STATE OF THE AIR REPORT

2020

Division of Environmental Quality
Office of Air Quality
05/27/2021

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FOREWORD

Dear Reader,

On behalf of the Office of Air Quality, thank you for reading the 2020 State of the Air Report. Clean air remains critical for the health of Arkansans, and this is especially true during this challenging time when the respiratory health of our citizens is of paramount importance. While 2020 presented many challenges, I am proud of the way our talented public servants have adapted and innovated in surmounting those challenges. I encourage the reader to note the tools and practices throughout this report that have allowed the Office to respond flexibly. These are highlighted in the "Innovation at Work" boxes.

Arkansans can feel assured that Office of Air Quality Inspectors remained vigilant and responsive to the needs of the public in 2020. OAQ Inspectors continued to safely perform both complaint inspections and routine inspections consistent with health guidelines and met Environmental Protection Agency (EPA) goals for inspections during federal fiscal year 2020. Permit Engineers continued to issue timely and technically sound permits. This included quick action to ensure that facilities that pivoted to the production of hand sanitizer were able to do so rapidly.

Arkansans remain especially fortunate that the entire state continued to attain the National Ambient Air Quality Standards. Visibility at those scenic areas designated as Class I Areas continued to improve. The Office also continued to support local communities while enhancing air quality by providing $964,960 in funding to replace heavy duty diesel vehicles through the Clean Fuels program and the Reducing Emissions from Diesels, or GoRED!, program. Finally, the Office continued to ensure asbestos professionals are effectively trained by issuing a total of 1,355 licenses and asbestos certifications.

Sincerely,

William K. Montgomery, J.D.
Associate Director, Office of Air Quality

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APPENDICES

INTRODUCTION TO THE OFFICE OF AIR QUALITY

WHO WE ARE

The Office of Air Quality (OAQ) consists of four branches:

- Permits,
- Compliance,
- Policy and Planning, and
- Asbestos and Enforcement.

Each branch of the OAQ has specific duties and addresses various aspects of the air program. The OAQ team is composed of scientists, engineers, inspectors, attorneys, and administrative professionals.

OAQ RESPONSE TO COVID-19

HEALTH AND SAFETY MEASURES

On March 23, 2020, OAQ staff fully transitioned to remote work as a precaution to reduce the spread of COVID-19 until health and safety measures for in-office work could be developed. In coordination with Arkansas Department of Energy and Environment (E&E) shared services, OAQ staff acquired the equipment and other resources necessary to perform its mission effectively and efficiently while working remotely.

On July 1, 2020, OAQ staff began working part-time remote and part-time in the office on a rotational schedule to provide for adequate social distancing when in the office. Staff at increased risk or who are caregivers of persons at increased risk of morbidity or mortality if infected with COVID-19 continue to work remotely full-time. Access by non-employees to E&E headquarters is restricted and meetings (including internal meetings) continue to be held virtually.

ON-SITE WORK SAFETY GUIDELINES

- Wear a face covering/mask in the workplace.
- Maintain a physical distance of at least 6 feet from others.
- Conduct internal and external meetings utilizing Zoom video and phone conferencing.
- Follow maximum occupancy guidelines posted for common areas.
- Avoid congregating around cubicles and common areas.

MEETING THE CHALLENGES TO ACHIEVE THE MISSION

The OAQ continued to fulfill its mission and responsibilities during the pandemic, while also protecting staff, members of the regulated community, and the public from unnecessary exposure.

E&E created an email address, covid19EE@adeq.state.ar.us for regulated entities to request regulatory flexibility and assistance to reduce potential exposures to COVID-19 by implementing alternative approaches to maintaining compliance. E&E issued Enforcement Guidance for DEQ's response to instances of noncompliance that are verifiably caused by the COVID-19 public health emergency.

Innovation at Work

Zoom as a Virtual Office

In 2020, OAQ staff expanded their use of Zoom to facilitate communications in a remote work setting.

