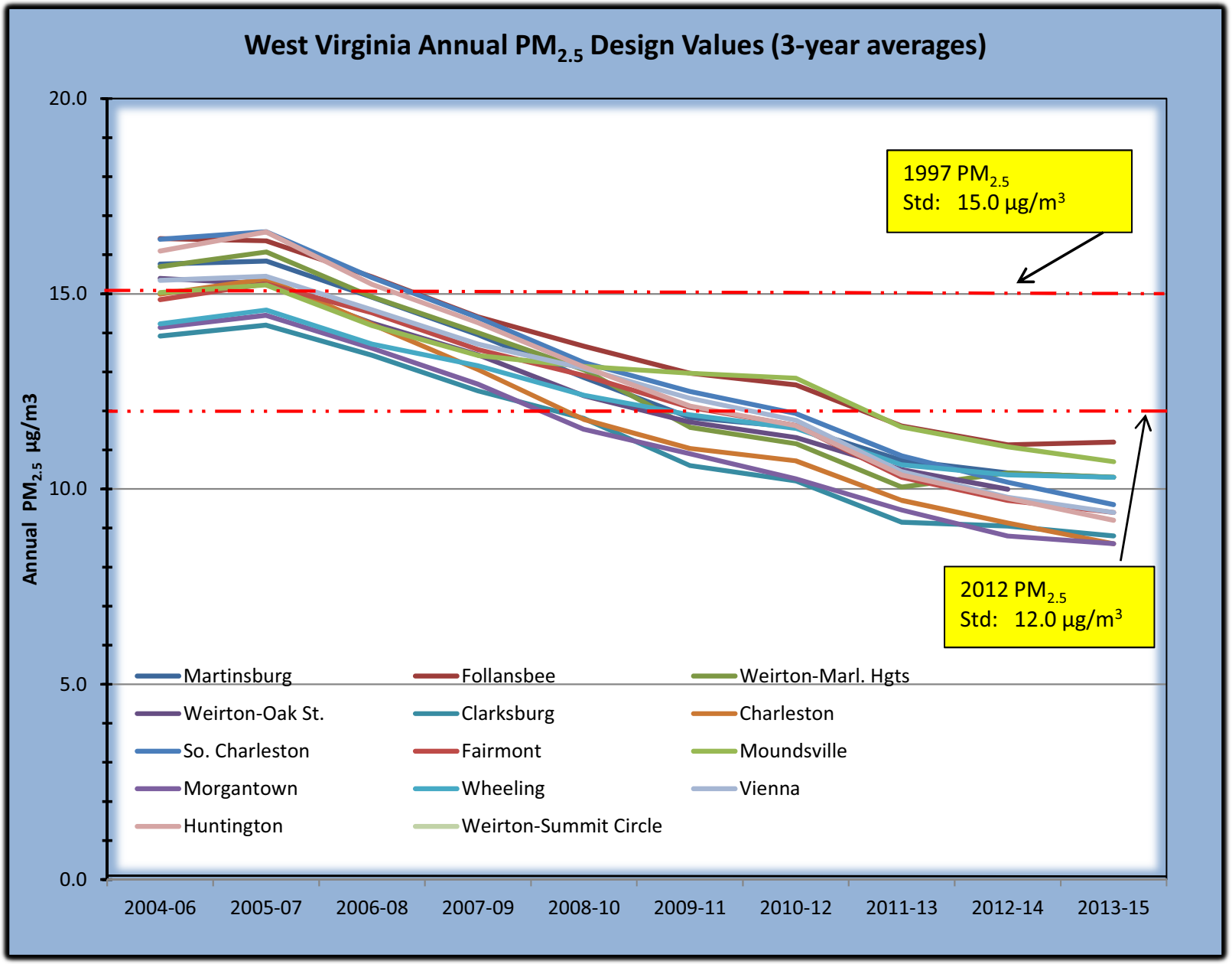
2006 $PM_{2.5}$ Maintenance Areas

Charleston (Kanawha and Putnam counties)
Weirton (Brooke and Hancock counties)

Particulate Matter ($PM_{2.5}$) Less than 2.5 microns in diameter



Particulate Matter ($PM_{2.5}$) Less than 2.5 microns in diameter



Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) 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. The table on page 23 identifies the typical sources and the health and environmental effects of SO_2 emissions.

PRIMARY AIR QUALITY STANDARDS:	1-hour concentration 75 ppb (3-year average 99th percentile)
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 concentration levels. It also aggravates pre-existing respiratory, cardiovascular and pulmonary diseases.

In June 2010, the EPA revised the primary SO_2 standard, designed to protect public health, to 75 parts per billion (ppb) measured over a one-hour period. The previous primary standards of 140 ppb measured over 24 hours and 30 ppb averaged over an entire year were revoked. The EPA also adopted a new "form" of the standard (based on the three-year average of the 99th percentile) to determine compliance with the new NAAQS. Current scientific evidence links health effects with short-term exposure to SO_2 ranging from five minutes to 24 hours. Adverse respiratory effects include narrowing of the airways which can cause difficulty breathing (bronchoconstriction) and asthma symptoms. These effects are particularly important for asthmatics during periods of faster or deeper breathing (e.g. while exercising or playing). Studies also show an association between short-term SO_2 exposure and increased visits to emergency rooms and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly and asthmatics.

On July 25, 2013, the EPA designated the Cross Creek Tax District in Brooke County and the Clay, Franklin and Washington Tax Districts in Marshall County nonattainment with the 2010 one-hour SO_2 standard based on 2009-2011 design values. Both areas are currently monitoring attainment of the standard based on 2013-2015 design values.

In 2012 the EPA finalized action to retain the current secondary standard for SO_2. All of West Virginia SO_2 monitored values are well below the secondary standard of 0.50 ppm (three-hour concentration not to be exceeded more than once per year).

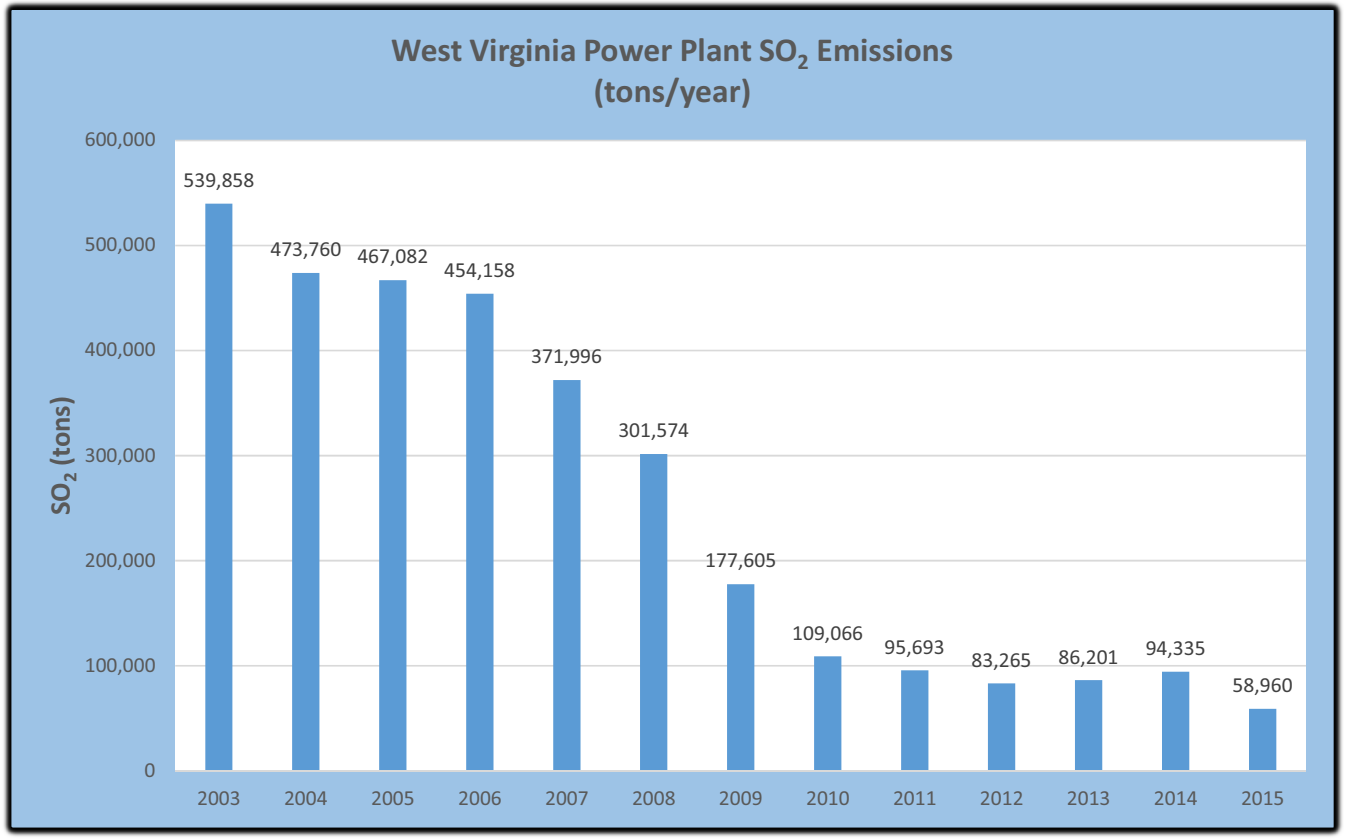
SO_2 can also react with other compounds in the atmosphere to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.

The chart on page 18 shows how the monitoring sites compare to the one-hour SO_2 standard. The one-hour standard is a short term averaging period for SO_2 monitoring. The current data show that all sites are below the more stringent one-hour standard.

Sulfur Dioxide (SO_2)

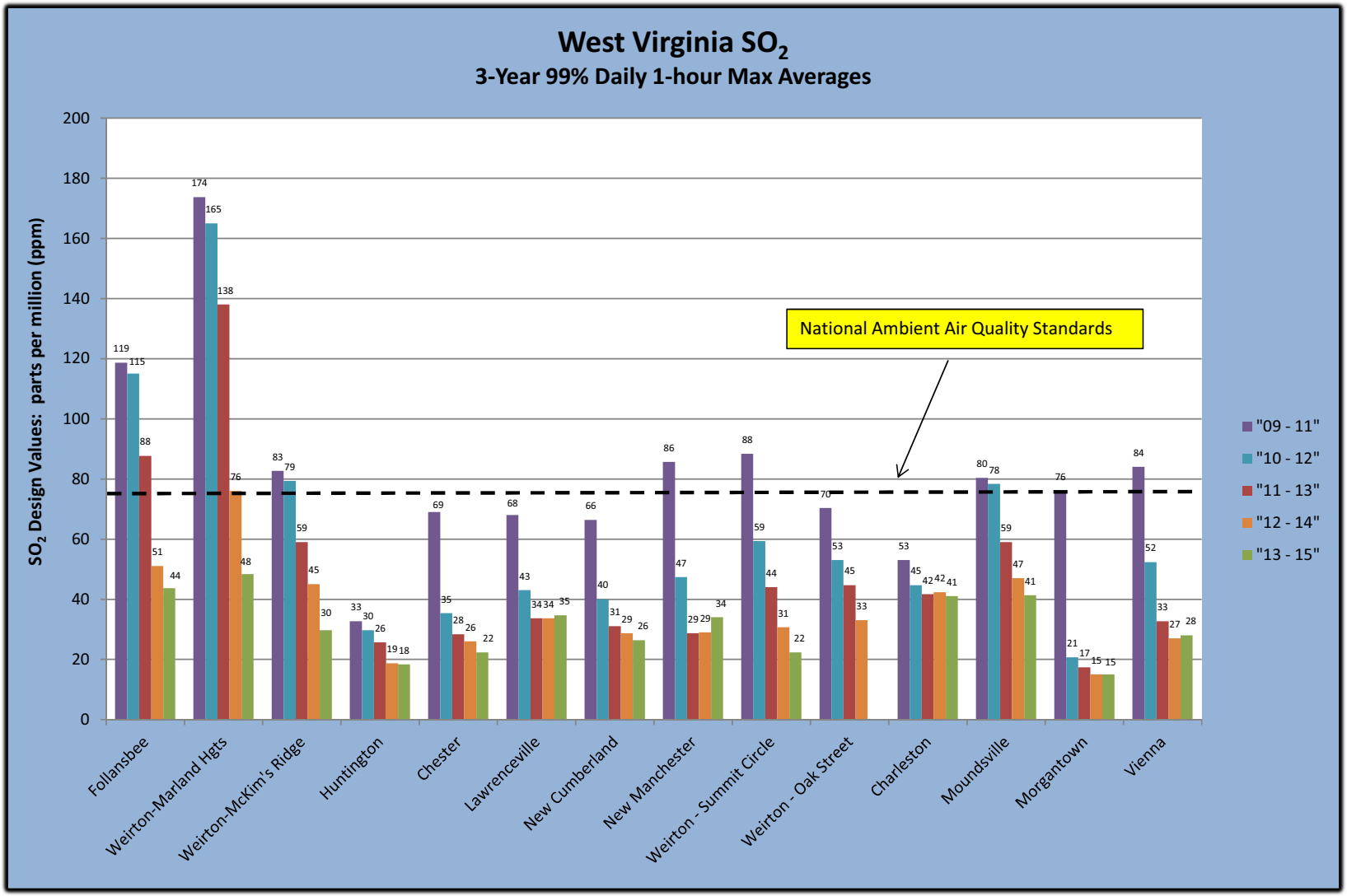
West Virginia has made significant reductions in SO_2 emissions from power plants. Through implementation of the federal Acid Rain Program and the regional Clean Air Interstate Rule (CAIR), SO_2 emissions have plummeted about 83 percent, from 539,858 (calendar year 2003) to 58,960 (calendar year 2015) tons/year. Several large power plants in the state have invested in very efficient control technologies such as flue-gas desulfurization (FGD). The sharp decrease in emissions after calendar 2008 is largely due to application of this technology.

