2016 Retrospective

State of the Air in Arkansas

Office of Air Quality
Arkansas Department of Environmental Quality
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Table of Contents

List of Tables

List of Figures

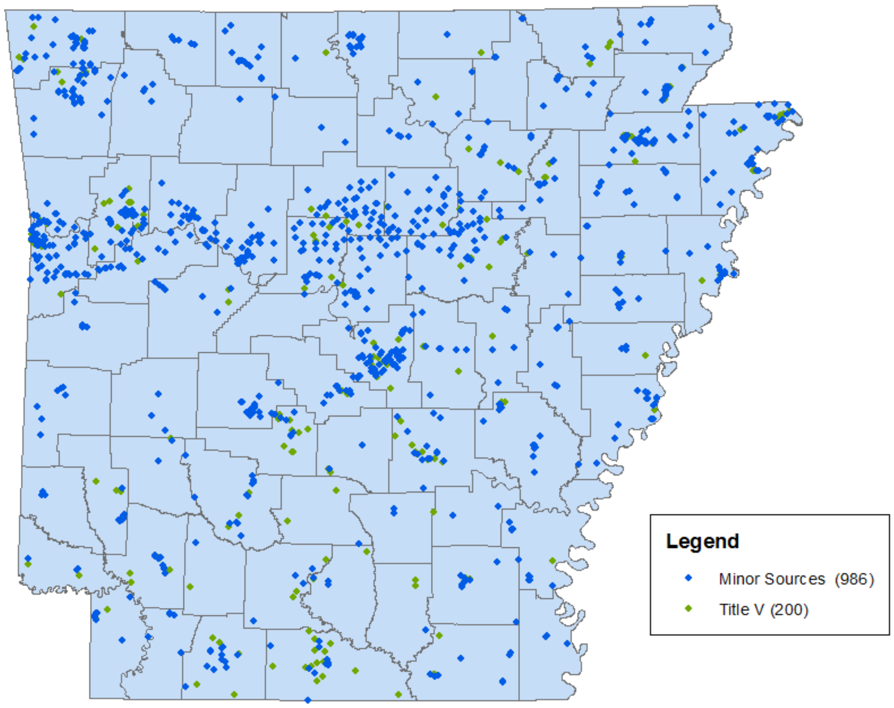
State of the Air in Arkansas

Introduction

The state of the air in Arkansas is excellent and continues to improve. All areas of Arkansas are in attainment with the National Ambient Air Quality Standards (NAAQS) promulgated by the United States Environmental Protection Agency (EPA). The NAAQS are limits set to protect the public health and welfare. The Arkansas Department of Environmental Quality (ADEQ) has the responsibility of developing and administering air quality programs to ensure that all areas of the state are in attainment with the NAAQS. Emissions reductions have been achieved through implementation of both state and federal programs. Arkansas is also on target to meet or beat other Clean Air Act (CAA) goals, including visibility improvement in national parks and reductions in carbon emissions.

The Office of Air Quality (OAQ) at ADEQ is responsible for implementing programs to protect and improve air quality throughout the State. The OAQ has issued permits for approximately 986 minor sources and 200 Title V sources. The locations of minor and Title V sources with ADEQ air permits are displayed on Figure 1. The OAQ recently underwent a reorganization and implemented measures to realize increased efficiencies and enhance communication with its end users. As a result of the leadership in the OAQ permits branch, permit issuance timeframes have been greatly reduced and the backlog of Title V permits has decreased dramatically in the past year and a half. Arkansas is now ranked 5th best in terms of Title V permit renewal backlog for permitting authorities with greater than 100 Title V sources.

Figure 1. Locations of Facilities with Active Minor or Title V Air Permits



The OAQ also actively engages specific communities when there are local air quality concerns. The OAQ has established special projects, including short-term monitoring for specific pollutants in response to these concerns. The OAQ also investigates complaints from the public pertaining to potential local air quality issues. Between October 1, 2015 and September 30, 2016, inspectors performed 794 inspections, investigated 409 complaints, and reviewed 620 stack tests. The OAQ compliance branch continues to excel at ensuring that regulated sources are meeting their permit requirements. Compliance with state air regulations and state air permits ensures that air quality in the state continues to attain and maintain the air quality standards.

This report focuses on trends in air quality and emissions over the past decade.[1] Specifically, this report looks at trends in ambient air quality with respect to criteria pollutants and visibility in national parks. This report also examines trends in emissions of criteria pollutants and their precursors, as well as carbon dioxide. These recent trends are illustrative of the improvements in air quality seen in Arkansas that have resulted in attainment of CAA goals.

[1] ADEQ has monitored for certain criteria pollutants for more than thirty years.

Air Quality Standards

National Ambient Air Quality Standards

The CAA requires that EPA set NAAQS for pollutants that are common to outdoor air and are considered harmful to public health and the environment. These pollutants, which are referred to as "criteria pollutants," include ozone, particulate matter, carbon monoxide (CO), lead, sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). The EPA administrator, in consultation with the Clean Air Scientific Advisory Committee, sets primary and secondary NAAQS to protect public health and the environment for each criteria pollutant. The primary NAAQS is set at a level that reduces the risk of harm so as to protect public health, including sensitive populations, with an adequate margin of safety.[2] The secondary NAAQS is set at a level that is protective of the public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Secondary standards are typically equal to the primary standard or less stringent than the primary standard. The current NAAQS are listed in Table 1.

Table 1. National Ambient Air Quality Standards

Pollutant	Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead	Primary and secondary	Rolling 3-month average	0.15 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and secondary	Annual	53 ppb	Annual mean
Ozone	Primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution, PM$_{2.5}$	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
	Secondary	Annual	15 $\mu g/m^3$	
	Primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
Particle Pollution, PM$_{10}$	Primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

[2] CAA §109

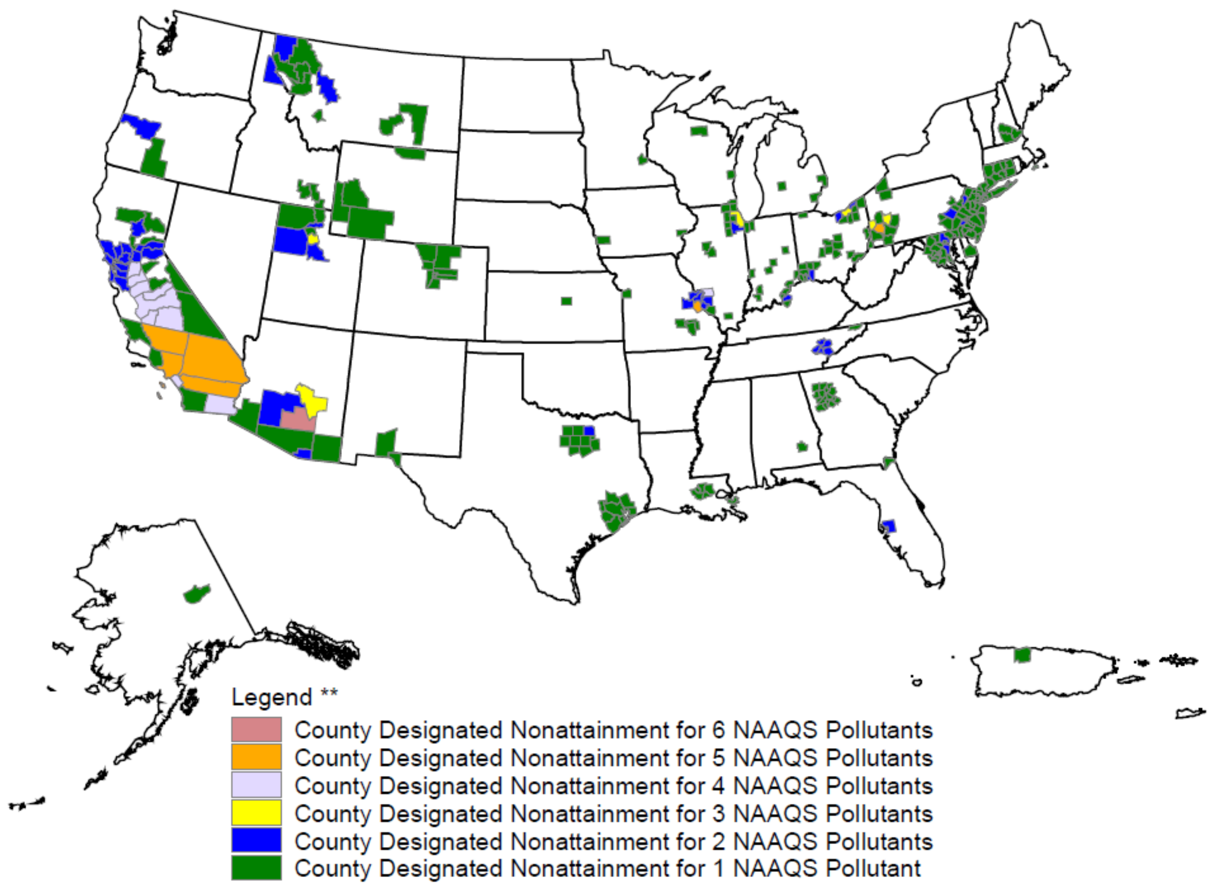
The NAAQS are reviewed every five years to determine whether recent scientific data continue to indicate that the level, form, and averaging time of the current NAAQS are protective of public health.[3] If the data show that the current level of the NAAQS is not protective of public health with an adequate margin of safety, the EPA must revise the standard and states must develop implementation plans to ensure that all areas of the state attain and maintain the revised NAAQS.[4] Areas in which the NAAQS for a particular criteria pollutant is not being met are designated as nonattainment and require additional planning efforts to improve air quality.[5] Nonattainment designation recommendations are made by the Governor and promulgated by EPA. EPA classifies nonattainment areas as marginal, moderate, serious, severe, or extreme, based on the severity of the air pollution and the availability and feasibility of pollution control measures. For each nonattainment area, the affected states must develop plans to reduce pollutant levels in the air to achieve attainment with the NAAQS as expeditiously as possible.

Attainment Status

All counties in Arkansas are in attainment with the NAAQS for all criteria pollutants. Crittenden County, which is located in the Memphis metropolitan area, had previously been designated a marginal nonattainment area for the 1997 ozone standard and the 2008 ozone standard. Based on monitored improvements in air quality between 2012 and 2014, EPA redesignated the county to attainment, effective May 25, 2016. All counties in Arkansas are anticipated to continue to attain all NAAQS, including the recently promulgated 2015 ozone NAAQS set at 70 parts per billion (ppb). On September 29, 2016, Governor Asa Hutchinson submitted a letter to EPA Region 6 recommending that all counties in Arkansas be designated attainment or attainment/unclassifiable (for counties that do not have a monitor) based on 2013 – 2015 data. Figure 2 is a map of counties designated nonattainment with one or more NAAQS.

[3] CAA §109
[4] CAA §110
[5] CAA Title I Part D

Figure 2. Counties Designated Nonattainment for National Ambient Air Quality Standards



Attainment status is determined based on air quality measurements by ambient air monitoring networks. A design value is computed for each monitor location based on time-weighted averages of the criteria pollutant in ambient air and the form of the NAAQS. Design values are compared with the level of the NAAQS to determine whether the standard is exceeded and if so, by how much. If multiple monitors are collocated in an area, the monitor with the highest design value controls attainment status. When EPA promulgates a new NAAQS, states must evaluate monitoring data to determine whether to recommend an attainment or a nonattainment status to EPA.

Ambient air monitoring networks are established according to federal requirements based on total population in a metropolitan statistical area (MSA). Within an MSA, several factors are used to determine the location of the monitoring sites:

1. Where the highest concentration is expected to occur in the area covered by the monitor (usually determined through modelling);
2. What the expected representative concentrations are in areas of high population density;

3. What impacts on ambient pollution levels significant sources or source categories may have; and
4. What the background concentration levels are.

Locations of monitors in the current Arkansas Ambient Air Monitoring Network are listed in Table 2 and depicted in Figure 3.

Figure 3. Arkansas Ambient Air Monitoring Network

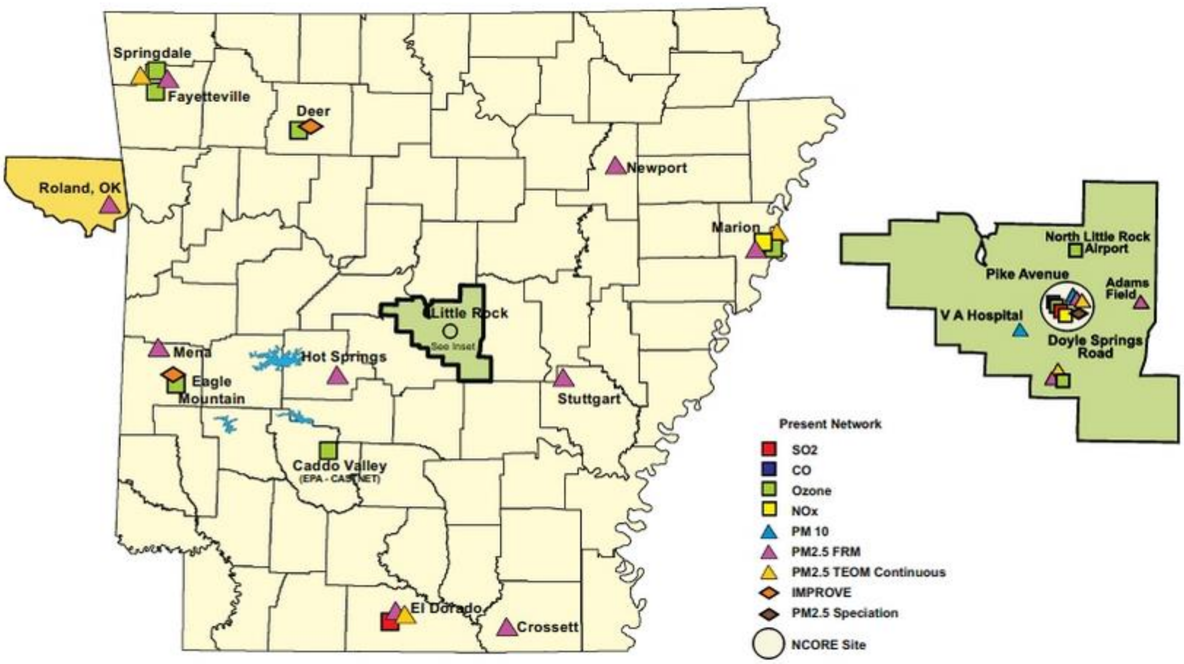


Table 2. Arkansas Ambient Air Monitors

Pollutant	Number of Monitors	Locations
Ozone	8	Clark County Crittenden County Newton County Polk County Pulaski County Washington County
Particulate Pollution (PM_{10})	2	Pulaski County
Particulate Pollution ($PM_{2.5}$)	14	Arkansas County Ashley County Crittenden County Garland County Jackson County Polk County Pulaski County Union County Washington County Sequoyah County (Oklahoma)