- Chat
- Team-specific channels
- Video and phone meetings
- Webinars
- Screen-share
- Collaborative editing

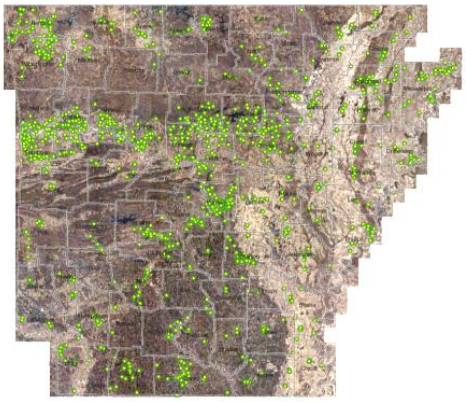
PERMITS

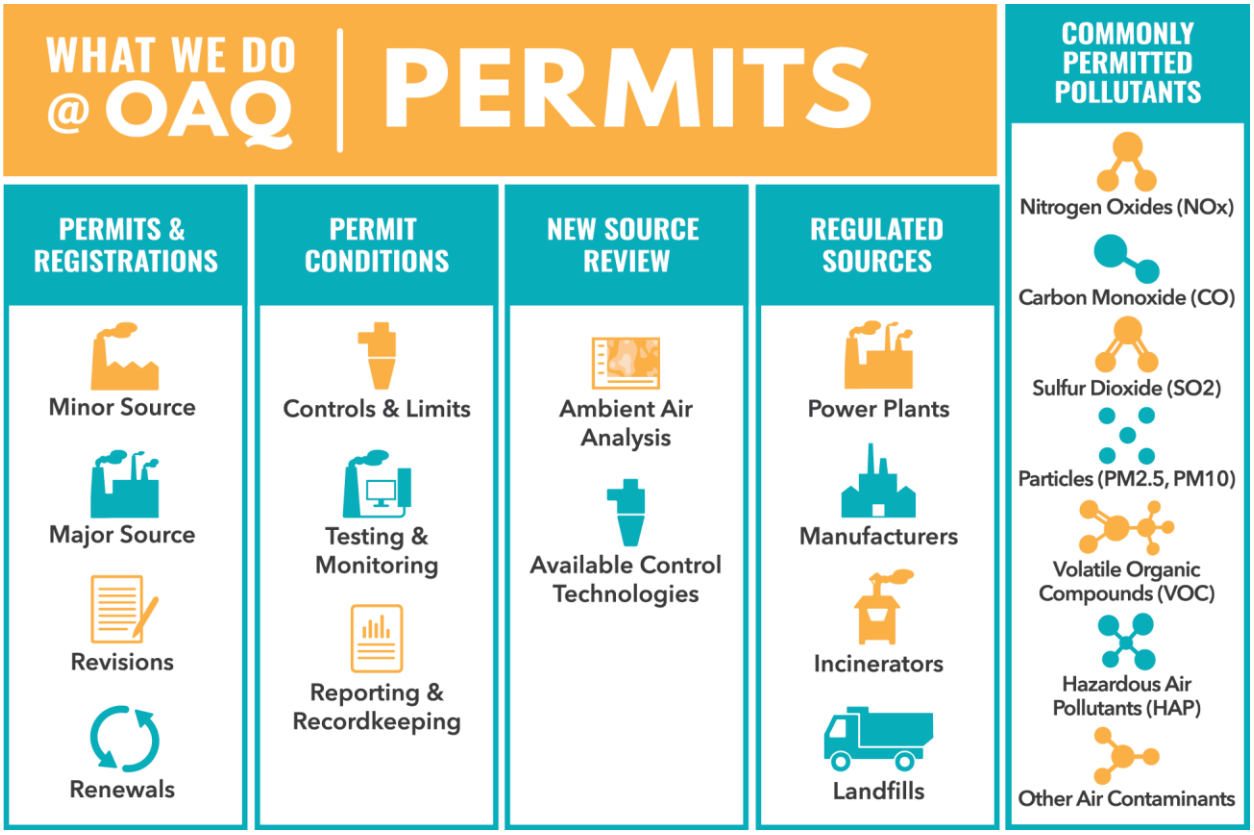
Emissions of air pollutants from certain activities that have the potential to significantly impact the environment or pose a human health risk require an air permit from OAQ. Even minor activities, when combined, can create the potential for significant air quality impacts.

OAQ issues permits that ensure that stationary sources will be constructed and operated such that emissions of air pollutants do not cause or contribute to conditions that may pose a risk of adverse health or environmental impacts. OAQ permits both federally regulated air pollutants and other air contaminants, such as ammonia, that are regulated solely under state law.

Visit our website more information about OAQ's Permits Branch: http://www.adeq.state.ar.us/air/permits/

FIGURE 1: PERMITTED STATIONARY SOURCES IN ARKANSAS





TYPES OF PERMITS AND REGISTRATIONS

Pursuant to Arkansas Pollution Control and Ecology Commission (APC&EC) Rules 18, 19, and 26, OAQ issues registrations, minor source permits, major source permits, and general permits. The type of permit required is based on facility-wide annual emissions, type of activity, or both.