Like many environmental issues, power plant emissions are affected by the cumulative actions of millions of individual people. Therefore, each individual can also reduce their contribution to the problem and become part of the solution. Individuals can contribute directly by conserving energy, since energy production is closely related to SO_2 emissions.



Source: EPA's Clean Air Markets Division, www.epa.gov/airmarkets

Sulfur Dioxide (SO_2)



Carbon Monoxide (CO)

Carbon monoxide (CO) 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 vehicles, as well as 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. The table on page 23 identifies the typical sources and the health and environmental effects of CO emissions.

The main health effect of CO 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 of CO.

PRIMARY AIR QUALITY STANDARDS:	Eight-hour average not to exceed 9 ppm more than once per year. One-hour average not to exceed 35 ppm more than once per year.
SECONDARY NAAQS:	None.

In August 2011, the EPA issued a decision to retain the existing NAAQS for CO. The EPA affirmed that the current standards provide the required level of public health protection, including protection for people with heart disease, who are especially susceptible to health problems associated with exposures to CO in ambient air. There are no secondary (welfare-based) NAAQS for CO due to a lack of evidence of direct effects on public welfare at ambient concentrations. One Hancock County monitoring site and one in Brooke County measured CO in 2015. Both sites reported levels below the one-hour and eight-hour standards.

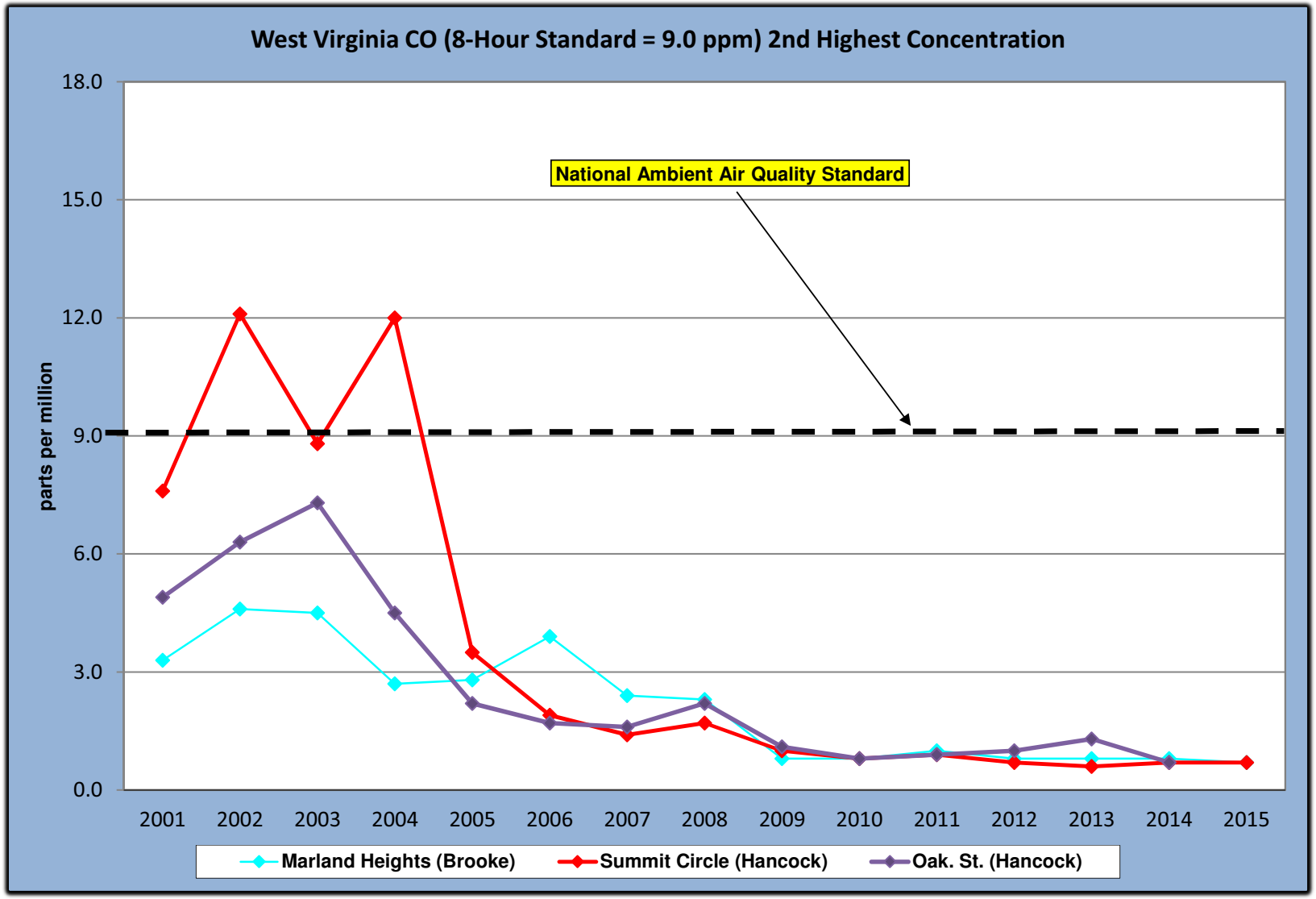
The EPA revised minimum requirements for CO monitoring by requiring monitors to be sited near roads in certain urban areas. Specifically, the EPA required the co-location of one CO monitor with a "near-road" nitrogen dioxide monitor in urban areas having populations of 1 million or more. Also, the EPA specified that monitors required in Core Based Statistical Areas (CBSAs) of 2.5 million or more people be operational by January 1, 2015. Monitors required in CBSAs having 1 million or more people are required to be operational by January 1, 2017. West Virginia does not have any areas that trigger these "near-road" monitoring requirements.

A historical summary of monitored CO data is located on pages 20 and 21.

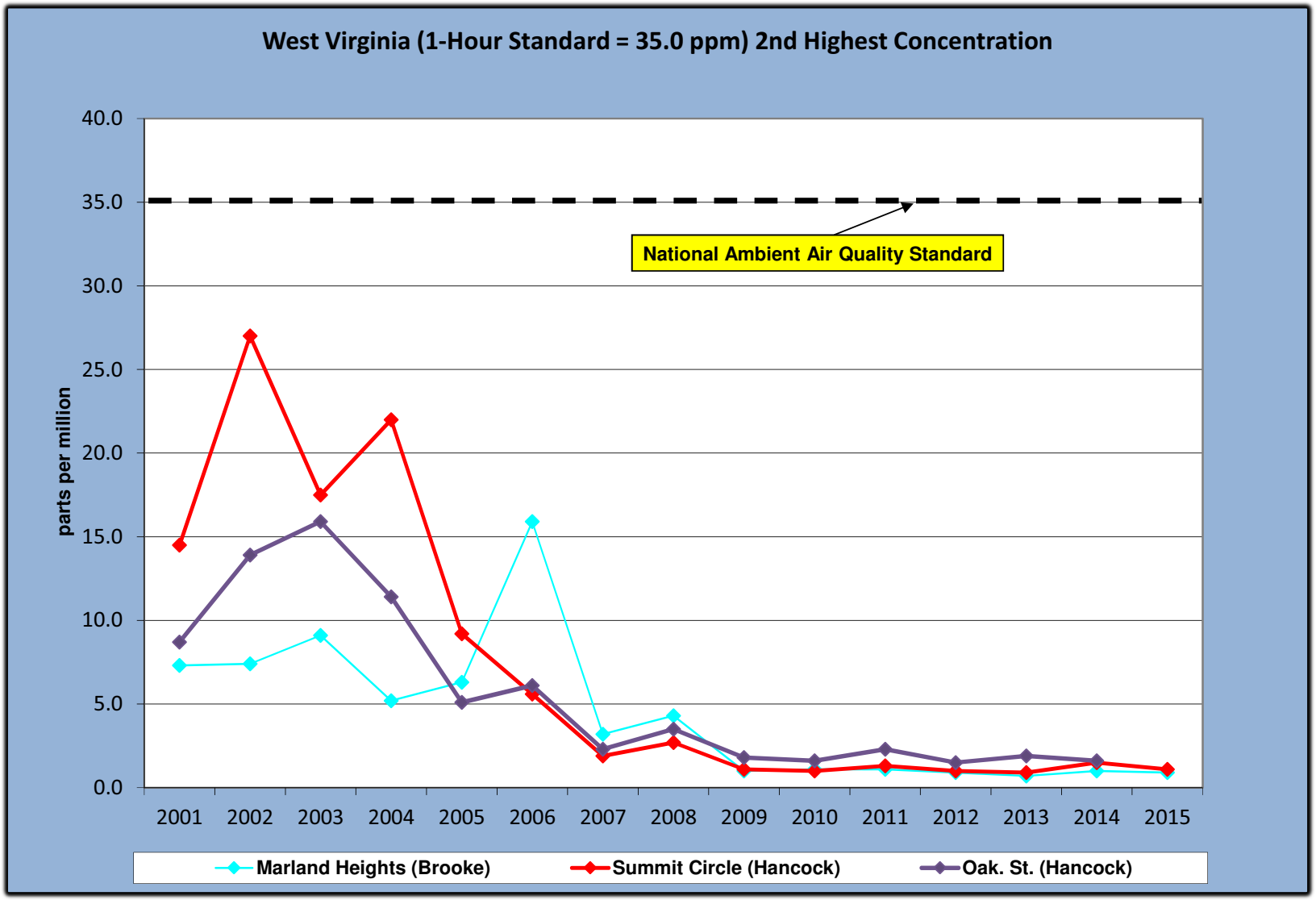
Many strategies for reducing CO emissions from energy usage are cross-cutting and apply to homes, businesses, industry, and transportation. Make sure appliances are installed and operated according to the manufacturer's instructions and local building codes. Most appliances should be installed by qualified professionals. Have your heating system professionally inspected and serviced annually to ensure proper operation. The inspector should also check chimneys and flues for blockages, corrosion, partial and complete disconnections, and loose connections.

In addition to CO in the ambient air outside of the home, CO levels in the home are of concern. Dangerous levels of CO in your home can be caused by improper installation and maintenance of fuel burning applicances.