Pollutant	Number of Monitors	Locations
Carbon Monoxide	1	Pulaski County
Nitrogen Dioxide	2	Crittenden County Pulaski County
Sulfur Dioxide	2	Pulaski County Union County
Lead	1	Pulaski County

Per federal requirements, Arkansas's air monitors are strategically located throughout the state to ensure that data from the monitors provide high-quality information so that ADEQ can confirm that air quality programs in the state are adequately protecting public health and that environmental goals are being achieved. ADEQ reviews the Arkansas Ambient Air Monitoring Network each year to detail the exact expected operation schedule for each monitor for the coming calendar year. The most recent annual network review was submitted to EPA on July 13, 2016. The network is evaluated every five years to determine whether the current number and location of monitors meets ADEQ's environmental monitoring objectives and satisfies federal monitoring requirements for each pollutant. The Five-Year Network Assessment is a robust analysis that includes meteorological analysis, probability analysis, correlation analysis, and historical trends. The Five-Year Network Assessment also outlines possible and expected changes to the network that may occur within the next five years based on changes in the regulations or projections of population growth. The most recent Five-Year Network Assessment was submitted to EPA on October 12, 2015. EPA acknowledged on July 22, 2016 that the monitoring plan detailed in the Five-Year Network Assessment was adequate to meet federal requirements.

Criteria Pollutants

Ozone

All areas of the state have ozone design values below the level of the current NAAQS for ozone (70 ppb). Crittenden County was designated a marginal nonattainment area for the 1997 ozone standard and the 2008 ozone standard, but ultimately reattained each standard through continued improvements in air quality. Over the past ten years, concentrations of ozone have dropped in Crittenden County and across the state because of federal and State air quality programs to reduce emissions of precursor pollutants, particularly NOx.

Ozone is a reactive molecule composed of three atoms of oxygen. In the upper atmosphere, ozone is beneficial and protects the earth from harmful ultraviolet rays. At ground level, ozone is unhealthy to breathe and can trigger various respiratory and cardiovascular health problems. Ozone is ubiquitous in the natural environment and is formed by photochemical reactions involving nitrogen oxides (NOx), volatile organic compounds (VOCs), and sunlight. VOCs can be emitted from both biogenic and anthropogenic sources. In Arkansas, approximately 81% of VOC emissions come from biogenic sources, particularly trees, and only 10% of emissions come from sources regulated by State and federal air quality programs.[6] NOx is formed primarily by combustion of fossil fuels. The formation of ozone is highly weather dependent, and ozone can be transported long distances by wind.

In setting the level of the ozone NAAQS, EPA considers various clinical and epidemiological studies to evaluate what level, averaging time, and form of the standard would be protective of human health and public welfare. The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to ozone. EPA also develops an air quality index (AQI) to communicate with the public on days when ozone concentrations are likely to be elevated so that the public can consider taking actions to limit their exposure. Although EPA uses the AQI as a communication tool, EPA actually evaluates air quality with respect to ozone-based measurements from ambient air monitors.

Over the last 10-year period, EPA has increased the stringency of the 8-hour ozone NAAQS twice from 0.08 parts per million (ppm) in 1997 to 0.075 ppm in 2008 then to 0.070 ppm in 2015. Although the level of the ozone NAAQS changed, the form and averaging time remained the annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years. Figure 4 shows the trends compared to the standard on a pass/fail basis.[7] Figure 5 illustrates the degree by which design values at each monitor fall above or below the level of the ozone NAAQS in effect during the period over which design values were calculated.

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[6] Source: 2011 National Emissions Inventory version 2

[7] For both Figures 3 and 4, all design values shown are rounded to the nearest 1000th of a ppm; however, those design values for year ranges prior to 2008 would be rounded to the nearest 100th of a ppm for comparison with the 1997 ozone NAAQS for the purposes of determining attainment per EPA requirements. Design values for the 2008 and 2015 ozone NAAQS must be reported to the nearest 1000th of a ppm. For example, a design value of 0.083 ppm would be rounded down to 0.08 ppm when considering whether the 1997 ozone NAAQS of 0.08 ppm is met, but a design value of 0.073 ppm would not be rounded down when considering whether the 2015 ozone NAAQS of 0.070 ppm is met. Thus, an area with a 0.083 ppm design value would be considered to meet the 1997 ozone NAAQS, but an area with a 0.073 ppm design value would be considered to exceed the level of the 2015 ozone NAAQS.

Figure 4. Ozone Design Values at Arkansas Monitors (Pass/Fail)

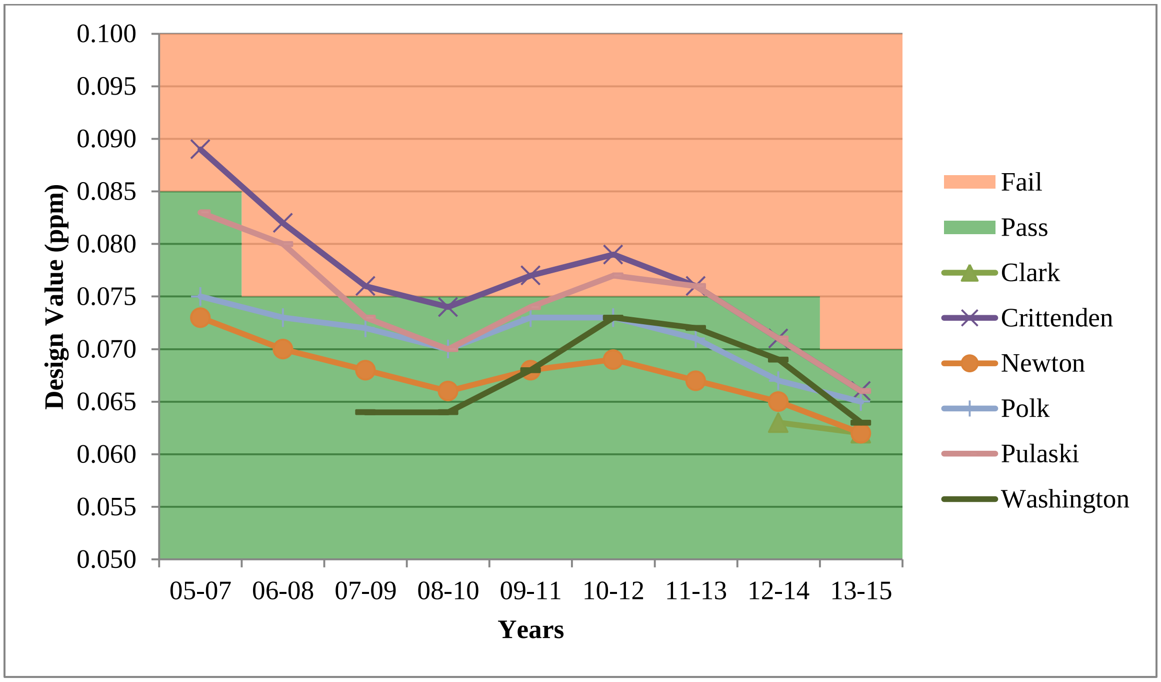
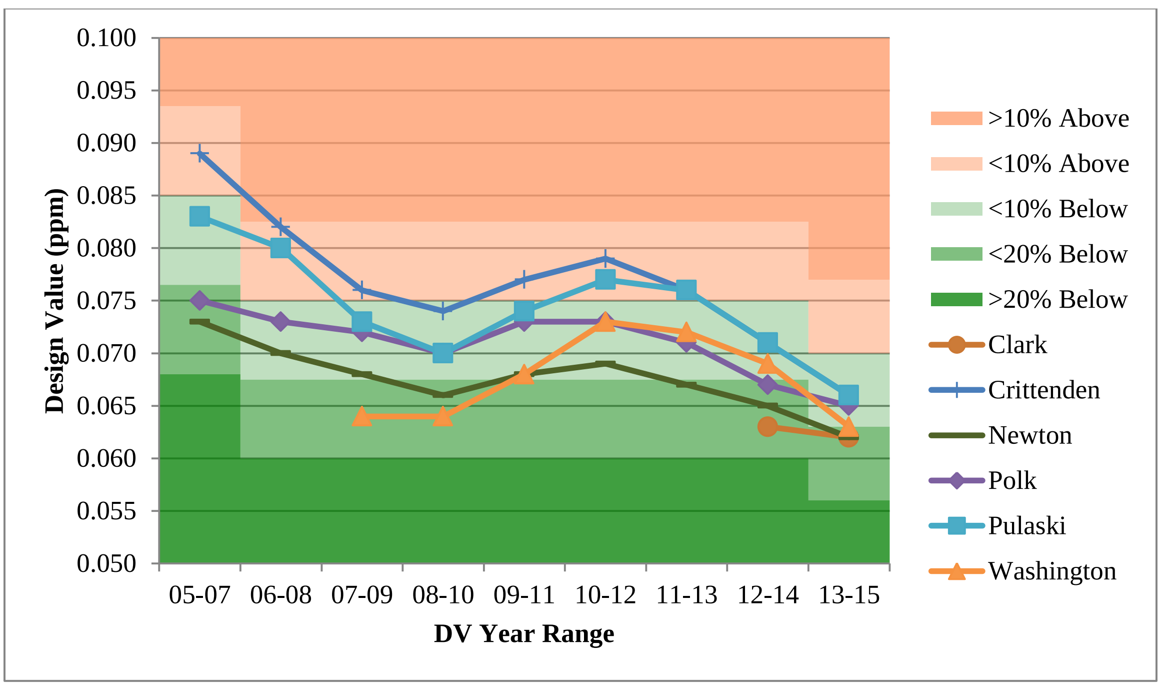


Figure 5. Ozone Design Values at Arkansas Monitors (Degree of Deviation from the NAAQS)



As indicated by Figures 4 and 5 above, ozone concentrations have shown a decline over the past ten years. Both Pulaski County and Crittenden County have experienced brief periods during which the level of the ozone NAAQS was exceeded. These exceedances were very small, less than 10% above the level of the NAAQS. Although the design value for Pulaski County was above the level of the 2008 ozone NAAQS during the 2006 – 2008 averaging period, the design value dropped below the standard for the 2007 – 2009 averaging period, and a nonattainment designation was avoided. Crittenden County was designated as a marginal nonattainment area for both the 1997 ozone standard and the 2008 standard. Crittenden County was redesignated to attainment for the 1997 ozone standard in 2010 and redesignated for the 2008 ozone standard in 2016.

All counties in Arkansas are on track to attain the 2015 ozone NAAQS. Approximately 713,485 Arkansans live in areas monitored for ozone.[8] The latest design values from 2015 indicate that 46.4% of Arkansas's population living in monitored areas reside in areas within 10% of the 2015 ozone NAAQS. The remaining 53.6% of Arkansas's population living in monitored areas reside in areas where design values are more than 10% lower than the 2015 ozone NAAQS.[9] An additional 2,254,180 Arkansans live in rural unmonitored areas where ozone concentrations are likely to be even lower.[10] The 2016 three-year average fourth high values are on track to be even lower than 2015 design values for Pulaski County, Northwest Arkansas, Clark County, Newton County, and Polk County. The 2016 three-year average fourth high value for Crittenden County is on track to be slightly higher than the 2015 design value, but under the 70 ppb level of the 2015 ozone NAAQS. Design values will not be calculated for 2016 until the ozone season ends and all ozone season data have been certified. On September 29, 2016, Governor Asa Hutchinson submitted a letter to EPA Region 6 recommending that all counties in Arkansas be designated attainment or attainment/unclassifiable (for counties that do not have a monitor) based on 2013 – 2015 data.

Particulate Matter

All areas of the state are in attainment with the current NAAQS for particulate matter. There are two size fractions of particulate matter for which EPA sets NAAQS: particles less than 10 microns in diameter (PM_{10} or "coarse particulate matter") and particles less than 2.5 microns in diameter ($PM_{2.5}$ or "fine particulate matter"). PM_{10} levels have seen little change over the past ten years, and design values have stayed well below the level of the PM_{10} NAAQS. Concentrations of $PM_{2.5}$ have declined over the past ten years.

PM_{10} particles are small enough to enter the respiratory tract once inhaled. Inhalation of PM_{10} can increase the frequency and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Certain populations may be more sensitive to the effects of particulate pollution than others. These include children, the elderly, exercising adults, and those with pre-existing lung disease.

[8] Source: U.S. Census Bureau 2015 estimated population
[9] Id.
[10] Id.

$PM_{2.5}$ particles are microscopic solids and liquid droplets that are small enough to penetrate deep into the lungs when inhaled. Numerous scientific studies have linked $PM_{2.5}$ exposure to a number of adverse health effects. These effects include the following: premature death in people with heart or lung disease; nonfatal heart attacks; irregular heartbeat; aggravated asthma; decreased lung function; and increased respiratory symptoms, such as irritation of airways, coughing, and difficulty breathing.

PM_{10} and $PM_{2.5}$ fractions of particulate matter have different physical characteristics and are emitted by different sources. PM_{10} particles originate from a variety of mobile and stationary sources, and their chemical composition varies widely. Some of the actions that generate PM_{10} particles include grinding or crushing operations, mineral processing, agricultural operations, fuel combustion, and fires. $PM_{2.5}$ is emitted directly from diesel engines, smelters, and other combustion sources. $PM_{2.5}$ can also form in the atmosphere because of complex reactions of precursor compounds, such as oxides of sulfur (SOx) and NOx. $PM_{2.5}$ may be composed of sulfate, nitrate, ammonium, and/or hydrogen ions. It may also contain elemental carbon, metal compounds, organic compounds, and particle-bound water.