Registrations

Stationary sources that operate under a registration have relatively low emissions of air pollutants, and they do not require a permit for either the type of activities performed by the source or the specific pollutants emitted. If a source's potential-to-emit exceeds or will exceed the thresholds listed in Table 1, the owner or operator must register the source with DEQ. Registered sources are not required to obtain a permit as long as potential emissions remain below the thresholds listed in Table 2.

In federal fiscal year 2020 (FFY20), six stationary sources registered with OAQ (and three requested registration modifications) to operate in Arkansas.

TABLE 1: REGISTRATION THRESHOLDS

Pollutants	Annual Emissions (tons per year)
CO	40–75
NOx	25–40
SO_2	25–40
VOC	25–40
PM	15–25
PM_{10}	10–15
HAP	1–2 tons (single HAP) or 3–5 tons (Combined HAP)

Major Source and Minor Source Permits

Stationary sources with facility-wide emissions greater than or equal to the thresholds listed in Table 2 must obtain a permit. In addition, some types of sources must obtain a permit regardless of emissions.

If the stationary source is considered a "major source" under the Clean Air Act, then the owner/operator of the source must obtain a Title V permit. Otherwise, the owner/operator of the stationary source can construct and operate under a minor source permit. Title V permits are both state and federally enforceable.

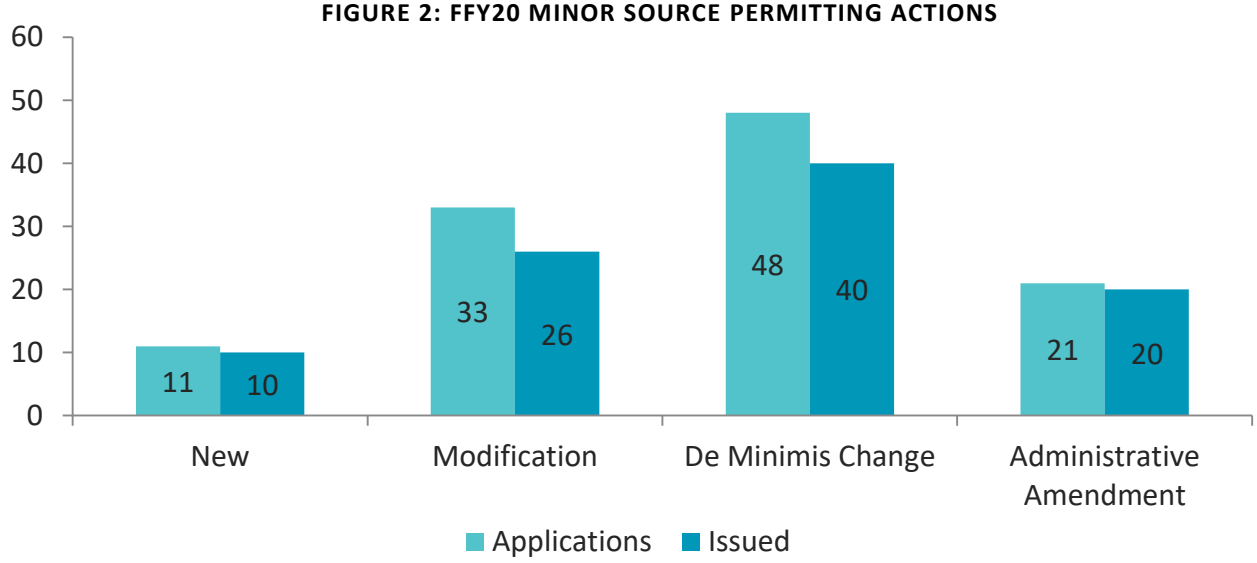
TABLE 2: PERMIT THRESHOLDS

Pollutants	Annual Emissions (tons per year)
CO	75
NOx	40
SO2	40
VOC	40
PM	25
PM10	15
PM2.5	10
HAP	2 tons (single HAP) or 5 tons (Combined HAP)
Lead	0.5
Other Air Contaminants	25

FFY20 MINOR SOURCE PERMITTING ACTIONS

In FFY20, OAQ acted on 96 applications for new and revised minor source permits (including applications received prior to FFY20).