Carbon Monoxide (CO)



Carbon Monoxide (CO)



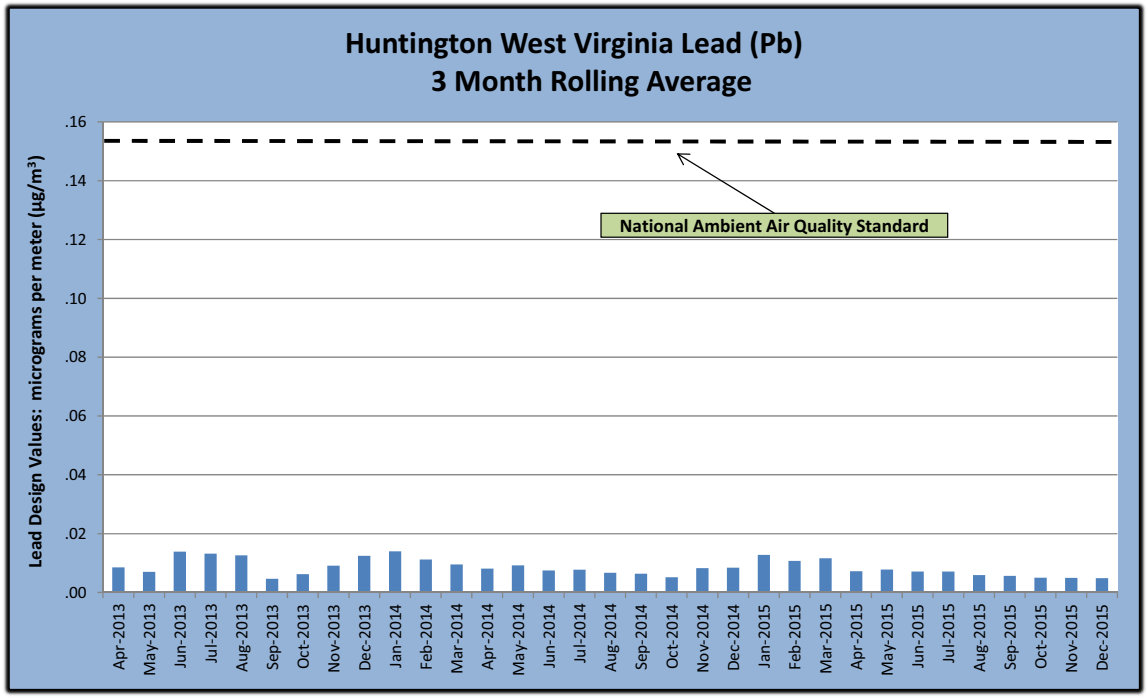
Lead (Pb)

Prior to 1996, lead additives in gasoline burned in engines was a significant source of the lead emissions found in ambient air. Under the CAA Amendments of 1990, lead in gasoline was required to be eliminated by January 1, 1996, and replaced with unleaded gasoline. The DAQ lead monitoring network in place at that time began recording much lower lead values as a result of the switch. As monitored lead concentrations in the ambient air dropped significantly and the national emphasis on lead monitoring diminished, these monitors were removed and the resources reallocated to other monitoring initiatives, such as for particulate matter equal to or less than 2.5 imcrons in diameter ($PM_{2.5}$).

Based on new health studies, the EPA tightened the lead standard in 2008, making it 10 times more stringent than the previous standard. The agency revised the primary standard from 1.5 micrograms per cubic meter ($\mu g/m^3$) to 0.15 $\mu g/m^3$.

In December 2010, the EPA changed the emission threshold that state monitoring agencies must use to determine if an air quality monitor should be placed near an industrial facility that emits lead. The new emission threshold is 0.5 tons per year (tpy), reduced from the previous threshold of 1.0 tpy. As a result of this change, the DAQ installed a lead monitor at an existing monitoring site in Huntington, and began collecting data on February 3, 2012.

The EPA changed the calculation method for the averaging time to use a "rolling" three-month period with a maximum (not-to-be-exceeded) form, evaluated over a three-year period. This replaces the current approach of using calendar quarters. A rolling three-month average yields 12 three-month periods associated with a given year, not just the



Finding Sources of Air Pollution

Pollutant	Sources	Health Effects	Environmental Effects
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
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
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
Particulate Matter (PM_{10}, $PM_{2.5}$) 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 man-made 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


Compliance
& Enforcement

Compliance & Enforcement

The DAQ's Compliance and Enforcement Section (C&E) is responsible for conducting inspections and investigations of air pollution sources, addressing citizen complaints involving alleged air pollution violations, and inspecting asbestos demolition and renovation projects.

The sources involved are subject to a wide range of regulations, including EPA-delegated programs, EPA-approved State Implementation Plans (SIPs), and state-only regulations. Most of the EPA-delegated programs are rules governing the emissions of hazardous air pollutants utilizing maximum achievable control technology (MACT) standards or are subject to federal new source performance standards (NSPS).

Compliance actions are defined as follows:

- Full Compliance Evaluation (FCE)
  A comprehensive evaluation of a facility addressing all regulated pollutants at all regulated emission points. The DAQ conducts FCEs of both major and minor sources of air emissions. The charts on pages 25 and 26 show FCEs of major and minor sources, respectively, by regional office across the state during 2015.

- Partial Compliance Evaluation (PCE)
  A comprehensive evaluation of a subset of regulated pollutants or regulated emission points at a facility.

- Stack Test Activity
  A stack test is the actual measurement of pollutant emissions from a process vent and is performed using a scientifically developed and approved method(s) designed for the specific pollutant being measured. Stack test activities include observing the test in person and reviewing the analytical results.

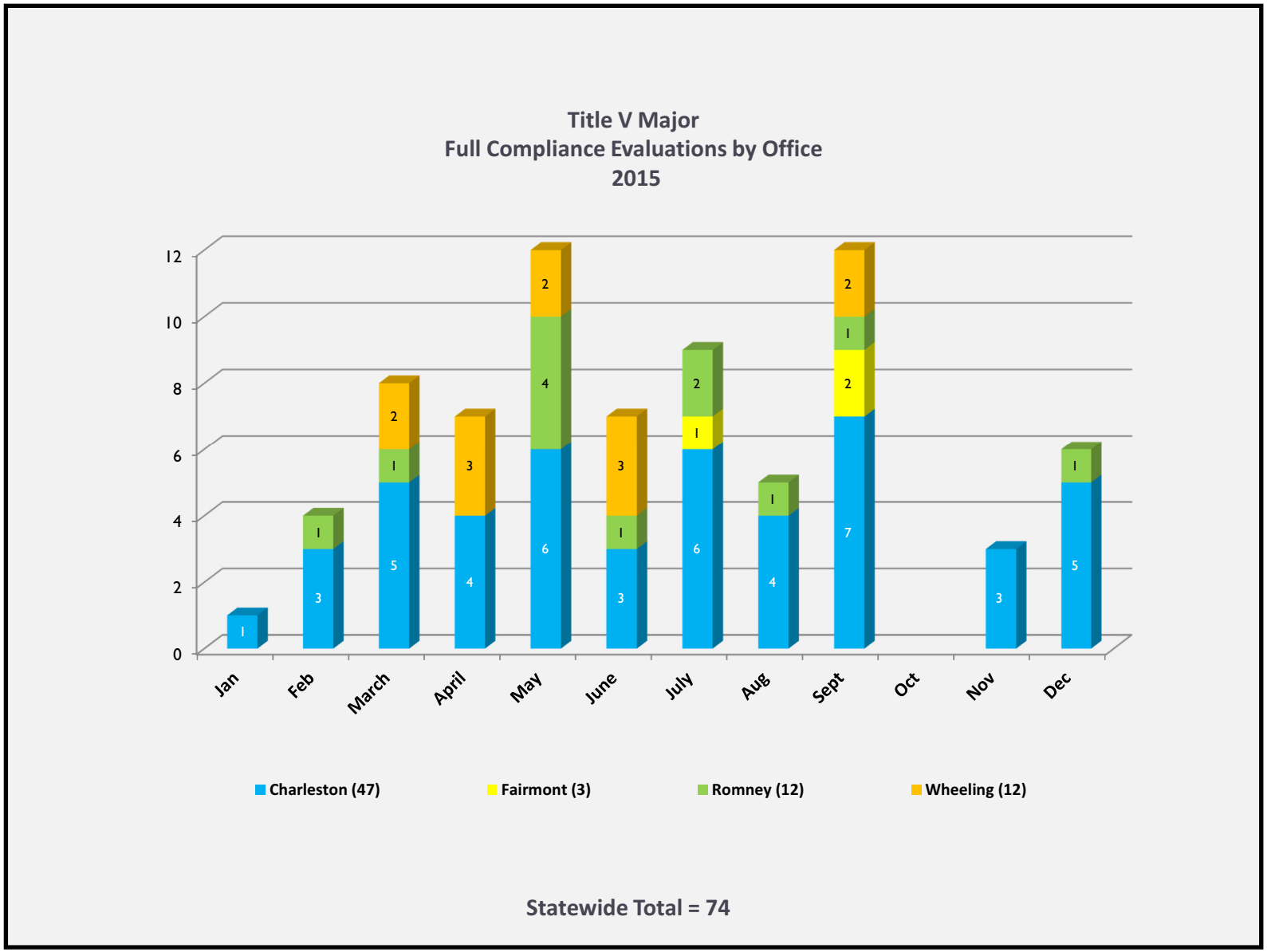
- Title V Certification Review
  A Title V certification is written documentation certifying that a company has or has not complied with each of the requirements of its Title V operating permit. These certifications are reviewed by the C&E Section.

- Self Monitoring Report (SMR) Review
  A self monitoring report is a report submitted by a company, often required by a permit or regulation, to report actual emissions of pollutants or operating conditions that may indicate emissions of pollutants. These reports are reviewed by the C&E Section.

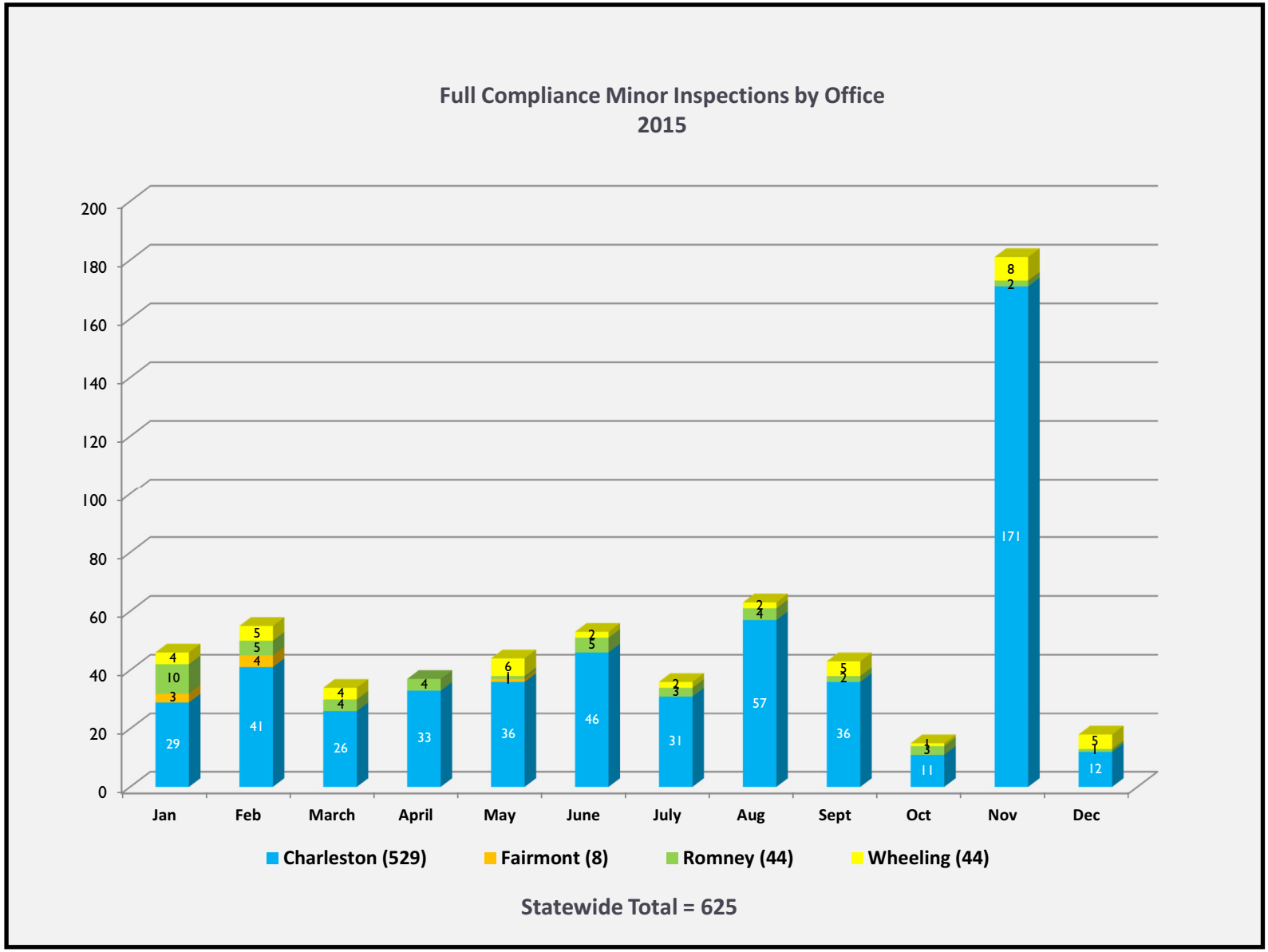
- Continuous Emissions Monitoring System (CEMS) Review
  A CEMS is a system of instruments that continuously measures pollutant emission concentrations and/or quantity and is capable of recording and reporting them. The C&E Section reviews CEMS reports.

Sources are regularly inspected in order to determine compliance and meet program goals, as follow-up to previously cited violations and/or to address citizen complaints. The chart on page 27 shows the citizen complaints handled by each regional office during 2015.