The nature of $PM_{2.5}$ is such that it may stay suspended in the atmosphere for long periods of time and may be transported hundreds of miles. PM_{10} particles generally do not stay suspended in the atmosphere as long or travel as far as $PM_{2.5}$ particles do. PM_{10} particles often settle out in areas relatively near their sources. The vast majority of PM_{10} emissions in Arkansas can be attributed to dust, agricultural activities, and fires. Much smaller contributions come from industrial processes, mobile sources, fuel combustion, solvents, and other miscellaneous sources. The majority of $PM_{2.5}$ emissions in Arkansas can be attributed to fires, agricultural activities, and dust. Much smaller contributions are made by mobile sources, industrial processes, miscellaneous sources, fuel combustion, and solvents. It is very difficult to tie secondary $PM_{2.5}$ in the atmosphere to specific sources.

In setting the level of the NAAQS for particulate matter, EPA considers various clinical and epidemiological studies to evaluate what level, averaging time, and form of the standard would be protective of human health and public welfare. The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to particulate matter. EPA has established a 24-hour primary PM_{10} NAAQS of 150 micrograms per cubic meter ($\mu g/m^3$), which is not to be exceeded more than once per year on average over three years. EPA has also established a primary and secondary 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$, based on the annual mean averaged over three years, and a primary annual $PM_{2.5}$ NAAQS of 12 $\mu g/m^3$, based on the 98^{th} percentile averaged over three years. For the $PM_{2.5}$ fraction of particulate matter, EPA has also developed an AQI to communicate with the public on days when $PM_{2.5}$ concentrations are likely to be elevated so that the public can consider taking actions to limit their exposure. Although EPA uses the AQI as a communication tool, EPA actually evaluates air quality with respect to $PM_{2.5}$ based on measurements from ambient air monitors.

There are two PM_{10} monitors in Arkansas, both of which are located in Pulaski County. $PM_{2.5}$ monitors are located throughout the state. Figure 6 shows the maximum 24-hour time-weighted average for PM_{10} at Arkansas monitors. No design values are calculated for PM_{10}. Attainment is determined based on whether the level of the standard is exceeded more than once a year averaged over three years. Figures 7 and 8 illustrate the degree by which design values at each monitor fall above or below the level of the annual $PM_{2.5}$ NAAQS and the 24-hour $PM_{2.5}$ NAAQS, respectively. The primary annual $PM_{2.5}$ NAAQS decreased from 15 µg/m^3 to 12 µg/m^3 in 2012. This change is indicated in Figure 7 during the 2011 – 2013 design value years.

Figure 6. PM_{10} 24-Hour Maximum by Year

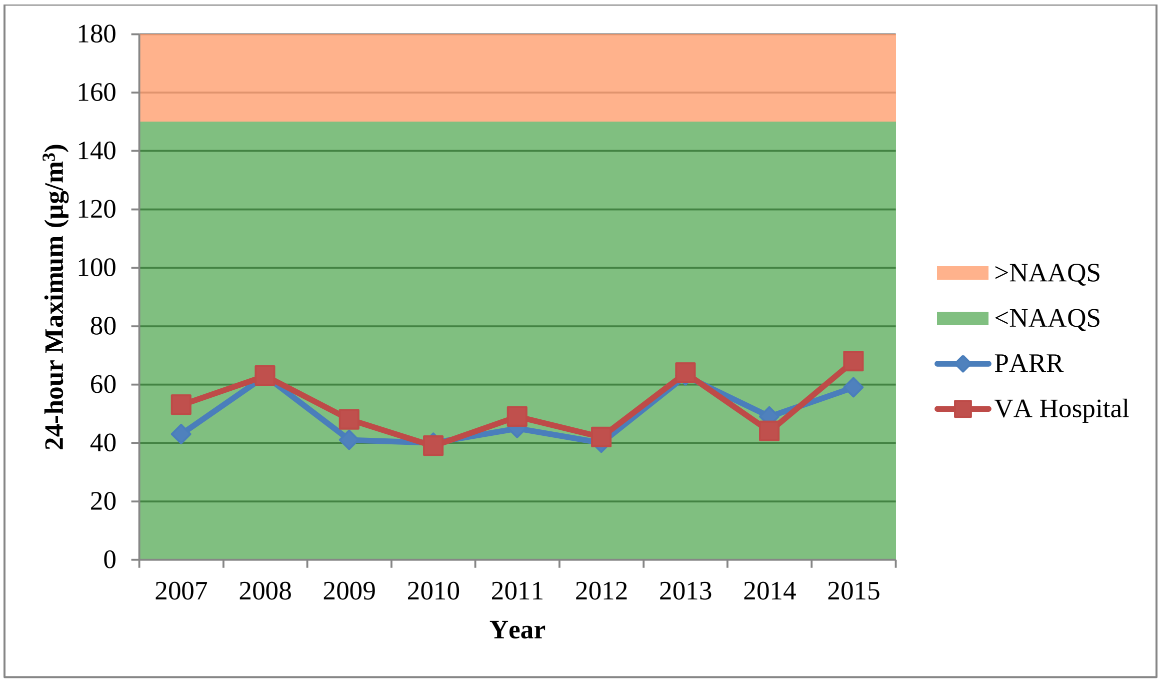


Figure 7. PM$_{2.5}$ Annual Design Values at Arkansas Monitors (Degree of Deviation from the NAAQS)

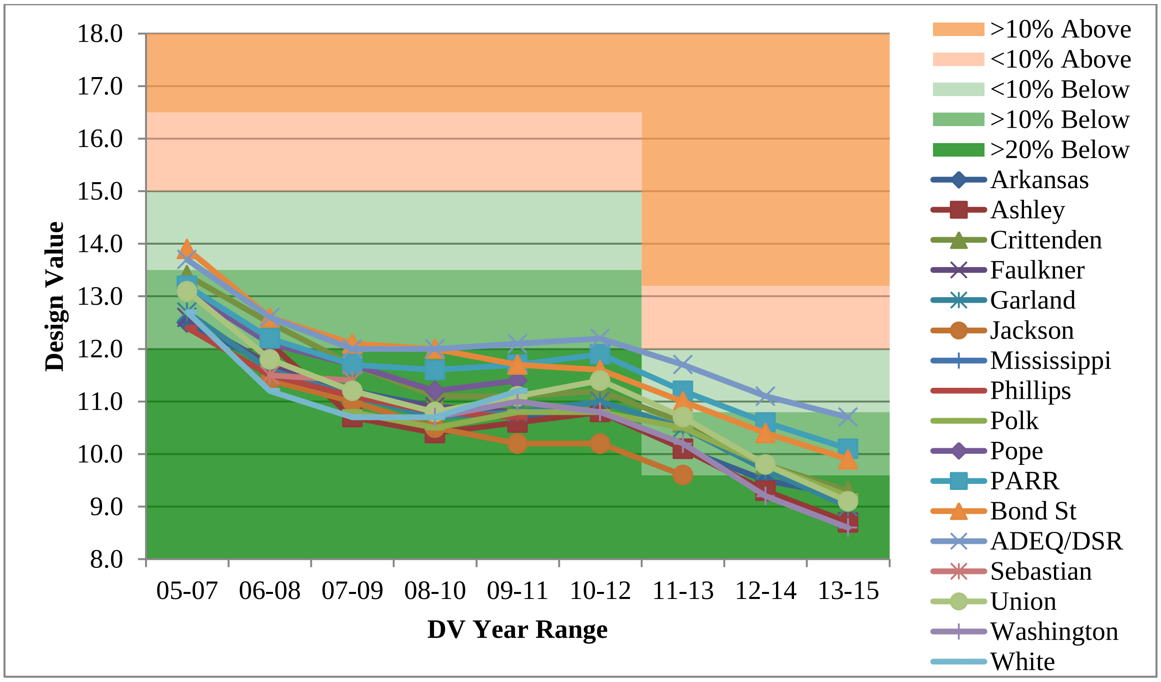
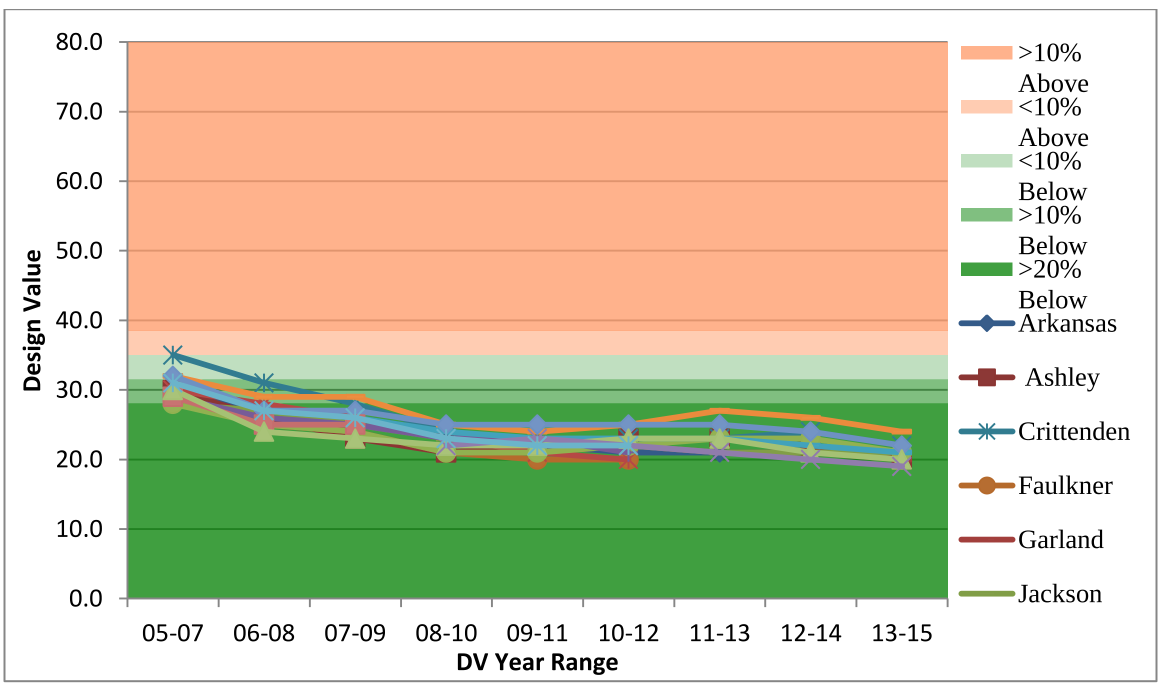


Figure 8. PM$_{2.5}$ 24-Hour Design Values at Arkansas Monitors (Degree of Deviation from the NAAQS)



As indicated in Figure 6, the maximum 24-hour PM$_{10}$ time-weighted average concentration has increased slightly over the past ten years. However, the maximum annual value has remained far below the level of the PM_{10} NAAQS. The highest maximum 24-hour PM_{10} concentration during the period displayed in Figure 5 was 68 µg/m^3 and occurred in 2015. This value is less than half the level of the PM_{10} NAAQS (150 µg/m^3). Figures 7 and 8 display the decreasing trend in $PM_{2.5}$ design values over the past ten years. Design values for the primary annual $PM_{2.5}$ NAAQS were below the level of the concurrent NAAQS during the entire ten year period. Design values for the primary 24-hour $PM_{2.5}$ NAAQS were at or below the level of the NAAQS during the entire 10-year period.

Approximately 859,776 Arkansans live in areas with particulate monitors that provide data for the purposes of determining attainment with the annual $PM_{2.5}$ NAAQS, and 877,275 Arkansans live in locations monitored for the 24-hour $PM_{2.5}$ NAAQS.[11] The latest design values from 2015 indicate that 45.6% of Arkansans living in monitored locations reside in areas with design values 10 – 20% lower than the annual $PM_{2.5}$ NAAQS, and the remaining 54.4% live in areas where design values are more than 20% lower than the annual $PM_{2.5}$ NAAQS.[12] Design values from 2015 for the 24-hour $PM_{2.5}$ NAAQS indicate that all Arkansans living in monitored locations live in areas where design values are more than 20% lower than the 24-hour $PM_{2.5}$ NAAQS.[13] Approximately 2.1 million Arkansans live in rural unmonitored locations.[14]

Carbon Monoxide

Arkansas is in attainment with the CO NAAQS. Over the past ten years, CO design values have declined by more than 50%. CO design values in Arkansas remained well below the level of the 1-hour and 8-hour CO NAAQS throughout the ten-year period.

CO is a colorless, odorless gas emitted from combustion processes. CO is primarily a byproduct of incomplete combustion of fuels such as gasoline, natural gas, oil, coal, and wood. CO emissions in Arkansas come primarily from fires, mobile sources, and biogenics.[15] Smaller contributions come from industrial processes, fuel combustion, solvents, and other miscellaneous sources.

CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and other tissues. At extremely high levels, CO can cause death. Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body’s already compromised ability to respond to the increased oxygen demands of exercise or exertion. Based on the acute effects of CO, EPA set

[11] Source: U.S. Census Bureau 2015 estimated population
[12] Id.
[13] Id.
[14] Id.
[15] Source: 2014 National Emissions Inventory version 1

a 1-hour NAAQS of 35 parts per million (ppm) and an 8-hour NAAQS of 9 ppm. For both standards, these levels are not to be exceeded more than once per year.

Arkansas's CO monitor is located in Pulaski County. Figure 9 shows the maximum 8-hour time-weighted average for CO at Arkansas monitors. Figure 10 shows the maximum 1-hour average for CO at Arkansas monitors. The 8-hour and 1-hour maximum CO time-weighted average concentrations have decreased over the past 10 years. Both the 8-hour maximum and the 1-hour maximum have remained well below the level of the 8-hour and 1-hour CO NAAQS during the past 10 years. In 2015, the 8-hour maximum was only 11% of the level of the 8-hour CO NAAQS, and the 1-hour maximum was only 3% of the level of the 1-hour CO NAAQS.

Figure 9. CO 8-Hour Maximum by Year

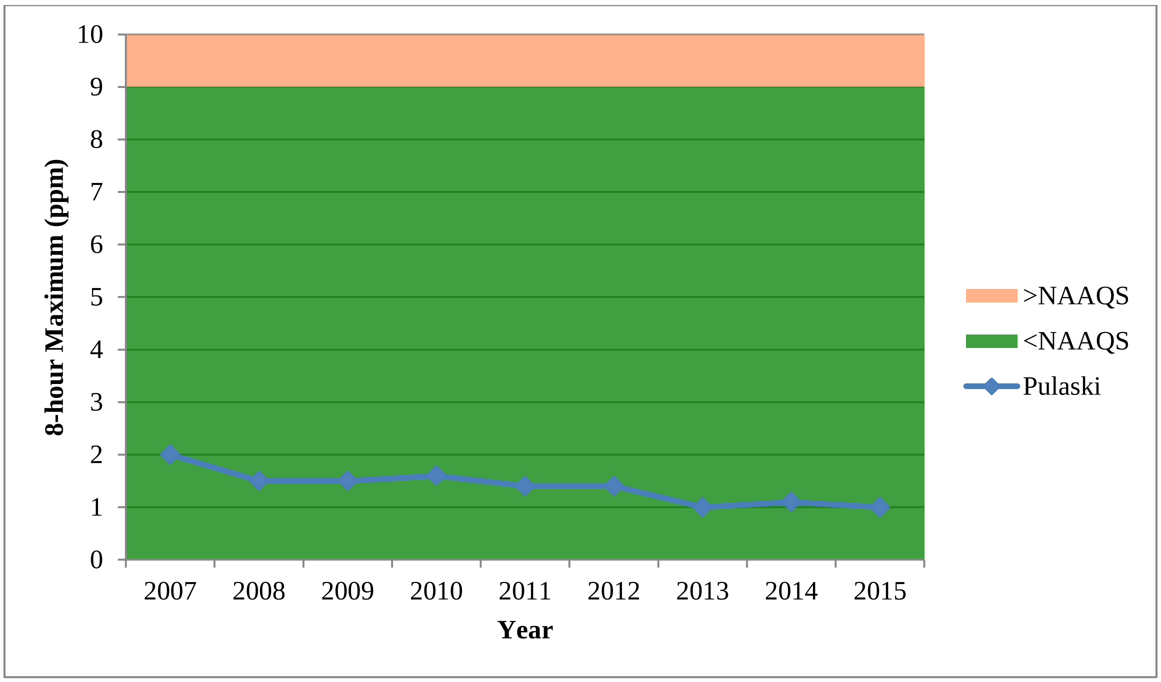
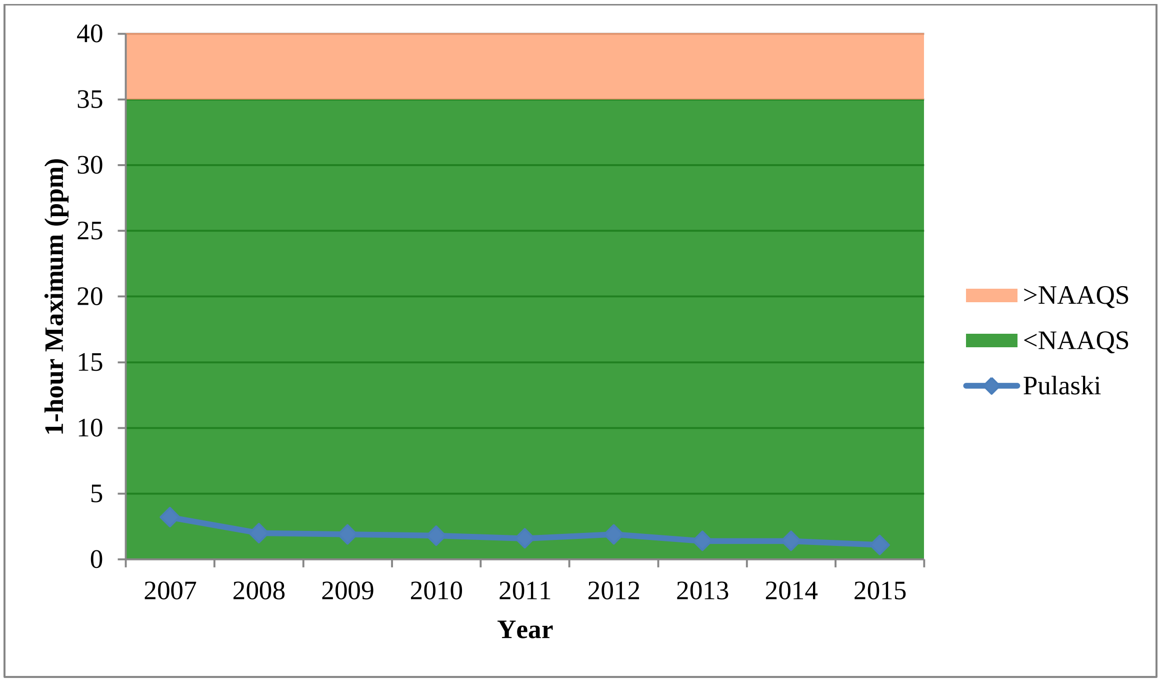


Figure 10. CO 1-Hour Maximum by Year



Nitrogen Dioxide

Arkansas is in attainment with the NO_2 NAAQS. Over the past 10 years, NO_2 design values in Crittenden County have declined because of measures to reduce ozone concentrations in the area. NO_2 design values in Pulaski County have also seen a small decline over the past 10 years. All NO_2 design values over the past decade have been well below the level of the NAAQS.

NO_2 is one of a group of highly reactive gases known as "oxides of nitrogen," "nitrogen oxides," or NOx. Other nitrogen oxides include nitrous acid and nitric acid. EPA's NAAQS uses NO_2 as the indicator for the larger group of NOx. NOx forms quickly from emissions from cars, trucks, buses, power plants, and off-road equipment. NOx may be transported for long distances and may react with other pollutants or water vapor to form secondary pollutants. NOx emissions in Arkansas result primarily from mobile sources and fuel combustion.[16] Smaller sources include biogenics, industrial processes, fires, solvents and other miscellaneous sources.

Exposure to NOx occurs through inhalation. Scientific studies link short-term NOx exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NOx concentrations and increased visits to emergency departments and hospital admissions for respiratory issues. This is especially true for people with asthma. The primary NO_2 NAAQS is

[16] Source: 2014 National Emissions Inventory version 1

set to reduce the risk of acute and chronic health effects due to exposure to NOx. EPA has established a 1-hour NO_2 NAAQS of 100 ppb, based on the 98th percentile averaged over three years, and an annual NO_2 NAAQS of 53 ppb, which is based on the annual mean.

There are two NO_2 monitors in Arkansas. One is located in Pulaski County, and the other is located in Crittenden County. Figure 11 shows trends in the annual design values at each monitor and figure 12 shows trends in the 1-hour design values at each monitor. Design values for both the 1-hour and the annual NO_2 NAAQS at the Pulaski County monitor have remained fairly stable. Design values for both NO_2 NAAQS in Crittenden County have declined, indicating an improvement in air quality. Both counties have design values that are well below the level of the 1-hour and annual NO_2 NAAQS.

Figure 11. NO_2 Annual Design Values

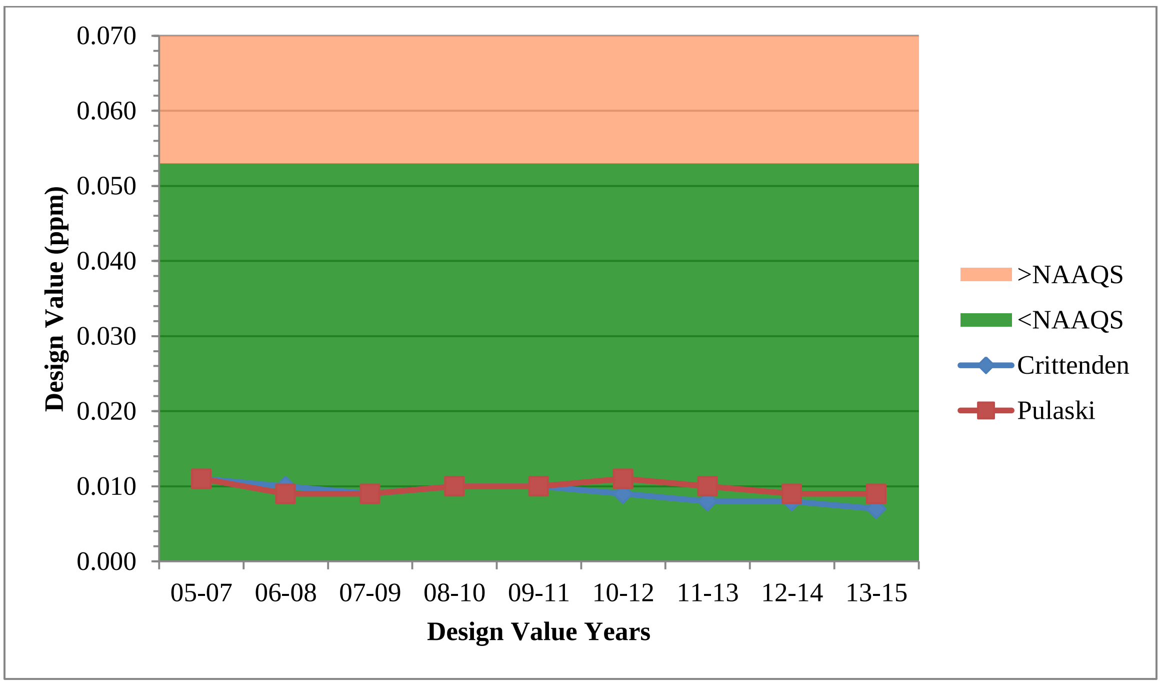
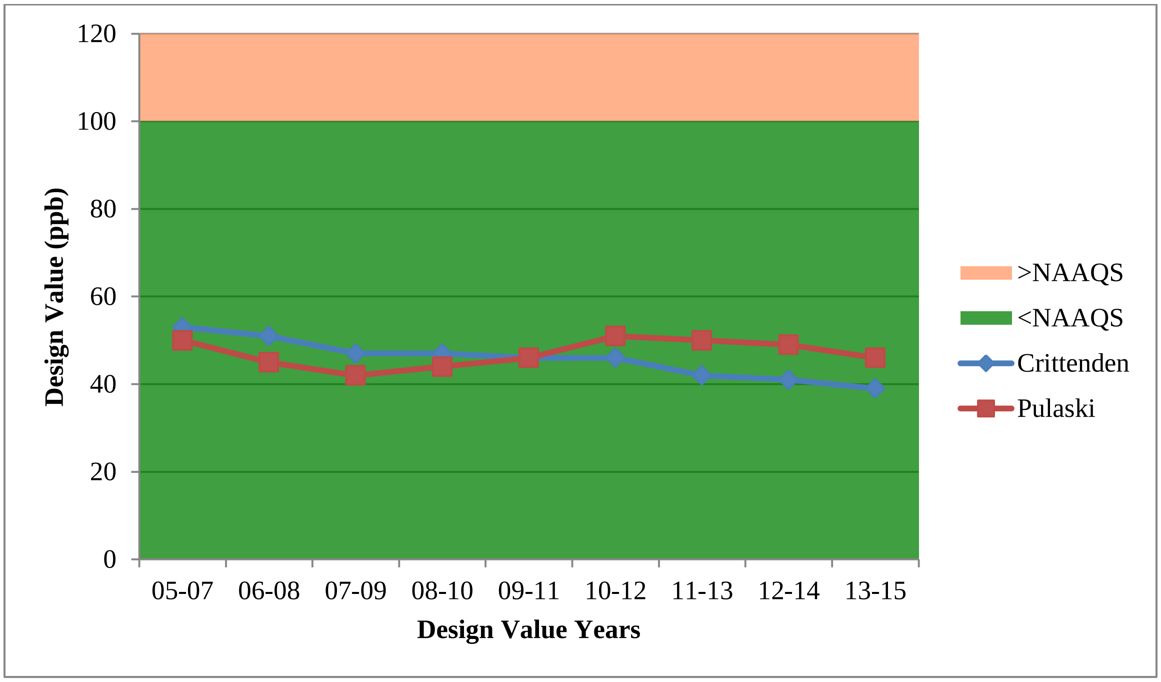


Figure 12. NO_2 1-HourDesign Values



Sulfur Dioxide

All areas in Arkansas are in attainment with the SO_2 NAAQS based on monitoring data. Because of the typical dispersion pattern of SO_2, EPA is also requiring that certain facilities perform modeling or install their own monitors to demonstrate attainment with the 1-hour SO_2 NAAQS. Arkansas has characterized air quality using dispersion modeling in areas in which large sources of SO_2 are located if those areas do not have a nearby ambient air quality monitor located to identify maximum 1-hour SO_2 concentrations. There are two such areas in Arkansas: Jefferson County and Independence County. These areas are home to White Bluff Steam Electric Station and Independence Steam Electric Station, respectively.