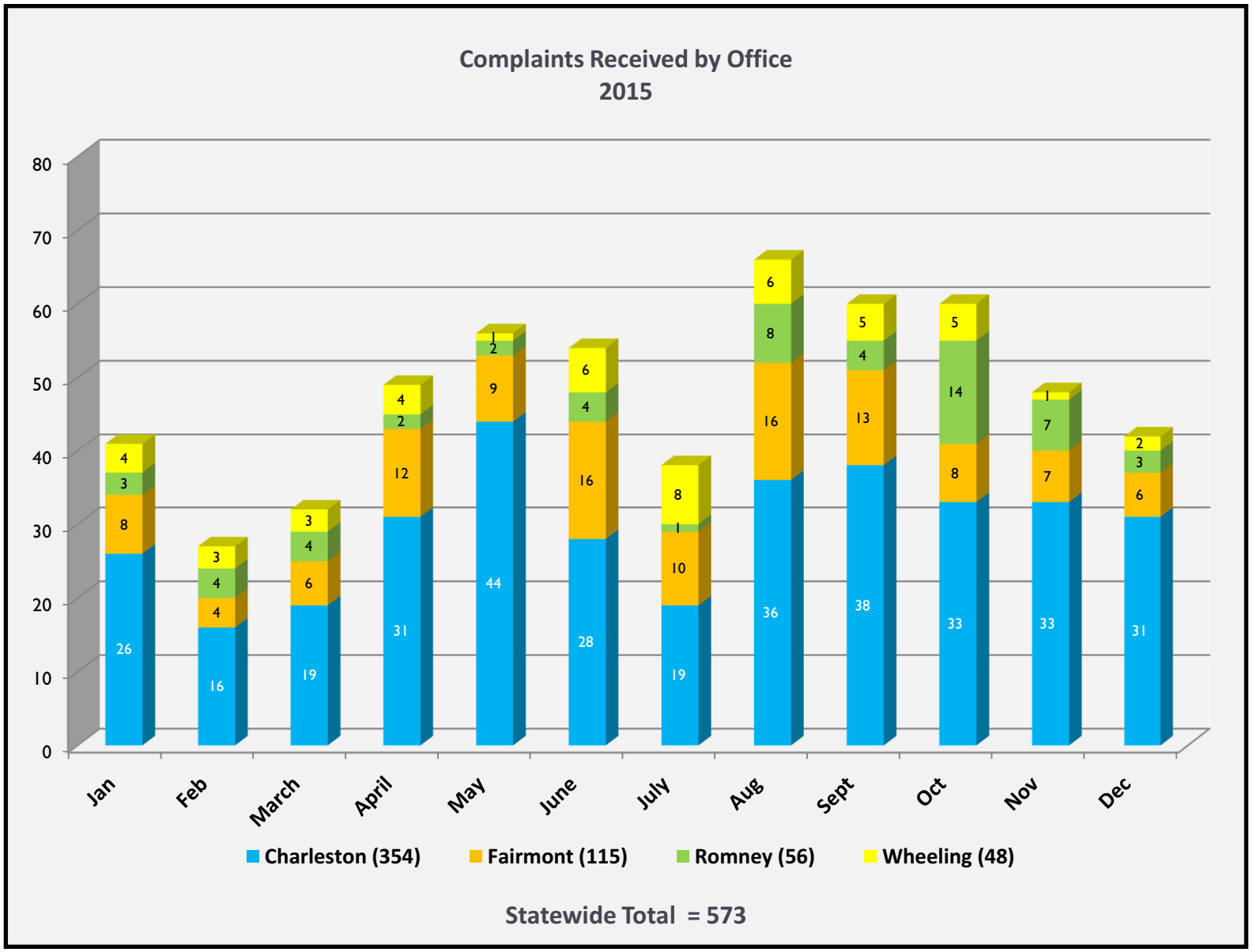
Compliance & Enforcement



Compliance & Enforcement



Compliance & Enforcement




Permitting

Permitting

The DAQ's Permitting Section implements West Virginia's permit program established under the State's Air Pollution Control Act.

New Source Review (NSR)

West Virginia's permit program includes review of applications, determination of permit applicability and issuance of permits for both minor and major sources. Minor sources are primarily permitted under the minor source rule found at the Code of State Regulations (CSR) 45CSR13. Major sources are primarily permitted under the NSR rules found at 45CSR14 and 45CSR19. Both minor and major permits must be obtained prior to operation of the source.

Our goal is to set forth the procedures for obtaining a permit to construct, modify, relocate and operate a new stationary source; a temporary permit; a general permit registration; and, for filing notifications of changes not otherwise subject to permit requirements. All applications by any person must conform to the review procedures and conditions of the West Virginia Code, as well as West Virginia permitting rules.

We strive to ensure that economic growth will occur in harmony with the preservation of existing clean air resources; to prevent the development of any new nonattainment problems; to protect the public health and welfare from any adverse effects which might occur even at air quality levels better than the National Ambient Air Quality Standards; and, to preserve, protect and enhance the air quality in areas of special natural, recreational, scenic and/or historic value.

The charts located on pages 30 and 31 provide a summary of the permitting actions in 2015.

Title V

Operating permits are legally enforceable documents that permitting authorities issue to air pollution sources after the source has begun to operate. Title V of the federal Clean Air Act (CAA), as amended in 1990, required each state to develop an operating permit program for major sources (and some minor sources) of air pollution. West Virginia's operating permit program issues Title V operating permits under the authority of 45CSR30 (Requirements for Operating Permits), which is the implementing rule of Title V of the 1990 Federal Clean Air Act Amendments. Sources required to obtain a Title V permit include the following:

- A major source that has the potential to emit, in aggregate, 10 tons per year (tpy) or more of any hazardous air pollutant listed pursuant to §112(b) of the CAA or 25 tpy or more of any combination of such hazardous air pollutants;
- A major source that has the potential to emit 100 tpy or more of any air pollutant, subject to regulation;
- Any source, including an area source, subject to a standard or other requirements promulgated under §111 of the CAA;
- Any source, including an area source, subject to a standard or other requirements under §112 of the CAA; or
- Any affected source that includes one or more affected units under Title IV of the CAA (Acid Deposition Control).

Permitting

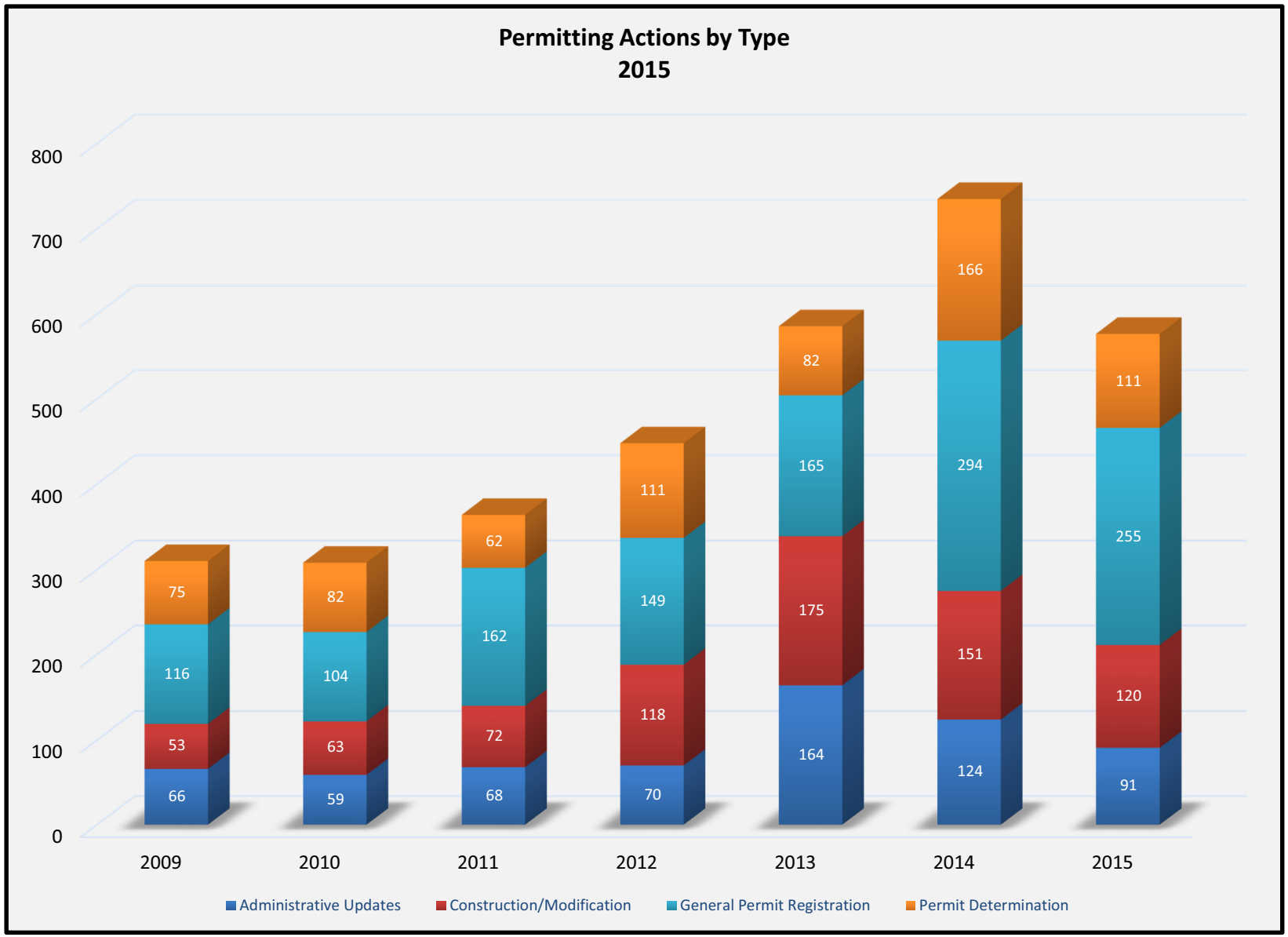
Title V operating permits identify all "applicable requirements" and include emission limits and standards, as well as monitoring, testing, recordkeeping, and reporting requirements. These permits also require submittal of reports of any required monitoring in the form of Semi-annual Monitoring Reports; and, the submittal of Annual Compliance Certifications, which require the permittee to certify compliance with the conditions of the permit.

In addition to issuing and renewing Title V permits, the Title V Permit Group also reviews and processes administrative amendments, minor modifications, significant modifications, reopenings, and off-permit changes to a facility's existing Title V operating permit.

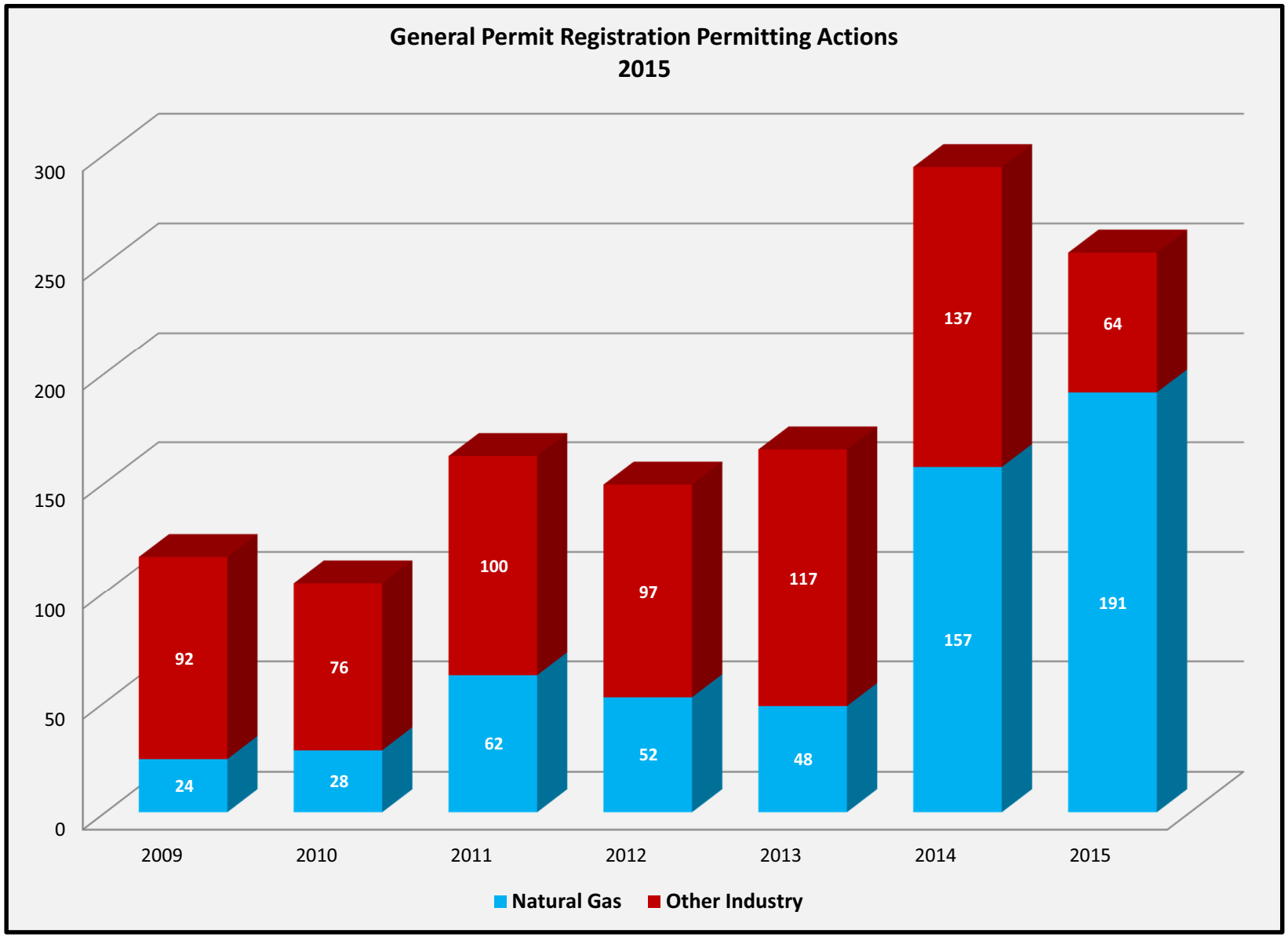
As of December 31, 2015, there were 169 Title V facilities in West Virginia with 192 active Title V permits (some facilities have multiple Title V permits). From January 1, 2015 to December 31, 2015, the following permitting actions were issued:

- 2 initial permits
- 27 renewals
- 11 significant modifications
- 28 minor modifications
- 15 administrative amendments

Permitting

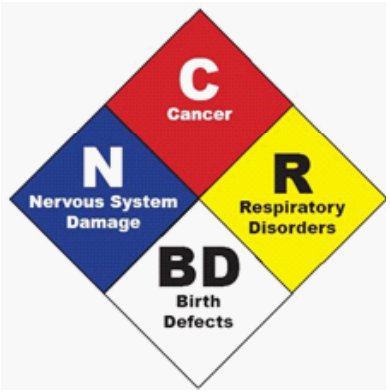

Permitting Actions by Type
2015
800
700
600
500
400
300
200
100
0
2009
2010
2011
2012
2013
2014
2015
75
116
53
66
82
104
63
59
62
162
72
68
111
149
118
70
82
165
175
164
166
294
151
124
111
255
120
91
Administrative Updates
Construction/Modification
General Permit Registration
Permit Determination

Permitting


General Permit Registration Permitting Actions
2015
300
250
200
150
100
50
0
92
24
76
28
100
62
97
52
117
48
137
157
64
191
2009
2010
2011
2012
2013
2014
2015
Natural Gas
Other Industry

Air Toxics

Air Toxics



Implementation of the federal maximum achievable control technology (MACT) standards and other programs authorized by the 1990 Clean Air Acts (CAA) Amendments continues. As these federal rules, as well as state rules, have gone into effect, they have helped reduce emissions of air toxics in West Virginia and the nation. MACT standards, established by the U. S. Environmental Protection Agency (EPA), regulate emissions of the 187 Hazardous Air Pollutants (HAPs) from various industrial sources, such as chemical plants, coal fired power plants, boilers, metallurgical manufacturers, refineries and surface coaters. Some HAPs are carcinogenic, some have only non-cancerous or acute effects, and some may exhibit all of these properties at certain exposure levels. Approximately two-thirds of the HAPs are known, probable, or possible human carcinogens. A few HAPs are known to bioaccumulate and bioconcentrate in humans and in the environment. All HAPs are not equivalent to one another in toxicity to humans or the environment.

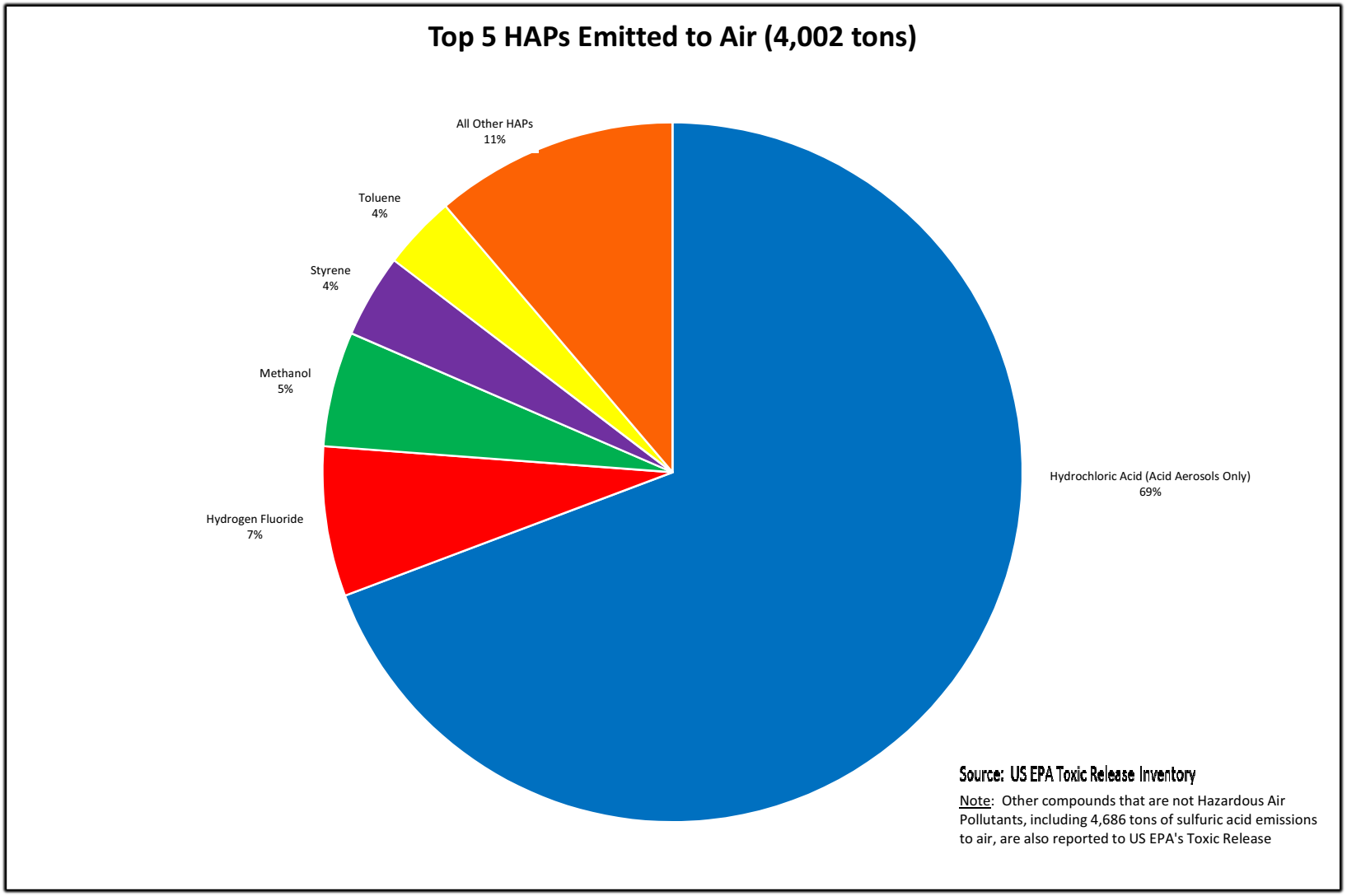
Since 1993, the EPA has issued nearly 100 MACT standards covering almost 200 categories of large industrial sources. Additionally, there are a number of air toxics standards for smaller facilities, including older standards for dry cleaners, chromium electroplaters, secondary aluminum producers, wood preservers, small chemical manufacturing facilities, small boilers and newer standards for natural gas facilities with dehydrators. More information on air toxics efforts can be found at www.dep.wv.gov/daq and choosing the "air toxics" link.

Air toxics emissions have decreased significantly in recent years due to the implementation of federal standards. As shown in the bar chart on page 34, HAP emissions continue to be reduced as the dates for complying with each of these standards for large and small facilities arrive. Over this period, the number of major sources has remained fairly consistent. The chart on page 33 shows the top five HAPs emitted to the air in West Virginia. The majority of HAP emissions in the state are acid gases, such as hydrogen chloride and hydrogen fluoride, which are primarily generated from the combustion of coal. As shown in the pie chart on page 35, the electric utility sector emits the most HAP emissions into the atmosphere, followed by the chemical and metal sectors. The decline in HAPs over the last several years is due to reductions of acid gas emissions at coal-fired electric utilities, as well as cleaner power plants achieving co-beneficial air pollutant reductions.

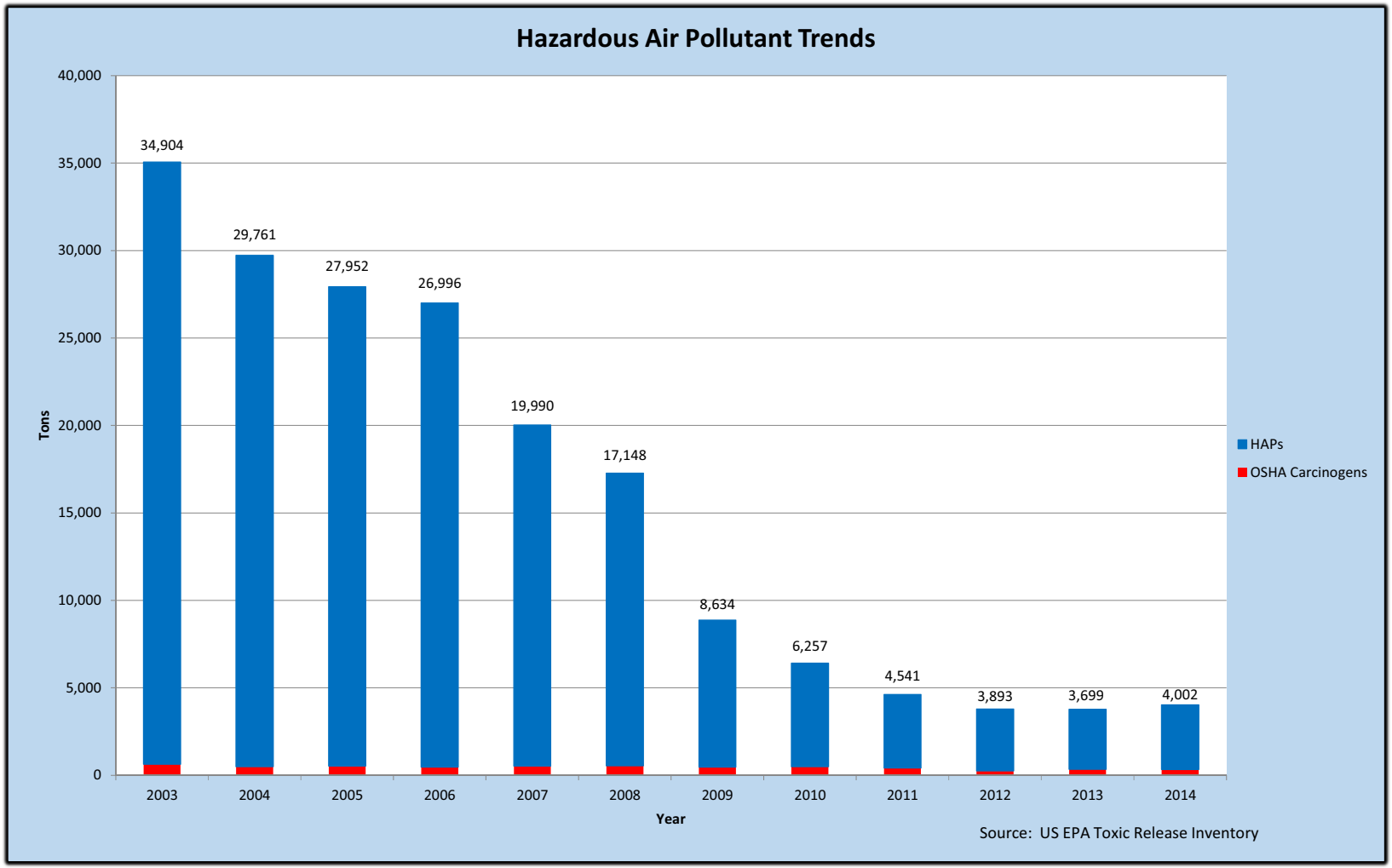
Air Toxics Monitoring

The DAQ operates a network of air toxics monitors to fulfill a variety of programmatic goals, including periodic special projects in specific areas. The DAQ began to install and operate ambient air toxics monitoring stations in 2005, and now has two sites, which operate in Charleston and Wheeling. These monitors collect samples every sixth day, and provide snapshots of what is in the urban air in West Virginia. The samples undergo laboratory analysis for volatile organic compounds, carbonyls and metals in particulate matter. The 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 other EPA Region III state and local agencies. Additionally, there are no national criteria for ambient levels of air toxics as there are for criteria pollutants. Instead, chronic inhalation health benchmarks for cancer or non-cancer effects (such as respiratory or neurological), where such data is known, are typically used as a comparison point for ambient air toxics levels. In general, the results for West Virginia's air toxics monitors are well below these health benchmarks on an annual basis.