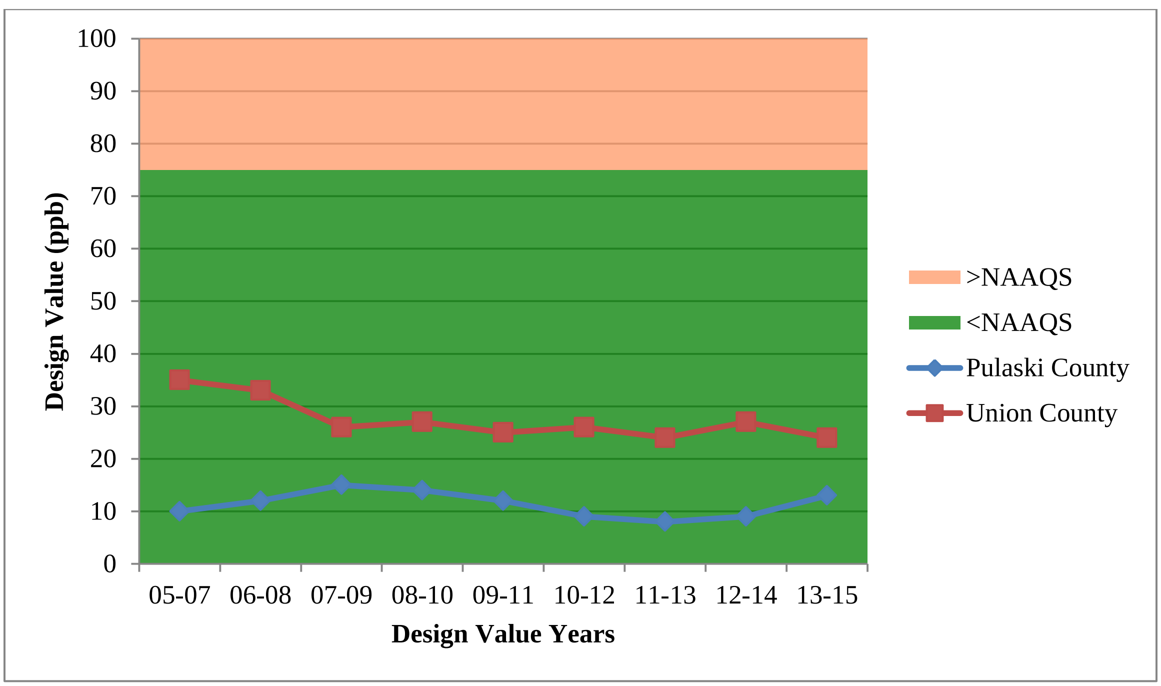
On September 11, 2015, Governor Asa Hutchinson submitted a letter to EPA Region 6 recommending that Independence County and Jefferson County be designated unclassifiable/attainment based on dispersion modeling analyses reviewed by ADEQ. On July 12, 2016, EPA acted on Arkansas's designation recommendations by affirming the unclassifiable/attainment designation for Jefferson County and designating Independence County as unclassifiable. Because EPA designated Independence County as unclassifiable, ADEQ is developing additional analyses to support its unclassifiable/attainment designation recommendation for Independence County. As part of this analysis, ADEQ will incorporate both Independence Steam Electric Station and a smaller SO_2 source, Future Fuel Chemical Company, into the modeling demonstration for Independence County.

SO_2 is one of a group of highly reactive gases known as "oxides of sulfur." The largest sources of SO_2 emissions are from fossil fuel combustion at power plants and other industrial facilities. Smaller sources of SO_2 emissions include industrial processes, such as extracting metal from ore, and the burning of high sulfur-containing fuels by locomotives, large ships, and nonroad equipment. While SO_2 tends not to be transported long distances in its original form, it does react with other pollutants and water vapor to form fine particulates and acidic aerosols that may be transported long distances. It also contributes to acid rain. SO_2 emissions in Arkansas result primarily from fuel combustion, with much smaller contributions from fires, industrial processes, mobile sources, solvents and other miscellaneous sources.[17]

Current scientific evidence links short-term exposures to SO_2, ranging from five minutes to 24 hours, with an array of adverse respiratory effects, including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing). The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to SO_2. EPA has established a primary SO_2 NAAQS of 75 ppb, based on the 99th percentile of 1-hour daily maximum concentrations averaged over 3 years.

Arkansas has two SO_2 monitors. One is located in Pulaski County, and the other is located in Union County. Figure 13 shows the trends in 1-hour SO_2 design values. Design values for the 1-hour SO_2 NAAQS have declined in Union County, but they have risen slightly in Pulaski County. Design values at both locations were well below the level of the NAAQS.

Figure 13. 1-Hour SO_2 Design Values



[17] Source: 2014 National Emissions Inventory version 1

Lead

Lead is a naturally occurring element that can be found in the air, water, and soil. Although small levels of lead are naturally occurring in soil, lead is also emitted into the air during ore and metals processing and combustion of fuels containing lead. In Arkansas, 66% of lead emissions come from aircraft running on leaded fuel.[18] The remaining 34% of lead emissions primarily come from the industrial and electricity sectors. Lead emitted into the air can settle onto surfaces like soil, dust and water where it can remain for long periods because it does not decay or decompose.

Exposures to lead over a long period of time can cause deleterious effects on the central nervous system. Lead exposure is particularly harmful to children because exposure may lead to neurodevelopmental impairment resulting in lowered intelligence quotients (IQ) and behavioral problems. According to the Centers for Disease Control, harmful effects may also result from short-term exposures to very high levels of lead. EPA has set the primary NAAQS at the level of 0.15 $\mu g/m^3$, based on a rolling three month average. The NAAQS is set at this level to reduce the risk of long-term health effects due to exposure to lead.

Arkansas's lead monitor is located in Pulaski County. The first year data were collected was 2010. All three-month rolling averages for 2010 – 2015 were below 0.01 $\mu g/m^3$.

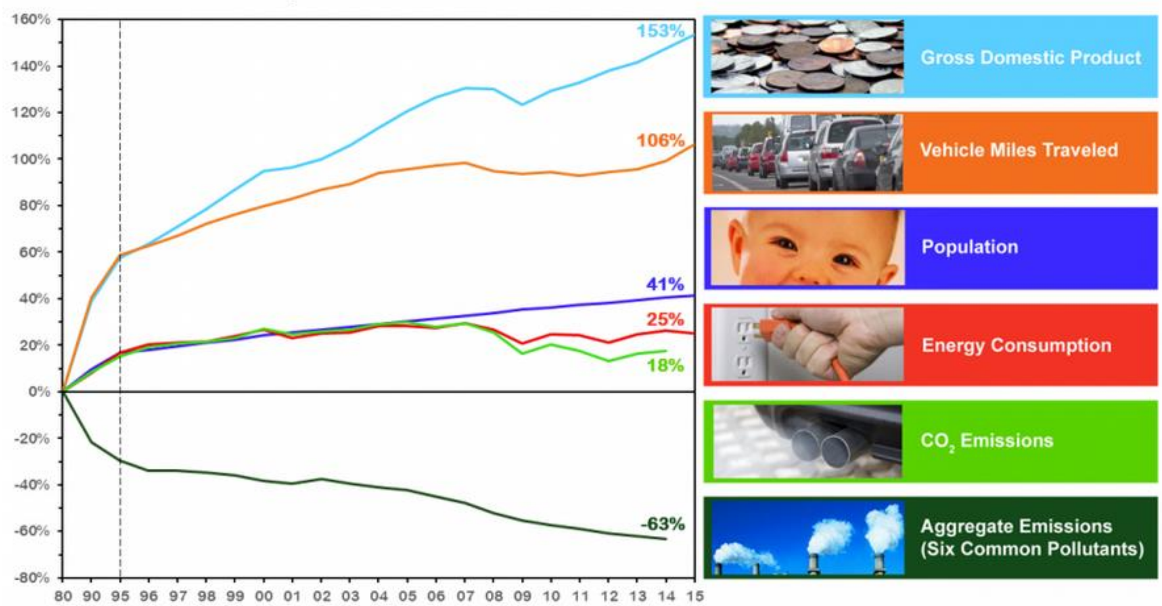
The Impact of Air Quality Programs on Pollutant Emissions

State and Federal Programs to Improve Air Quality

Air quality improvements have been achieved through implementation of State and federal programs to implement the CAA. EPA has the primary authority for the regulation of mobile sources. Regulation of stationary sources is achieved through a system of cooperative federalism under which the federal government sets air quality goals that are protective of public health and the environment and states have the primary responsibility of developing and implementing a regulatory approach that achieves these goals. States also have the primary responsibility to operate permitting programs to ensure that construction and operation of stationary sources do not interfere with attainment of air quality goals. Examples of air quality programs include Corporate Average Fuel Economy standards for light-duty vehicles, medium- and heavy-duty vehicle emission standards, the Regional Haze Program, new source review for stationary sources, and the Acid Rain Program. Since the promulgation of the CAA, concentrations of criteria pollutants have plummeted despite increases in gross domestic product, vehicle miles traveled, population, and energy consumption. Figure 14 shows national trends in economic growth and emissions of air pollutants. Similar to the rest of the nation, Arkansas has seen declines in emissions of air pollutants from regulated sources because of the implementation of air quality programs.

[18] Source: 2011 National Emissions Inventory version 2

Figure 14. Comparison of Growth Areas and Emissions, 1980 – 2015[19]



Criteria Pollutant and Precursor Emissions Trends for Regulated Sources in Arkansas

Every three years, EPA, in collaboration with the states, collects data on criteria pollutant emissions. EPA publishes the data in the National Emissions Inventory (NEI) and provides information about the estimated emissions of criteria pollutants and their precursors from various source categories. ADEQ provides EPA with emissions estimates reported by larger stationary sources for inclusion in the NEI. EPA estimates emissions from smaller stationary sources, nonpoint sources, biogenic sources, mobile sources, and event sources. The nonpoint source category includes small stationary sources too small to be reported as point sources (eg. residential heating, commercial combustion, solvent use, etc.). The biogenic source category includes vegetation and other natural sources of emissions (eg. crops, lawn grass, trees, and soils). Biogenic sources primarily emit NOx, CO, and VOCs, which may impact air quality with respect to NO_2 and ozone. The mobile source category is split into two subcategories: onroad vehicles and nonroad vehicles. EPA also estimates emissions from wildfires and prescribed burns. These emissions fall into the event category. Source categories and examples of source types that fall into these categories are listed in Table 3.

[19] https://www.epa.gov/air-trends/air-quality-national-summary
CO_2 emissions estimate through 2013 (Source: 2014 US Greenhouse Gas Inventory Report)
Gross Domestic Product: Bureau of Economic Analysis
Vehicle Miles Traveled: Federal Highway Administration Population: Census Bureau
Energy Consumption: Dept. of Energy, Energy Information Administration
Aggregate Emissions: EPA Clearinghouse for Inventories and Emissions Factors

Table 3. NEI Source Types

Source Category	Examples
Point	larger stationary sources
Nonpoint	residential heating, solvents, agriculture, road dust
Biogenic	crops, lawns, trees, soils
Onroad	passenger vehicles, trucks, buses
Nonroad	aircraft, locomotives, marine vessels
Event	wildfires, prescribed burns

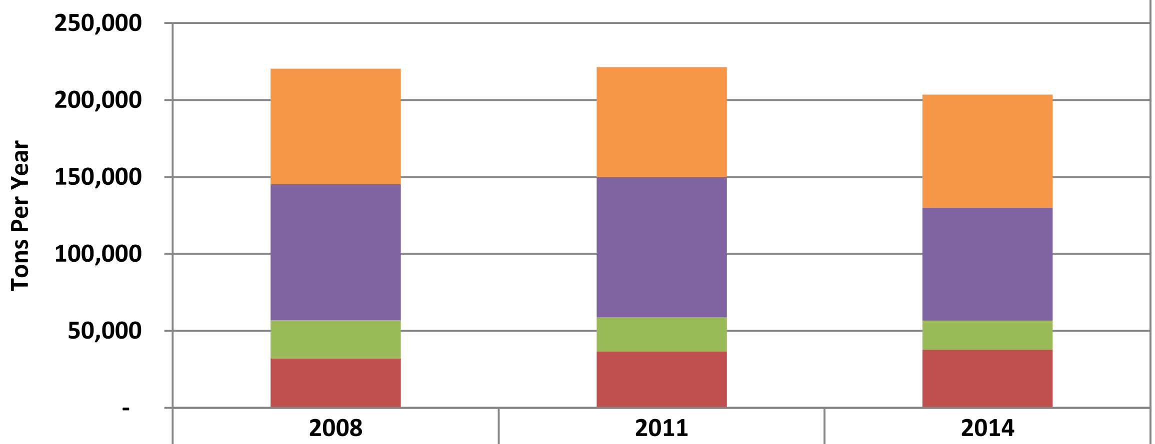
ADEQ air quality programs primarily regulate point sources. However, some nonpoint sources may also fall within ADEQ's regulatory authority. Mobile sources are regulated by EPA under Title II of the CAA. Because of the nature of biogenic and event sources, emissions from these two categories are not regulated. The following section describes emission trends by source category for the three most recent NEI years: 2008, 2011, and 2014.

Nitrogen Oxides

NOx is a precursor for multiple criteria pollutants including ozone and $PM_{2.5}$. The NO_2 NAAQS set by EPA uses NO_2 as the indicator for the larger group of NOx compounds. NO_2 is not directly tracked by the NEI because NO readily converts to NO_2 and vice versa. The equilibrium ratio of NO to NO_2 depends on the intensity of sunlight. Instead, the NEI tracks total NOx emissions, which includes both NO and NO_2. Approximately 88% of NOx emissions in Arkansas come from regulated source categories. [20] The primary contributors to NOx emissions in Arkansas are mobile sources, particularly onroad vehicles, and point sources. [21] Emissions from onroad vehicles constitute approximately 36% of NOx emissions from regulated source categories. [22] Point source NOx emissions comprise approximately 36% of emissions from regulated source categories in Arkansas. [23] Nonpoint NOx emissions comprise approximately 19%, and nonroad NOx emissions comprise approximately 9%.[24] Figure 15 breaks down NOx emissions from each regulated source category for NEI years 2008, 2011, and 2014.

[20] Source: 2014 National Emissions Inventory version 1
[21] Id.
[22] Id.
[23] Id.
[24] Id.

Figure 15. Arkansas NOx Emissions by Regulated Category[25]



	2008	2011	2014
Point	75,045	71,402	73,474
Onroad	88,416	91,215	73,325
Nonroad	24,811	22,156	18,882
Nonpoint	32,019	36,528	37,801

Overall, NOx emissions from regulated source categories decreased by 8% between the 2008 and 2014 NEI years. Onroad NOx emissions decreased by approximately 17%, nonroad NOx emissions decreased by 24%, and point source NOx emissions decreased by 2% between 2008 and 2014 NEI years. Nonpoint source NOx emissions increased by approximately 18% between 2008 and 2014 NEI years.

Volatile Organic Compounds

VOCs are precursors for ozone. Only 10% of VOC emissions in Arkansas come from regulated sources. [26] Emissions from nonpoint sources comprise the largest portion (53%) of the VOC emissions inventory from source categories regulated by state and federal air quality programs. [27] Point sources emit approximately 15%, onroad sources emit approximately 17%, and nonroad sources emit approximately 15% of the inventory from regulated source categories. [28] Figure 16 breaks down VOC emissions from each regulated source category for NEI years 2008, 2011, and 2014.

[25] Source: 2008 National Emissions Inventory version 3, 2011 National Emissions Inventory version 2, 2014 National Emissions Inventory version 1
[26] Source: 2014 National Emissions Inventory version 1
[27] Id.
[28] Id.

Figure 16. Arkansas VOC Emissions by Regulated Category[29]

	2008	2011	2014
Point	27,965	22,811	24,763
Onroad	40,952	35,407	26,533
Nonroad	32,563	29,365	23,223
Nonpoint	80,191	79,431	85,213

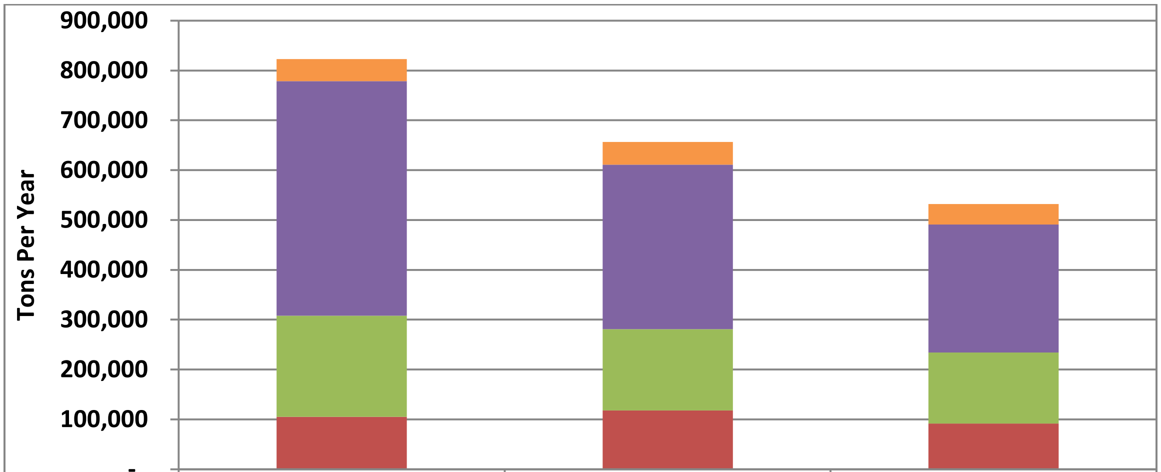
Overall, VOC emissions from regulated source categories decreased by approximately 12% between the 2008 and 2014 NEI. Emissions from nonpoint sources increased by 6% between the 2008 and 2014 NEI years. Emissions from nonroad, onroad, and point sources decreased during the same time period. The largest reduction (35%) in emissions was achieved by the onroad source category.

Carbon Monoxide

CO is both a criteria pollutant and a precursor for ozone. Approximately 43% of CO emissions come from regulated source categories.[30] Emissions from onroad sources comprise the largest portion (48%) of the CO emissions inventory from source categories regulated by state and federal air quality programs. [31] Point sources emit approximately 8%, nonroad sources emit approximately 17%, and onroad sources emit approximately 27% of the inventory from regulated source categories. [32] Figure 17 breaks down CO emissions from each regulated source category for NEI years 2008 and 2011.

[29] Source: 2008 National Emissions Inventory version 3, 2011 National Emissions Inventory version 2, 2014 National Emissions Inventory version 1
[30] Source: 2014 National Emissions Inventory version 1
[31] Id.
[32] Id.

Figure 17. Arkansas CO Emissions by Regulated Category[33]



	2008	2011	2014
Point	44,342	45,584	41,008
Onroad	470,696	330,471	256,745
Nonroad	202,623	162,986	142,271
Nonpoint	105,126	117,773	91,660

Overall, CO emissions from regulated source categories decreased by 35% between 2008 and 2014. Onroad and nonroad CO emissions dropped sharply by approximately 45% and 30%, respectively. Nonpoint CO emissions decreased by approximately 13% between 2008 and 2014 NEI years and point CO emissions decreased by approximately 8%.

Sulfur Dioxide

SO_2 is both a criteria pollutant and a precursor for $PM_{2.5}$. Virtually all SO_2 emissions come from regulated source categories.[34] Emissions from point sources comprise the largest portion (98.5%) of the SO_2 emissions inventory from source categories regulated by state and federal air quality programs. [35] Nonpoint sources emit approximately 1%, and onroad and nonroad sources emit less than 1% of the inventory from regulated source categories.[36] Figure 18 breaks down SO_2 emissions from each regulated source category for NEI years 2008, 2011, and 2014.

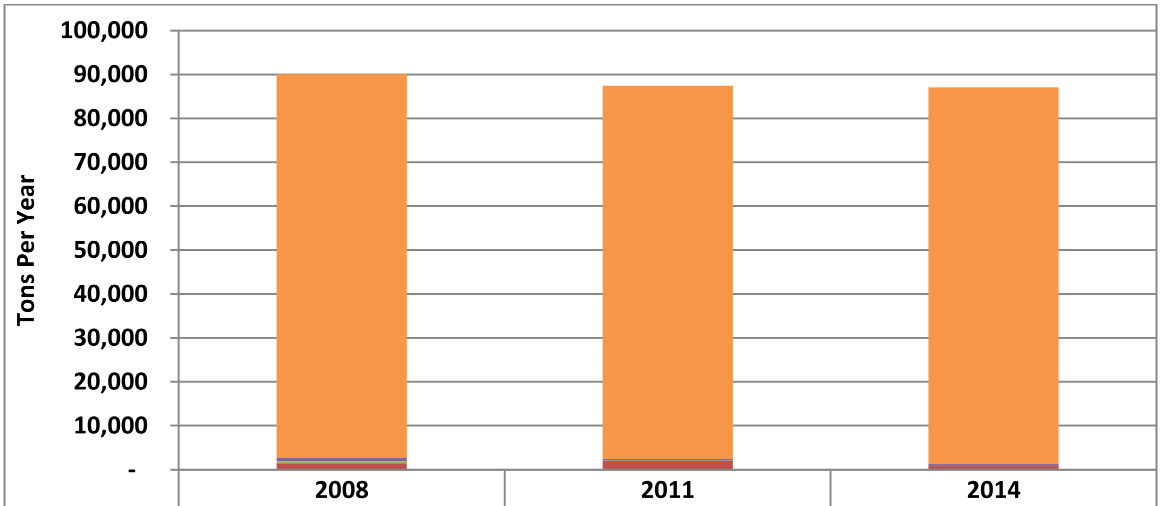
[33] Source: 2008 National Emissions Inventory version 3, 2011 National Emissions Inventory version 2, 2014 National Emissions Inventory version 1

[34] Source: 2014 National Emissions Inventory version 1

[35] Id.

[36] Id.

Figure 18. Arkansas SO_2 Emissions by Regulated Category[37]



	2008	2011	2014
Point	87,308	84,922	85,735
Onroad	819	360	363
Nonroad	463	57	41
Nonpoint	1,460	2,043	893

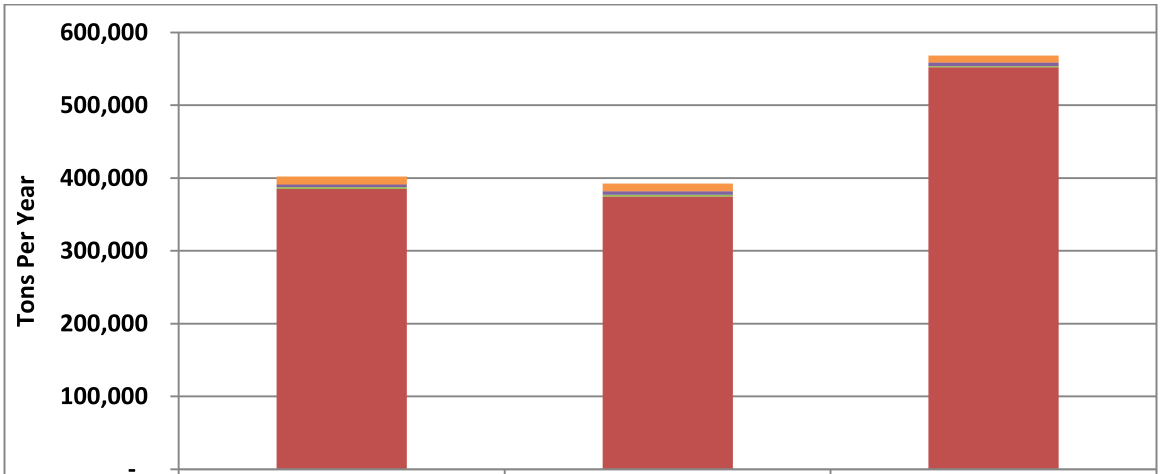
Overall, SO_2 emissions from regulated source categories decreased by approximately 3% between the 2008 and 2014 NEI. Emissions from all regulated source categories decreased during this period.

Coarse Particulate Matter

PM_{10}, also referred to as coarse particulate matter, is a criteria pollutant. Approximately 91% of PM_{10} emissions come from regulated source categories.[38] Emissions from nonpoint sources comprise the largest portion (97%) of the PM_{10} emissions inventory from source categories regulated by state and federal air quality programs.[39] Point sources emit approximately 2%, onroad sources emit approximately 1%, and nonroad sources emit less than 1% of the inventory from regulated source categories.[40] Figure 19 breaks down PM_{10} emissions from each regulated source category for NEI years 2008, 2011, and 2014.

[37] Source: 2008 National Emissions Inventory version 3, 2011 National Emissions Inventory version 2, 2014 National Emissions Inventory version 1
[38] Source: 2014 National Emissions Inventory version 1
[39] Id.
[40] Id.

Figure 19. Arkansas PM_{10} Emissions by Regulated Category[41]



	2008	2011	2014
Point	11,060	10,451	9,947
Onroad	3,647	4,971	4,583
Nonroad	2,586	2,317	1,928
Nonpoint	385,007	374,651	552,031

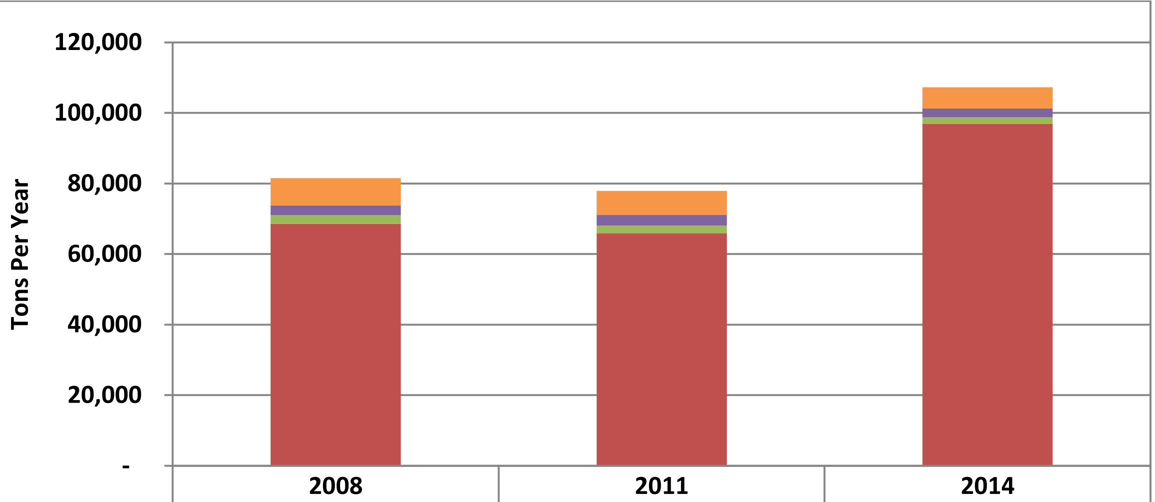
Overall, PM_{10} emissions from regulated source categories increased by approximately 41% between the 2008 and 2014 NEI. Emissions from point and nonroad source categories decreased. Nonpoint source emissions increased by 43% and onroad emissions increased by 26%.

Primary Fine Particulate Matter

Primary $PM_{2.5}$, fine particulate matter, is the condensable and filterable fraction that is directly emitted from sources. Primary $PM_{2.5}$ does not include $PM_{2.5}$ formed downwind by reactions between precursor pollutants, such as NOx, SO_2, and ammonia (NH_3). Approximately 69% of primary $PM_{2.5}$ emissions come from regulated source categories.[42] Emissions from nonpoint sources comprise the largest portion of the primary $PM_{2.5}$ emissions inventory from source categories regulated by state and federal air quality programs.[43] Point sources emit approximately 6%, onroad sources emit approximately 2%, and nonroad sources emit approximately 2% of the inventory from regulated source categories. [44] Figure 20 breaks down primary $PM_{2.5}$ emissions from each regulated source category for NEI years 2008, 2011 and 2014.

[41] Source: 2008 National Emissions Inventory version 3, 2011 National Emissions Inventory version 2, 2014 National Emissions Inventory version 1
[42] Source: 2014 National Emissions Inventory version 1
[43] Id.
[44] Id.