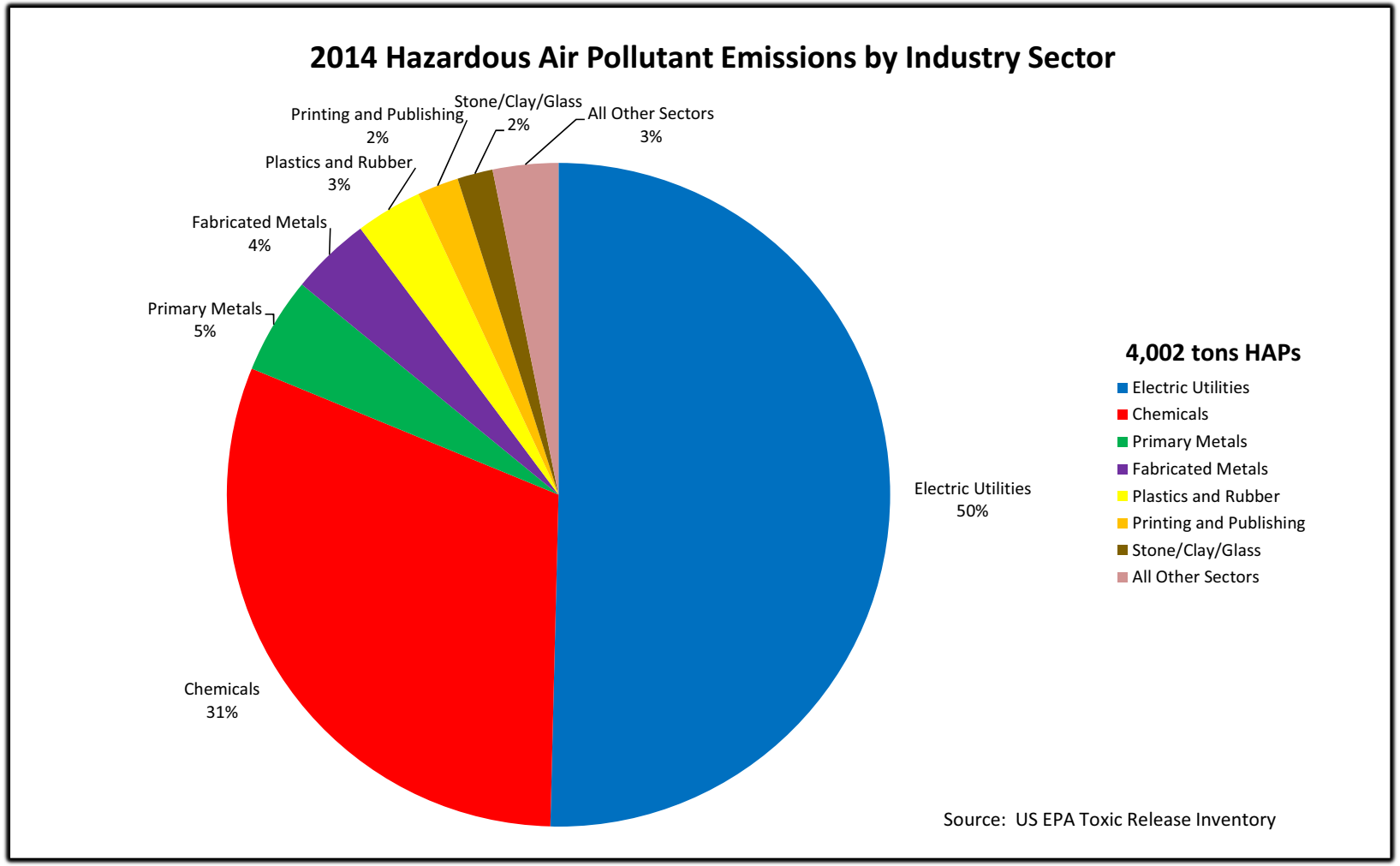
Air Toxics


Top 5 HAPs Emitted to Air (4,002 tons)
All Other HAPs
11%
Toluene
4%
Styrene
4%
Methanol
5%
Hydrogen Fluoride
7%
Hydrochloric Acid (Acid Aerosols Only)
69%
Source: US EPA Toxic Release Inventory
Note: Other compounds that are not Hazardous Air Pollutants, including 4,686 tons of sulfuric acid emissions to air, are also reported to US EPA's Toxic Release

Air Toxics


Hazardous Air Pollutant Trends
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Tons
34,904
29,761
27,952
26,996
19,990
17,148
8,634
6,257
4,541
3,893
3,699
4,002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Year
HAPs
OSHA Carcinogens
Source: US EPA Toxic Release Inventory

Air Toxics


2014 Hazardous Air Pollutant Emissions by Industry Sector
Printing and Publishing 2%
Stone/Clay/Glass 2%
All Other Sectors 3%
Plastics and Rubber 3%
Fabricated Metals 4%
Primary Metals 5%
Electric Utilities 50%
Chemicals 31%
4,002 tons HAPs
Electric Utilities
Chemicals
Primary Metals
Fabricated Metals
Plastics and Rubber
Printing and Publishing
Stone/Clay/Glass
All Other Sectors
Source: US EPA Toxic Release Inventory


AQI
AIR QUALITY INDEX

Air Quality Index

What is the Air Quality Index?

The Air Quality Index (AQI) is a simplified guide for understanding daily air quality. It indicates how clean or polluted the 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. The U. S. Environmental Protection Agency (EPA) uses the AQI for five major air pollutants regulated by the CAA: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide and nitrogen dioxide. For each of these pollutants, the EPA has established national air quality standards to protect against harmful health effects. The AQI does not indicate the levels of natural allergens, such as pollen count, which may also affect respiratory function.

How does the AQI Work?

The AQI can be thought of 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, and then for everyone as AQI values rise.

The AQI summary table on page 38 includes the more stringent one-hour sulfur dioxide (SO_2) standard for those sites that monitor SO_2. The revised SO_2 AQI has increased the number of days in the Unhealthy for Sensitive Groups category (USG). The AQI table also reflects the changes in the AQI category breakpoint for the revised ozone standard. The EPA set the 100 value of the index at the 70 parts per billion (ppb), the level of the primary eight-hour ozone standard. An AQI of 100 is the upper "Moderate" or "Code Yellow" range, and marks the level above which EPA begins cautioning at-risk groups. The "Unhealthy for Sensitive Groups" or "Code Orange" range (AQI of 101-150) will begin at 71 ppb and will extend to 85 ppb.

How do I find the AQI for WV?

The AQI for nine areas in West Virginia can be accessed by going to www.dep.wv.gov/daq and clicking 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, Moundsville, 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, Greenbrier County and Martinsburg are also reported.

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

The purpose of the AQI is to help citizens understand what local air quality means in relation to short-term health effects. To make the AQI as easy to understand as possible, the EPA has divided the AQI scale into six levels of health concern as follows.

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 wo 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 the sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health Alert, everyone may experience more serious health effects.
Hazardous	301-500	Health warnings of emergency conditions. The entire population is likely to be affected.

Air Quality Index

County	2015 - Days in each category:				Highest Value AQI	Pollutants Considered
	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy		
Berkley	216	41	0	0	94	O_3, $PM_{2.5}$
Brooke	305	58	2	0	105	SO_2, $PM_{2.5}$, PM_{10}
Cabell	318	39	0	0	87	O_3, SO_2, $PM_{2.5}$
Greenbrier	213	1	0	0	54	O_3
Hancock	313	50	2	0	110	O_3, SO_2, $PM_{2.5}$, PM_{10}
Harrison	92	24	0	0	84	$PM_{2.5}$
Kanawha	311	47	0	1	162	O_3, SO_2, $PM_{2.5}$, PM_{10}
Marion	87	32	0	0	89	$PM_{2.5}$
Marshall	261	104	0	0	87	SO_2, $PM_{2.5}$
Monongalia	330	34	1	0	111	O_3, SO_2, $PM_{2.5}$
Ohio	206	45	0	0	97	O_3, $PM_{2.5}$
Raleigh	25	0	0	0	42	$PM_{2.5}$
Wood	323	41	1	0	109	O_3, SO_2, $PM_{2.5}$

*Some monitors did not run everyday of 2015

Appendix A

Technical Information/Ambient Monitoring

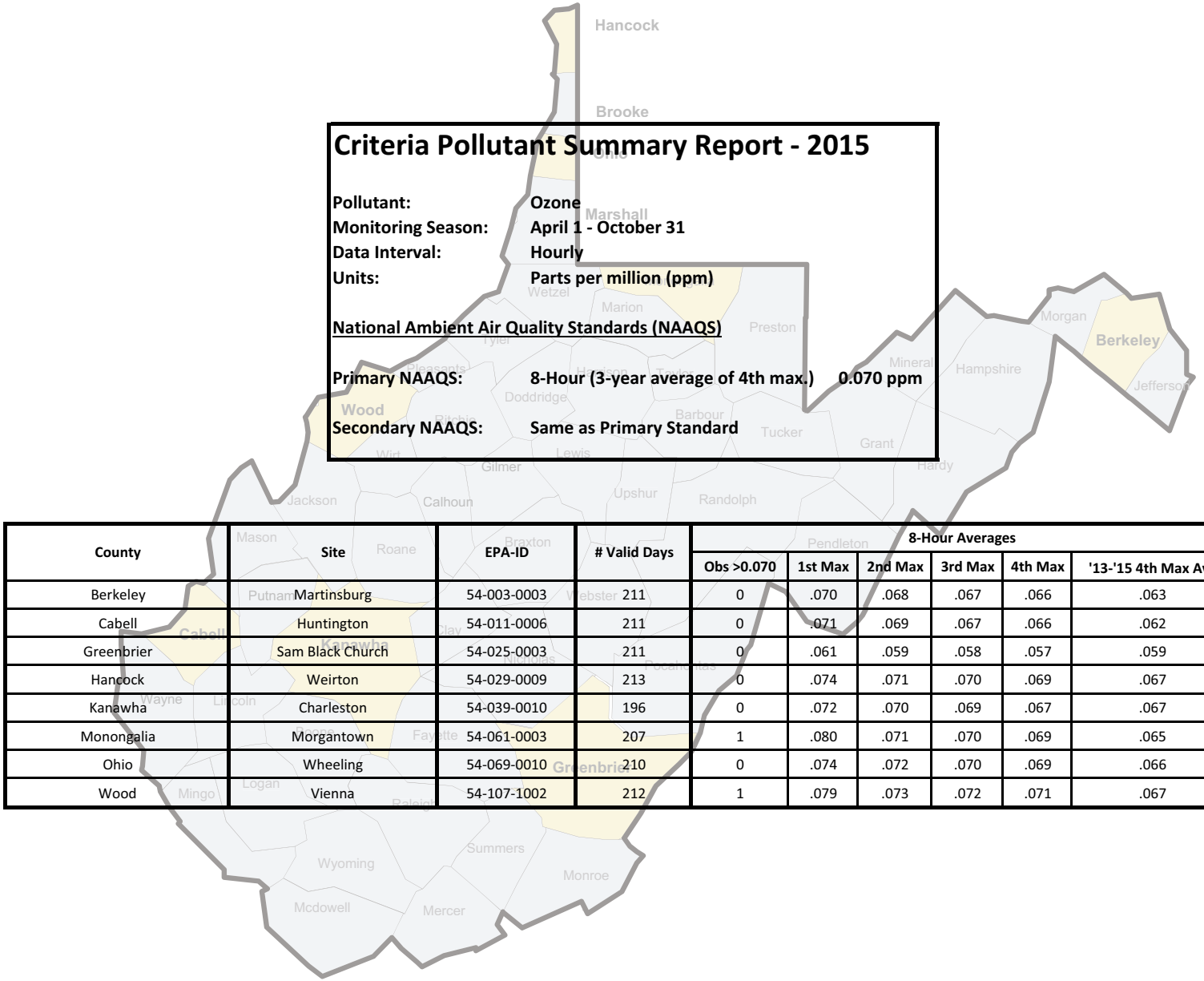
2015 Air Monitoring Network

West Virginia Division of Air Quality - Monitoring Network

CY 2015

COUNTY	PM_{10}	$PM_{2.5}$	CO	SO_2	O_3	MET	$PM_{2.5}$ SPECIATION	AIR TOXICS
Berkeley		1			1			
Brooke	2	2	1	3				
Cabell		1		1	1			
Greenbrier					1			
Hancock	2	1	2	6	1	1		
Harrison		1						
Kanawha	1	2		1	1		1	1
Marion		1						
Marshall		1		1			1	
Monongalia		1		1	1			1
Ohio		1			1			1
Wood		1		1	1			
Total Sites	5	13	3	14	8	1	2	3