Figure 20. Arkansas Primary $PM_{2.5}$ Emissions by Regulated Category[45]



	2008	2011	2014
Point	7,671	6,782	5,988
Onroad	2,818	2,981	2,568
Nonroad	2,470	2,211	1,837
Nonpoint	68,513	65,880	96,902

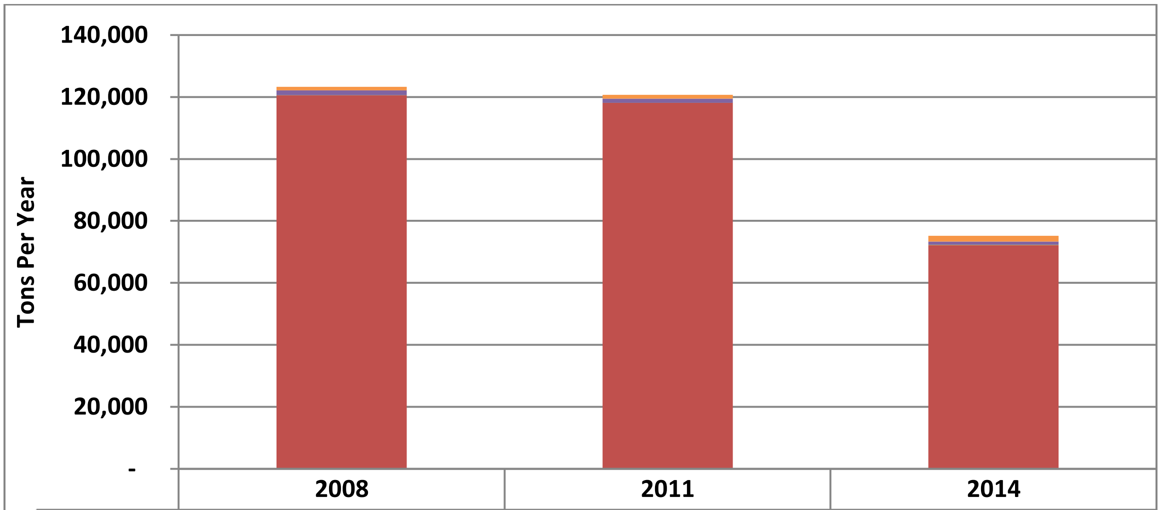
Overall, primary $PM_{2.5}$ emissions increased between the 2008 and 2014 NEI; however, this was driven by an increase in emission estimates from the nonpoint source category and in particular from the following two sectors: agriculture—crop and livestock dust—and unpaved road dust.[46] These two sectors of the nonpoint category are not regulated by ADEQ or EPA. Emissions from point, onroad, and nonroad source categories decreased.

Ammonia

NH_3 is a precursor for $PM_{2.5}$. Approximately 89% of NH_3 emissions come from regulated source categories.[47] Emissions from nonpoint sources comprise the largest portion (96%) of the NH_3 emissions inventory from source categories regulated by state and federal air quality programs.[48] Point sources emit approximately 3%, onroad sources emit approximately 1%, and nonroad sources emit less than 1% of the inventory from regulated source categories.[49] Figure 21 breaks down NH_3 emissions from each regulated source category for years 2008, 2011, and 2014 based on NEI data.

[45] Source: 2008 National Emissions Inventory version 3 and 2011 National Emissions Inventory version 2, and 2014 National Emissions Inventory version 1
[46] Id.
[47] 2014 National Emissions Inventory version 1
[48] Id.
[49] Id.

Figure 21. Arkansas NH_3 Emissions by Regulated Category[50]



	2008	2011	2014
Point	1,189	1,261	1,872
Onroad	1,464	1,307	1,095
Nonroad	26	27	28
Nonpoint	120,623	118,126	72,239

Overall, NH_3 emissions from regulated source categories decreased by approximately 39% between the 2008 and 2014 NEI. The overall decrease in NH_3 emissions was driven by a 40% decrease in nonpoint source NH_3 emissions between the 2008 and 2014 NEI. Onroad sources of NH_3 emissions also decreased between 2008 and 2014. Nonroad and point source emissions increased between 2008 and 2014.

Lead

Lead is a criteria pollutant. All lead emissions reported in the NEI come from regulated source categories.[51] Emissions from point sources, primarily airports, comprise the largest portion (68%) of the Arkansas lead emissions inventory from source categories regulated by State and federal air quality programs.[52] Nonpoint sources emit approximately 32% of the inventory from regulated source categories.[53] Figure 22 breaks down lead emissions from each regulated source category for NEI years 2008 and 2011.

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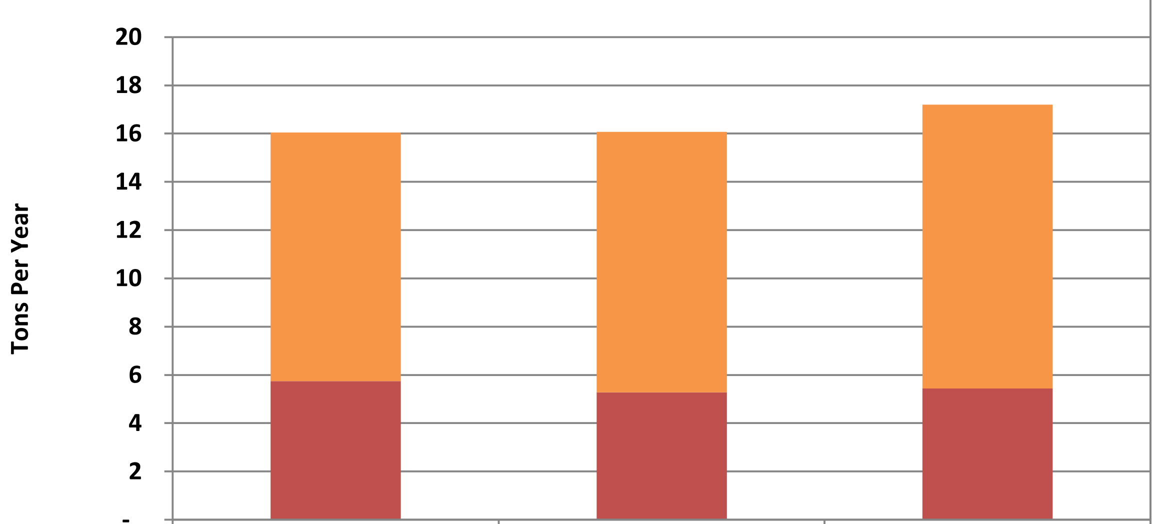
[50] Source: Source: 2008 National Emissions Inventory version 3 and 2011 National Emissions Inventory version 2, and 2014 National Emissions Inventory version 1
[51]Source: 2014 National Emissions Inventory version 1
[52] Id.
[53] Id.

Figure 22. Arkansas Lead Emissions by Regulated Category[54]



	2008	2011	2014
Point	10	11	12
Nonpoint	6	5	5

Overall, lead emissions from regulated source categories increased by 7% between the 2008 and 2014 NEI. Emissions from nonpoint sources decreased. Point source emissions increased by 14%.

Carbon Dioxide Emission Trends

Carbon dioxide emissions from the industrial, transportation, and electric power sectors in Arkansas have shown a marked decline since 2005. The residential and commercial sectors comprise 7% of carbon dioxide emissions in the state, and emissions in these sectors have remained fairly flat since 2005.[55] Approximately 13% of carbon dioxide emissions in the state come from the industrial sector. Industrial sector carbon dioxide emissions fell by 10% between 2005 and 2014.[56] The transportation sector, the second largest emitter of carbon dioxide, accounts for approximately 27% of carbon dioxide emissions in Arkansas. Carbon dioxide emissions from the transportation sector shrank by 8% between 2005 and 2014.[57] Approximately 51% of carbon dioxide emissions in Arkansas come from the electric power sector. Carbon dioxide emissions from the electric power sector grew by 40% between 2005 and 2014.[58] However, emissions from these sources have decreased rapidly in the past two years. Following

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[54] Source: 2008 National Emissions Inventory version 3 and National Emissions Inventory version 2

[55] Source: U.S. Energy Information Administration (EIA), State Energy Data System and EIA calculations made for this analysis. <http://www.eia.gov/environment/emissions/state/> Accessed 11/30/2016.

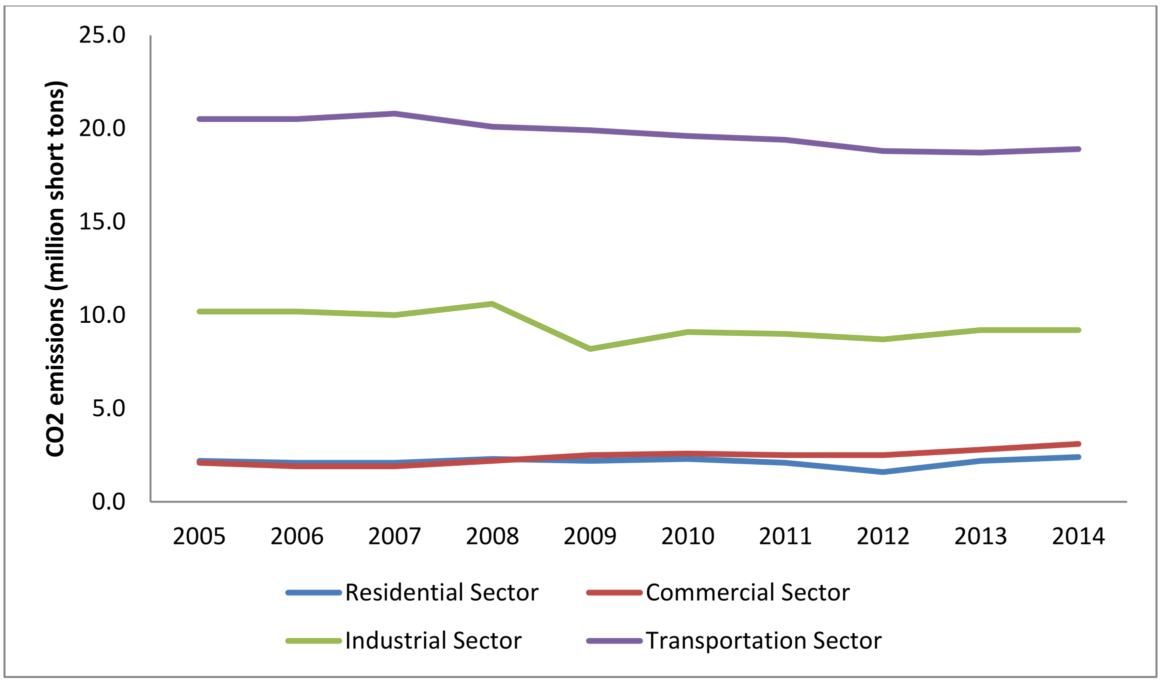
[56] Id.

[57] Id.

[58] Id.

a peak in emissions in 2013, the electric power sector in Arkansas has experienced a 26% decrease in emissions since 2013, and emissions in 2015 were only 3% higher than they were in 2005.[59] In fact, total carbon dioxide emissions from the power sector during 2015 were below EPA-established, 2030 targets for the State of Arkansas included in the 2015 Clean Power Plan.[60] A comparison of 1st and 2nd quarter emissions from the power sector during 2015 and 2016 show that 2016 emissions are on track to be even lower than in 2015.[61] Figure 23 illustrates trends in emissions in residential, commercial, industrial, and transportation sectors in Arkansas from 2005 – 2013. Figure 24 illustrates trends in emissions from the power sector from 2005 – 2015.

Figure 23. Arkansas Carbon Dioxide Emission Trends by Sector[62]



[59] Source: U.S. Environmental Protection Agency Clean Air Markets Program Division Air Markets Program Data

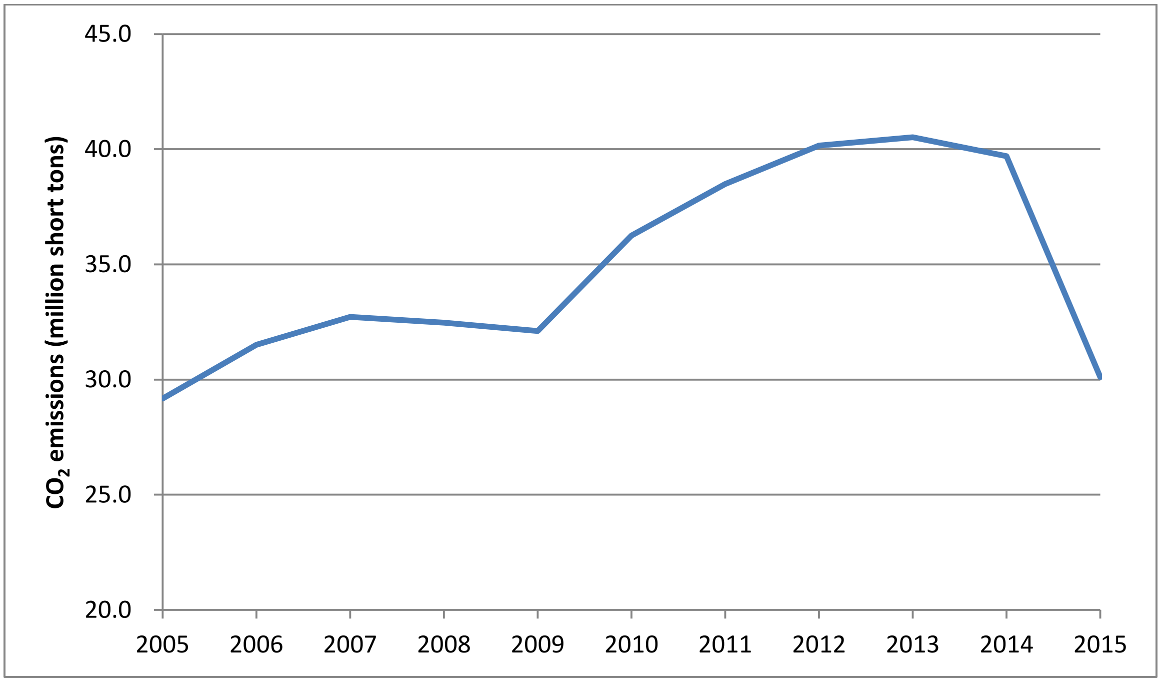
[60] "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule" (Clean Power Plan), finalized on October 23, 2015, requires emission reductions from electric generating units (EGU) in each state from 2012 baseline emissions. States are required to develop plans for affected EGUs in the state to decrease their emission intensity rate based on the best system of emission reduction or to decrease total emissions from affected EGUs to an equivalent mass. There are two options for mass-based plans: (1) include existing EGUs only or (2) include both new and existing EGUs in the state plan. According to Air Markets Program Data, affected EGUs emitted 30,106,197 short tons of carbon dioxide during 2015. The 2030 mass caps for affected EGUs in Arkansas established in the Clean Power Plan are 30,322,632 short tons for existing EGUs and 30,685,529 for existing and new EGUs.