2015 Criteria Pollutants - Ozone Summary



Criteria Pollutant Summary Report - 2015

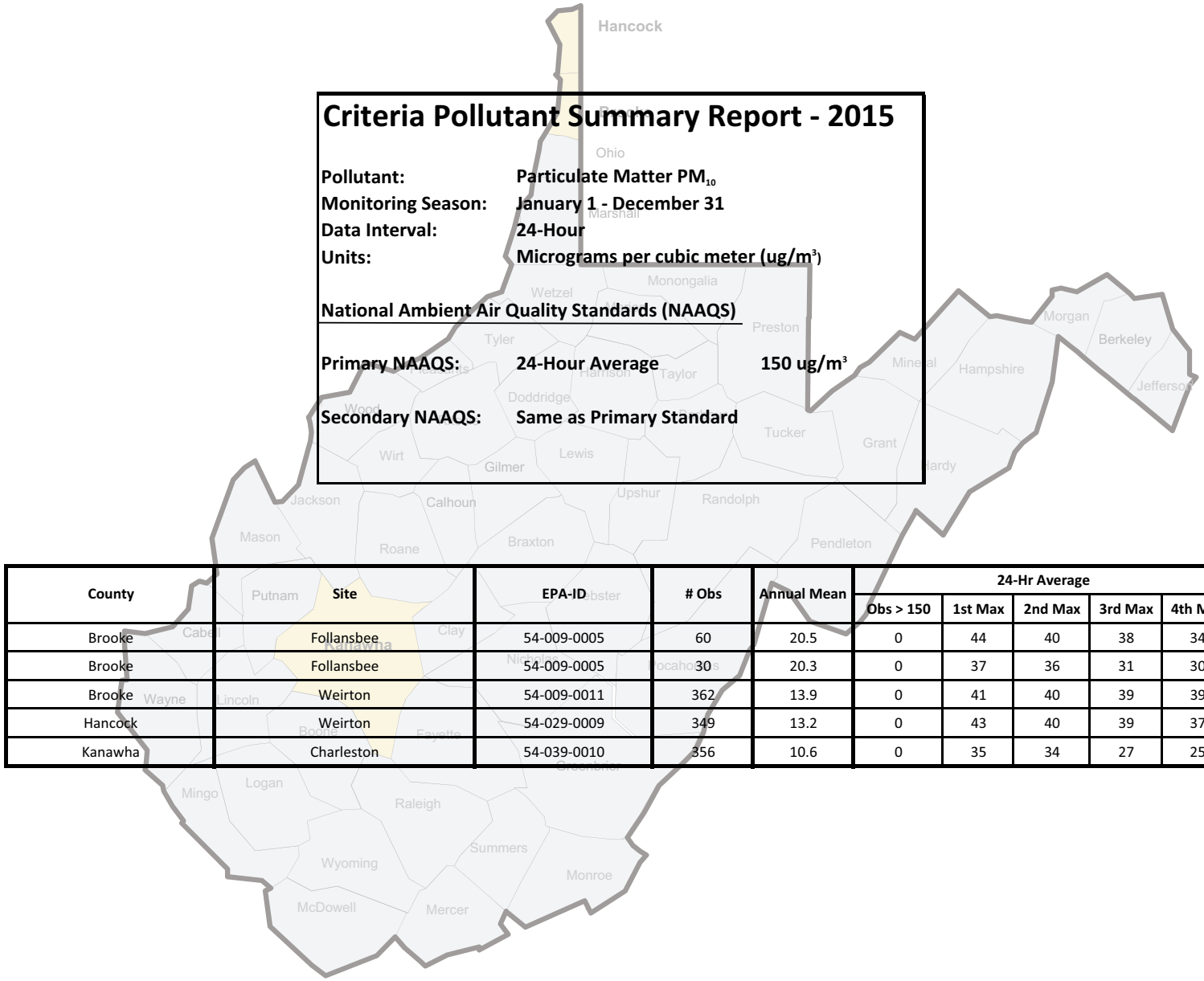
Pollutant: Ozone
Monitoring Season: April 1 - October 31
Data Interval: Hourly
Units: Parts per million (ppm)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 8-Hour (3-year average of 4th max.) 0.070 ppm
Secondary NAAQS: Same as Primary Standard

County	Site	EPA-ID	# Valid Days	8-Hour Averages					
				Obs >0.070	1st Max	2nd Max	3rd Max	4th Max	'13-'15 4th Max Avg
Berkeley	Martinsburg	54-003-0003	211	0	.070	.068	.067	.066	.063
Cabell	Huntington	54-011-0006	211	0	.071	.069	.067	.066	.062
Greenbrier	Sam Black Church	54-025-0003	211	0	.061	.059	.058	.057	.059
Hancock	Weirton	54-029-0009	213	0	.074	.071	.070	.069	.067
Kanawha	Charleston	54-039-0010	196	0	.072	.070	.069	.067	.067
Monongalia	Morgantown	54-061-0003	207	1	.080	.071	.070	.069	.065
Ohio	Wheeling	54-069-0010	210	0	.074	.072	.070	.069	.066
Wood	Vienna	54-107-1002	212	1	.079	.073	.072	.071	.067

2015 Criteria Pollutants - PM_{10} Summary



Criteria Pollutant Summary Report - 2015

Pollutant: Particulate Matter PM_{10}
Monitoring Season: January 1 - December 31
Data Interval: 24-Hour
Units: Micrograms per cubic meter (ug/m^3)

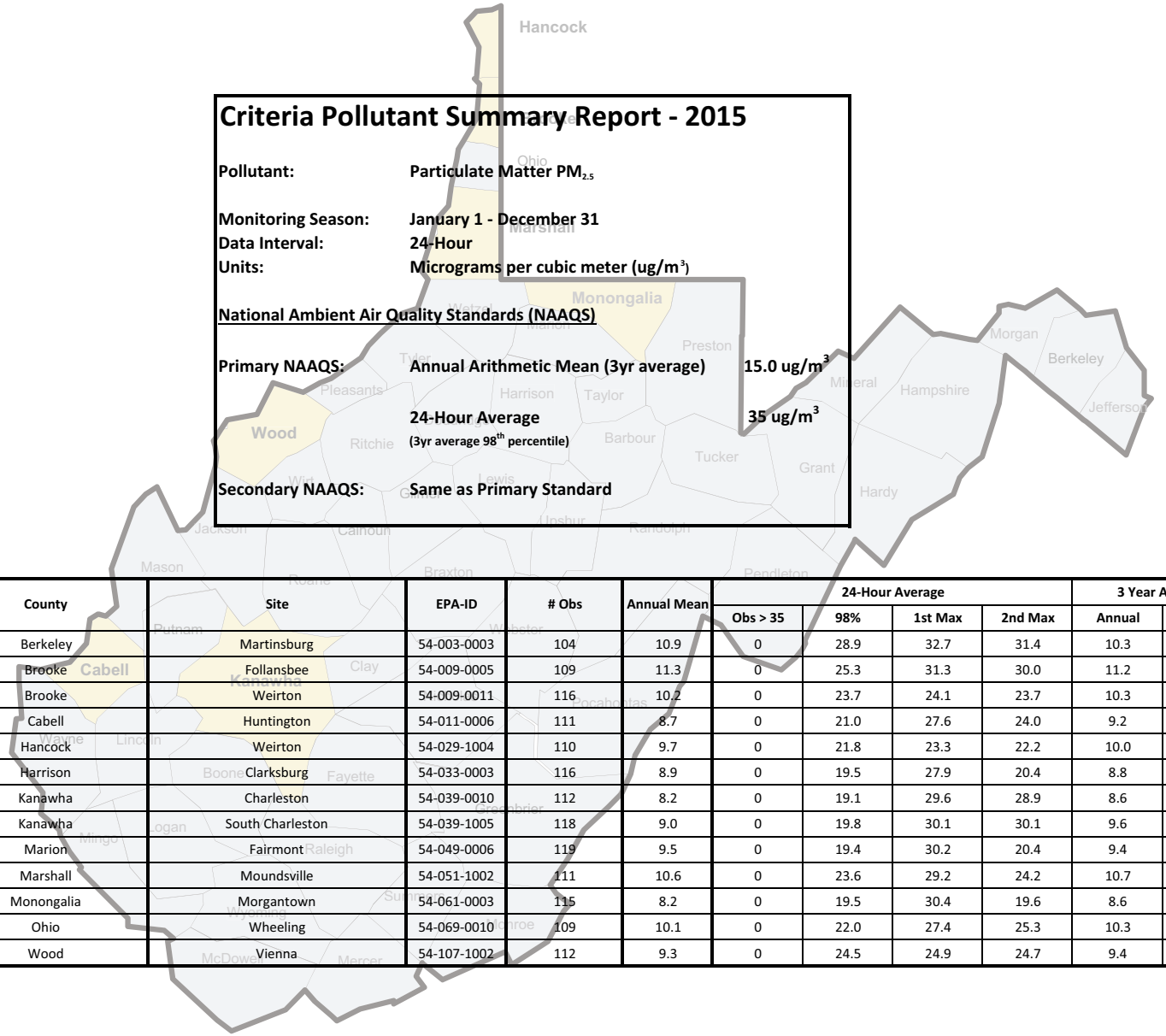
National Ambient Air Quality Standards (NAAQS)

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	60	20.5	0	44	40	38	34
Brooke	Follansbee	54-009-0005	30	20.3	0	37	36	31	30
Brooke	Weirton	54-009-0011	362	13.9	0	41	40	39	39
Hancock	Weirton	54-029-0009	349	13.2	0	43	40	39	37
Kanawha	Charleston	54-039-0010	356	10.6	0	35	34	27	25