[61] Carbon dioxide emissions for quarters one and two were 15,252,696 short tons in 2015 and 13,449,744 short tons in 2016.

Source: U.S. Environmental Protection Agency Clean Air Markets Program Division Air Markets Program Data

[62] Source: U.S. Energy Information Administration (EIA), State Energy Data System and EIA calculations made for this analysis. <http://www.eia.gov/environment/emissions/state/> Accessed 11/30/2016.

Figure 24. Arkansas Carbon Dioxide Emission Trends by the Electricity Sector[63]



Regional Haze

One of the most basic forms of air pollution is haze, which degrades visibility in many American cities and scenic areas. Haze is caused when sunlight encounters fine particles in the atmosphere and reduces the clarity and color of what we see, particularly during humid conditions. Some light is absorbed by particles, while other light is scattered. The result of this light scattering is reduced visibility. The higher the pollution levels, the lower the visibility. Some of the types of particles that degrade visibility conditions include sulfates, nitrates, soot, and dust. Air pollutants come from a variety of natural and manmade sources. Natural sources can include windblown dust and soot from wildfires. Manmade sources can include motor vehicles, electricity generation, industrial fuel burning, and manufacturing operations. Some haze-causing particles are directly emitted to the air, while others are formed when gases emitted to the atmosphere undergo chemical reactions that result in fine particles that can be transported for hundreds or even thousands of miles

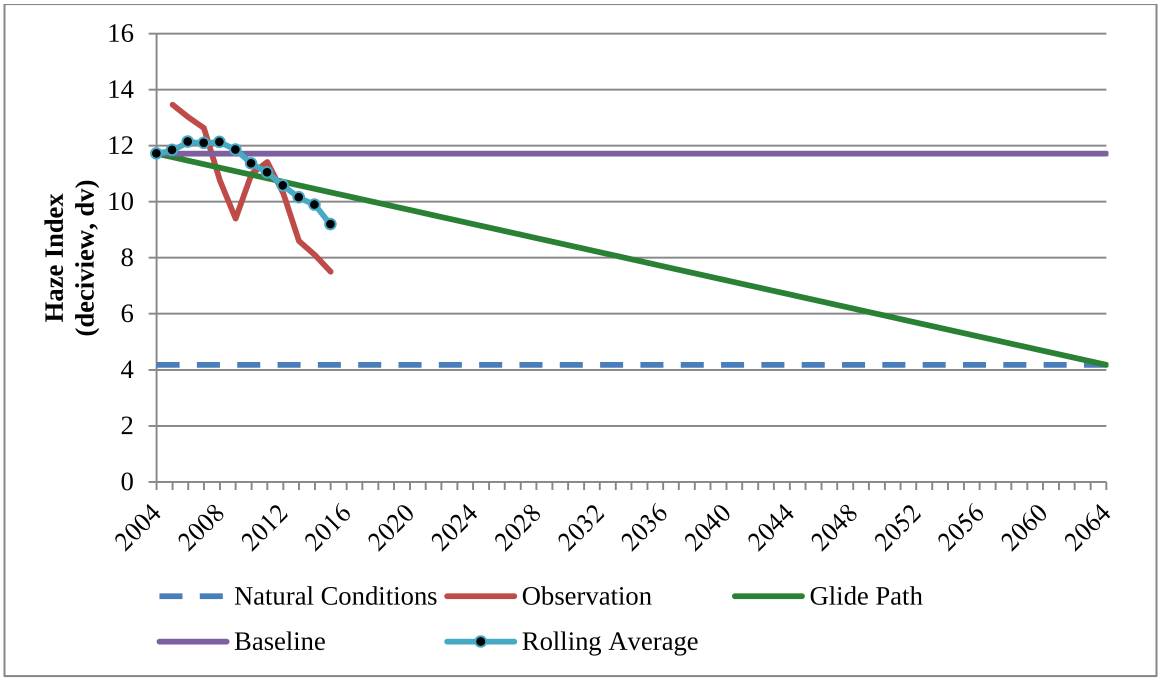
Some of the pollutants that form haze have also been linked to serious health problems and environmental damage. Exposure to fine particles in the air has been linked with increased respiratory illness, decreased lung function, and even premature death. In addition, particles such as nitrates and sulfates contribute to acid rain formation, which makes lakes, rivers, and streams unsuitable for certain species and erodes buildings, historical monuments, and paint on cars.

[63] Source: U.S. Environmental Protection Agency Clean Air Markets Program Division Air Markets Program Data

Since 1988, the federal government has been monitoring visibility in national parks and wilderness areas. In 1999, EPA issued the Regional Haze Rule to improve visibility conditions in national parks and wilderness areas. The ultimate goal of the Regional Haze Rule is to return those areas to natural background visibility conditions by 2064.

Visibility has improved dramatically in Arkansas since 2004. Visibility in the Natural State is approaching natural background conditions much more rapidly than required under the Regional Haze Rule. Figures 25, 26, 27, and 28 illustrate visibility improvements in the two federal wilderness areas in Arkansas, the Upper Buffalo Wilderness Area in northwest Arkansas and the Caney Creek Wilderness Area in west central Arkansas.[64]

Figure 25. Reasonable Progress Assessment: Upper Buffalo Wilderness Area – 20% Best Days



[64] Federal Land Manager Environmental Database <http://views.cira.colostate.edu/fed/ToolsMenu.aspx>

Figure 26. Reasonable Progress Assessment: Upper Buffalo Wilderness Area – 20% Worst Days

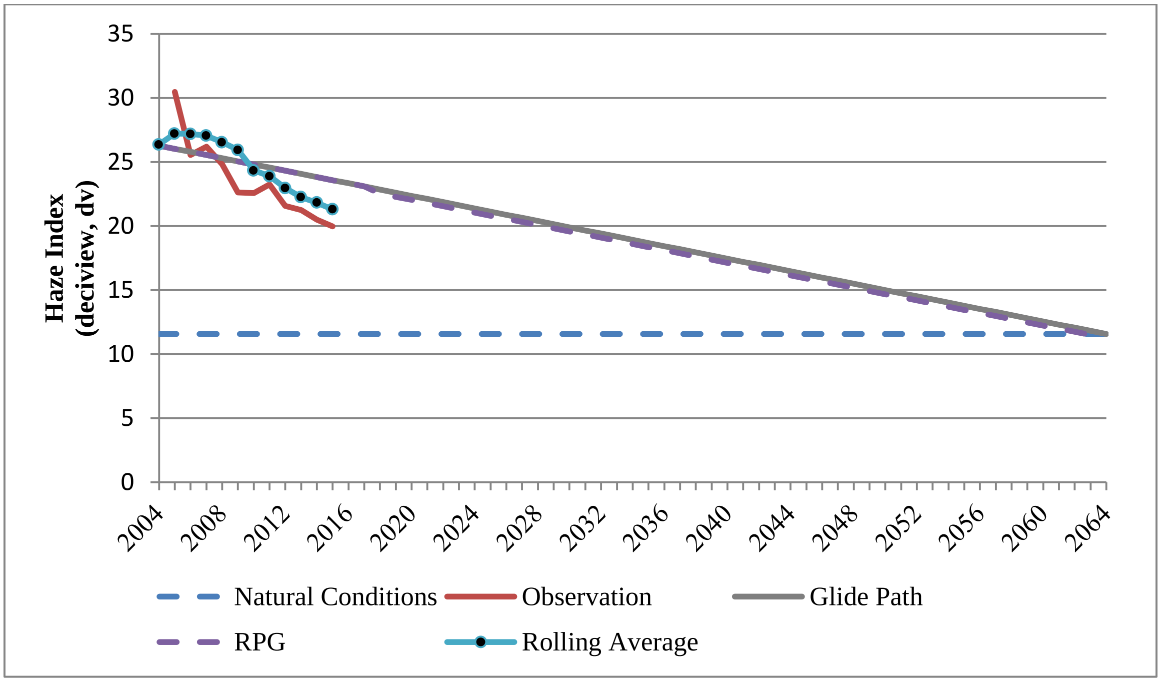


Figure 27. Reasonable Progress Assessment: Caney Creek Wilderness Area – 20% Best Days

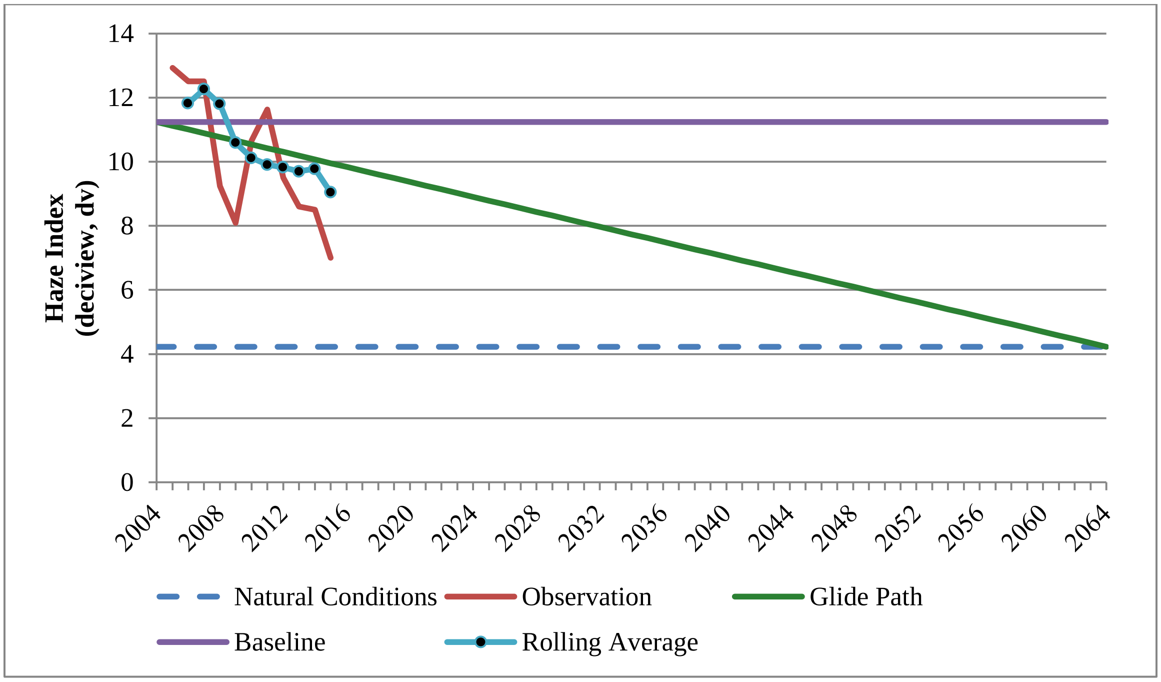
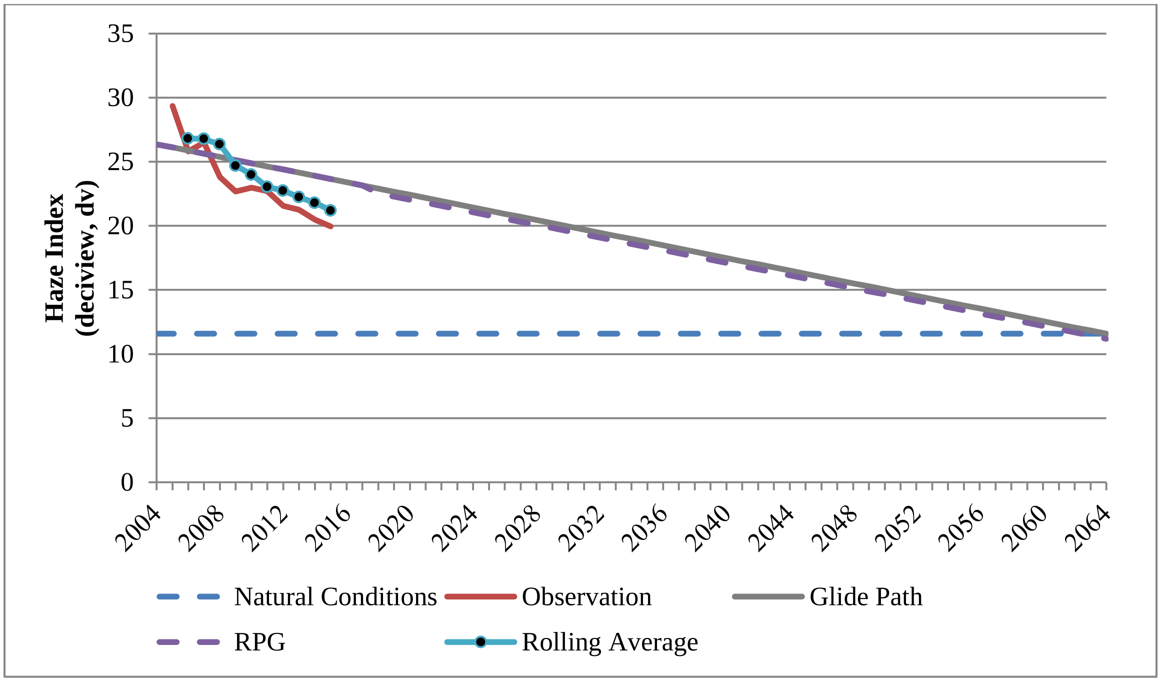


Figure 28. Reasonable Progress Assessment: Caney Creek Wilderness Area – 20% Worst Days



Conclusion

Available data clearly demonstrate that air quality in Arkansas is among the best in the nation. Arkansas is one of only 13 states with no NAAQS nonattainment areas. Although the air quality in Arkansas has always been among the best in the nation, implementation of state and federal air quality programs have resulted in even cleaner air for Arkansans. Reduced emissions from stationary sources and mobile sources realized over the past decade led to the redesignation of Arkansas's only nonattainment area, Crittenden County, to attainment status for the 2008 ozone NAAQS and have put Arkansas on track to meet all of its health, visibility, and greenhouse gas air quality goals. Air quality improvements are expected to continue because of implementation of state and federal programs, ensuring future generations the continued enjoyment of the clean air that residents of the Natural State have come to expect.