2015 Criteria Pollutants - $PM_{2.5}$ Summary



Criteria Pollutant Summary Report - 2015

Pollutant: Particulate Matter $PM_{2.5}$

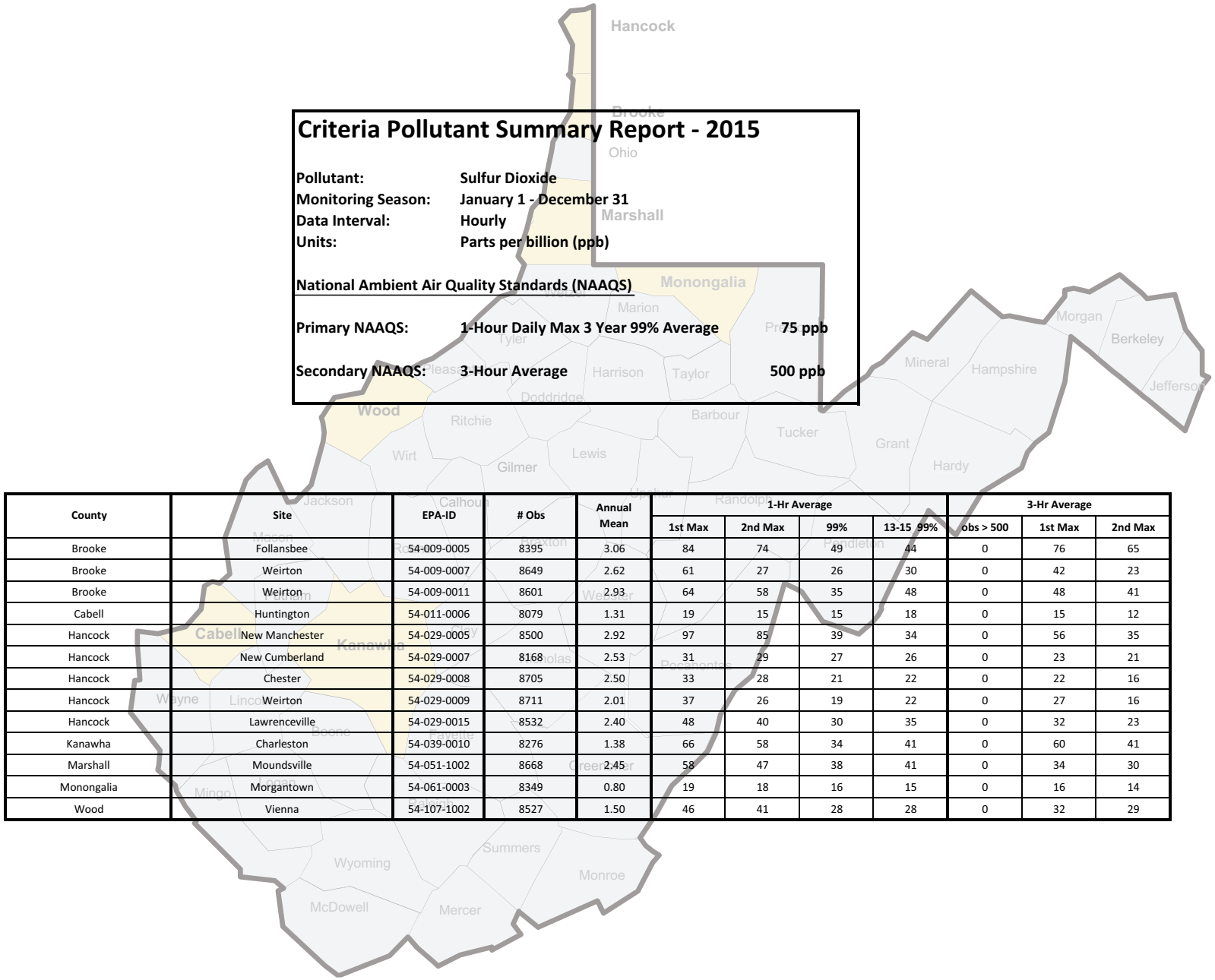
Monitoring Season: January 1 - December 31
Data Interval: 24-Hour
Units: Micrograms per cubic meter (ug/m^3)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS:	**Annual Arithmetic Mean (3yr average)**	**15.0 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	104	10.9	0	28.9	32.7	31.4	10.3	26
Brooke	Follansbee	54-009-0005	109	11.3	0	25.3	31.3	30.0	11.2	25
Brooke	Weirton	54-009-0011	116	10.2	0	23.7	24.1	23.7	10.3	24
Cabell	Huntington	54-011-0006	111	8.7	0	21.0	27.6	24.0	9.2	21
Hancock	Weirton	54-029-1004	110	9.7	0	21.8	23.3	22.2	10.0	25
Harrison	Clarksburg	54-033-0003	116	8.9	0	19.5	27.9	20.4	8.8	19
Kanawha	Charleston	54-039-0010	112	8.2	0	19.1	29.6	28.9	8.6	19
Kanawha	South Charleston	54-039-1005	118	9.0	0	19.8	30.1	30.1	9.6	20
Marion	Fairmont	54-049-0006	119	9.5	0	19.4	30.2	20.4	9.4	19
Marshall	Moundsville	54-051-1002	111	10.6	0	23.6	29.2	24.2	10.7	23
Monongalia	Morgantown	54-061-0003	115	8.2	0	19.5	30.4	19.6	8.6	19
Ohio	Wheeling	54-069-0010	109	10.1	0	22.0	27.4	25.3	10.3	23
Wood	Vienna	54-107-1002	112	9.3	0	24.5	24.9	24.7	9.4	21

2015 Criteria Pollutants - SO_2 Summary



Criteria Pollutant Summary Report - 2015

Pollutant: Sulfur Dioxide
Monitoring Season: January 1 - December 31
Data Interval: Hourly
Units: Parts per billion (ppb)

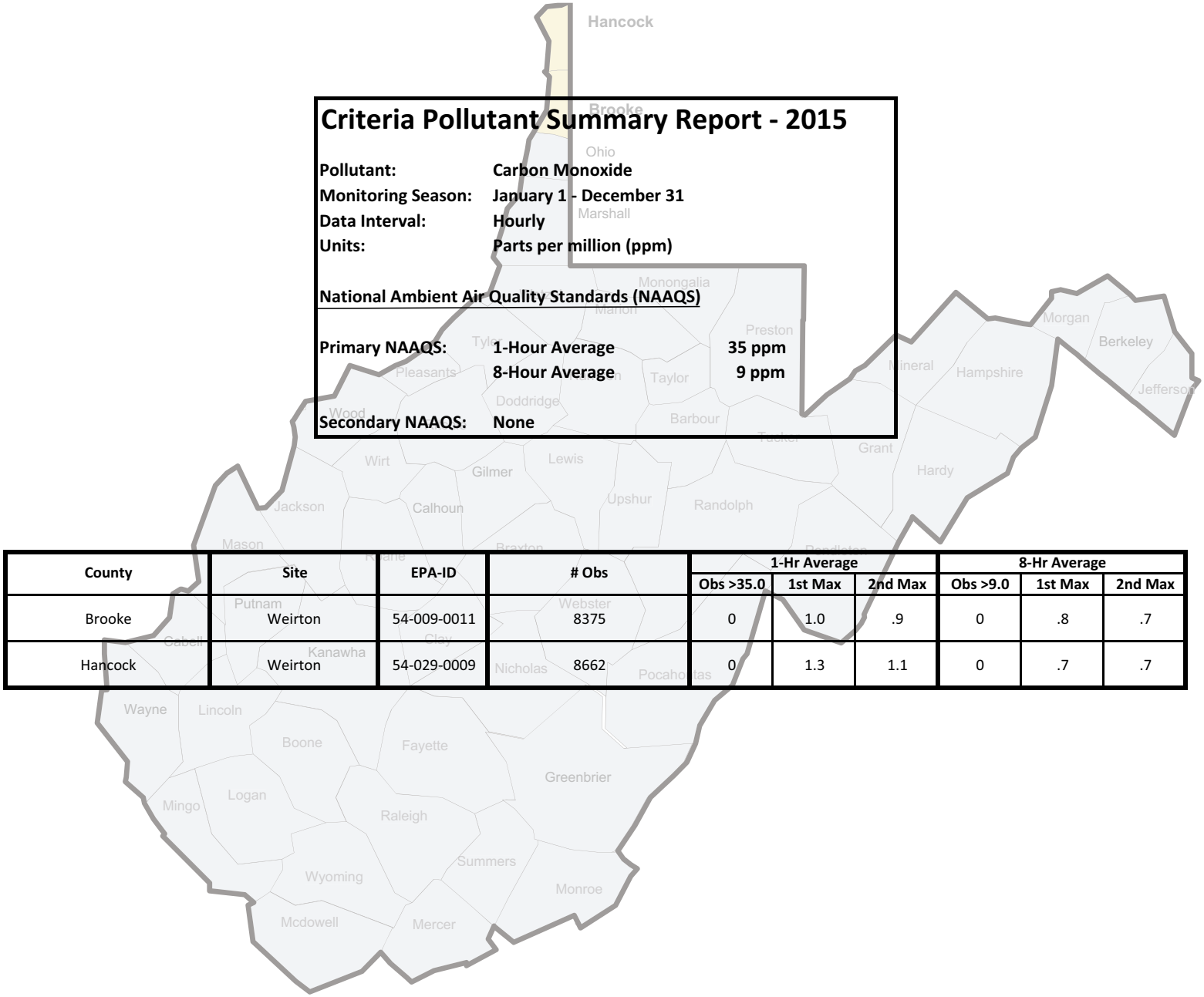
National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 1-Hour Daily Max 3 Year 99% Average — 75 ppb

Secondary NAAQS: 3-Hour Average — 500 ppb

County	Site	EPA-ID	# Obs	Annual Mean	1-Hr Average				3-Hr Average		
					1st Max	2nd Max	99%	13-15 99%	obs > 500	1st Max	2nd Max
Brooke	Follansbee	54-009-0005	8395	3.06	84	74	49	44	0	76	65
Brooke	Weirton	54-009-0007	8649	2.62	61	27	26	30	0	42	23
Brooke	Weirton	54-009-0011	8601	2.93	64	58	35	48	0	48	41
Cabell	Huntington	54-011-0006	8079	1.31	19	15	15	18	0	15	12
Hancock	New Manchester	54-029-0005	8500	2.92	97	85	39	34	0	56	35
Hancock	New Cumberland	54-029-0007	8168	2.53	31	29	27	26	0	23	21
Hancock	Chester	54-029-0008	8705	2.50	33	28	21	22	0	22	16
Hancock	Weirton	54-029-0009	8711	2.01	37	26	19	22	0	27	16
Hancock	Lawrenceville	54-029-0015	8532	2.40	48	40	30	35	0	32	23
Kanawha	Charleston	54-039-0010	8276	1.38	66	58	34	41	0	60	41
Marshall	Moundsville	54-051-1002	8668	2.45	58	47	38	41	0	34	30
Monongalia	Morgantown	54-061-0003	8349	0.80	19	18	16	15	0	16	14
Wood	Vienna	54-107-1002	8527	1.50	46	41	28	28	0	32	29

2015 Criteria Pollutants - CO Summary



Criteria Pollutant Summary Report - 2015

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:	**None**	

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	8375	0	1.0	.9	0	.8	.7
Hancock	Weirton	54-029-0009	8662	0	1.3	1.1	0	.7	.7

Appendix B

Definitions, Terms and Acronyms

Definitions

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.

Air toxics
Term generally referring to hazardous air pollutants, and used in the context of implementation of a program to address such emissions and their impacts.

Ambient air
Generally, the atmosphere; outdoors.

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.

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.

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 (SF_6). These gases absorb infrared radiation and trap heat in the atmosphere.

HAP
Hazardous Air Pollutant.

MACT
Maximum Achievable Control Technology.

Definitions

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.

NCore
A multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology.

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

NO_X or NO_2
Nitrogen oxides.

O_3
Ozone.

Ozone season
Varies geographically but for West Virginia it is the period beginning April 1 and ending on October 31 of the same year.

Pb
Lead.

PM
Particulate Matter.

$PM_{2.5}$
Particles that are 2.5 micrometers or less in size. These fine particles can be easily inhaled deep into the lungs where they can accumulate, react, be cleared or absorbed. These particles are about 30 times smaller than the diameter of a human hair.

PM_{10}
Particles that are 10 micrometers in size or less. This includes both fine particles (2.5 micrometers or less) and inhalable coarse particles having diameters larger than 2.5 micrometers and smaller than 10 micrometers.

Particulate Matter
Any material, except uncombined water, that exists in a finely divided form as a lliquid 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 Quality 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 Internet Sites

West Virginia Department of Environmental Protection - Division of Air Quality
www.dep.wv.gov/daq

Environmental Protection Agency
www.epa.gov/

Air Quality Data
AirData gives you access to air quality data collected at outdoor monitors across the United States, Puerto Rico, and the U.S. Virgin Islands
Emissions data and Air Toxics data are not available at this site
www3.epa.gov/airdata

Emissions Data
www.epa.gov/air/emissions/

Air Toxics Data
www3.epa.gov/ttn/rtw/

Air Monitoring - Provides information for evaluating the status of the atmosphere as compared to clean air standards and historical information
www.epa.gov/ttn/amtic

AirNow - Ozone mapping, AQI and real time data
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
www.epa.gov/air-trends

Nonattainment area descriptions
www3.epa.gov/airquality/greenbook/

EPA Technology Transfer Network (TTN Web)
Air Quality Monitoring www3.epa.gov/ttn/amtic/
NAAQS Information www3.epa.gov/ttn/naaqs/

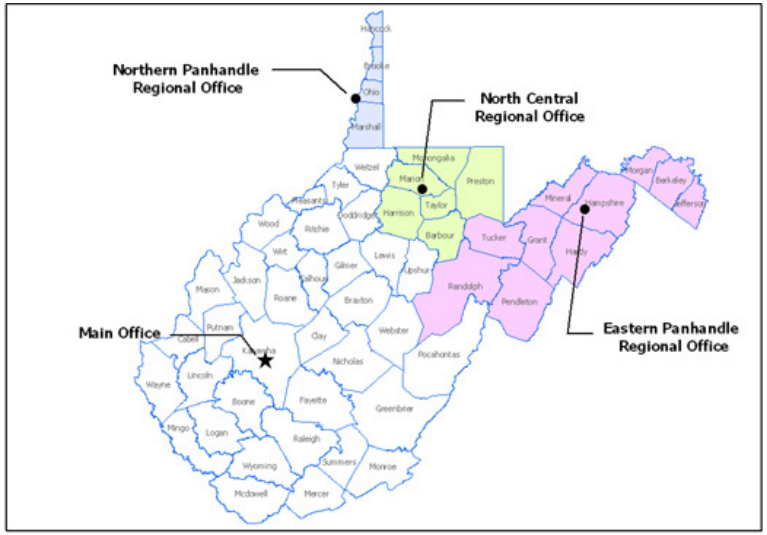
Education links for educational resources
www.epa.gov/students/

Provides links to outreach efforts about technical air training, upcoming conferences and environmental education
www.apti-learn.net

Public Notices for Regulatory Actions
www.dep.wv.gov/daq/publicnoticeandcomment/Pages/default.aspx

Contact Information

DEP - Division of Air Quality Regional Offices



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Fax: (304) 822-3535

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Guthrie Lab:
367 Gus R. Douglass Lane
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