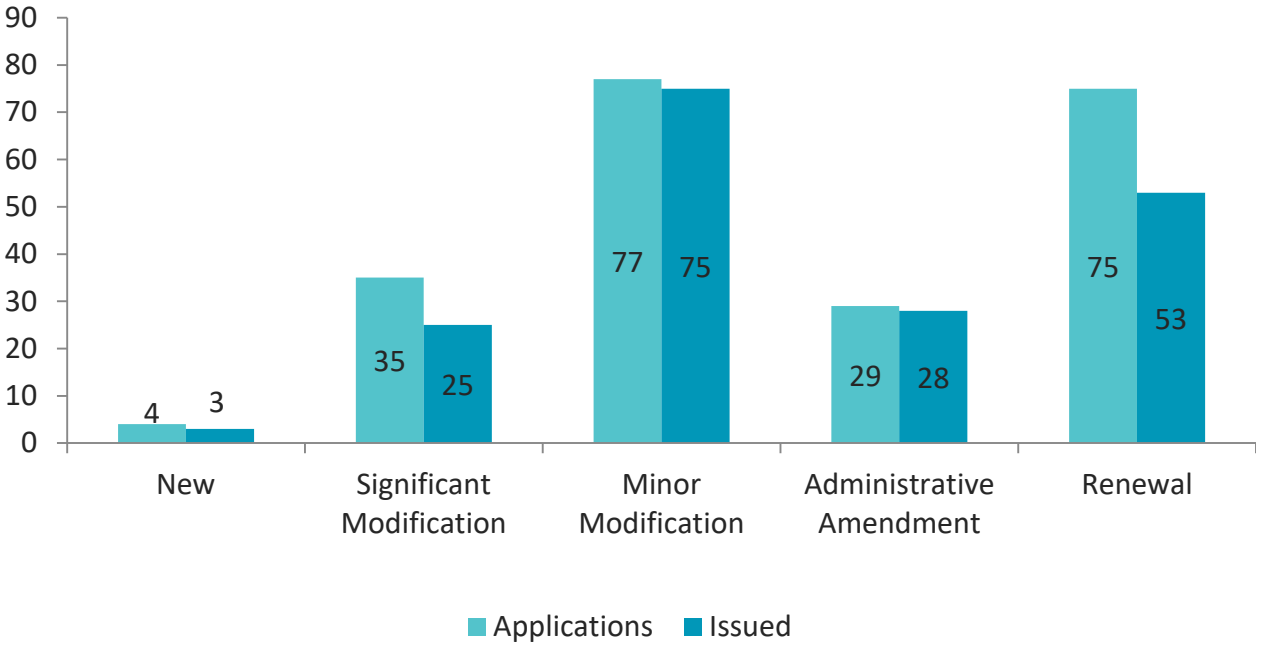
FIGURE 2: FFY20 MINOR SOURCE PERMITTING ACTIONS



FFY20 MAJOR SOURCE PERMITTING ACTIONS

In FFY20, OAQ acted on 184 applications for new and revised major source permits (including applications received prior to FFY20).

FIGURE 3: FFY20 MAJOR SOURCE PERMITTING ACTIONS



FFY20 GENERAL PERMIT ACTIONS

OAQ has pre-written standardized permits for specific categories of facilities. For those that qualify, general permits provide an alternative to applying for a traditional minor source or Title V permit.

During FFY20, OAQ renewed (with some revisions) the general permits for cotton gins, gasoline bulk plants, and natural gas compressor stations.

During FFY20, OAQ received 19 applications for new general permits, and 55 requests for modifications.*

TABLE 3: FFY20 NEW AND MODIFIED GENERAL PERMIT NOTICES OF INTENT*

Category	Issued
Air Curtain Incinerator	4
Animal/Human Remains Incinerator	1
Cotton Gin	5
Gasoline Bulk Plant	3
Hot Mix Asphalt	3
Natural Gas Compressor Station	54
Rock Crusher	4

*General permit renewals are often processed as a group of multiple sources operating under one company, and are not included in these totals.

PERMITS BRANCH ACHIEVEMENTS

The Permits Branch team implements measures designed to assist the regulated community in understanding when a permit is required, how to apply for a permit, and permit requirements.

The E-Portal online permit application system has enabled OAQ to streamline the permitting application process for applicants and the workflow for Permits Branch staff reviewing the application and preparing the permit. E-Portal expedites the permit application review process by providing guidance on application preparation and requiring fields to be populated to help ensure that the submission is complete. E-Portal also allows applicants to check the status of their applications.

During FFY20, OAQ received 456 permit-related submissions through E-Portal (including applications for new permits, renewals, modifications, and registrations). This represents a five percent increase in online submissions from FFY19.

Innovation at Work

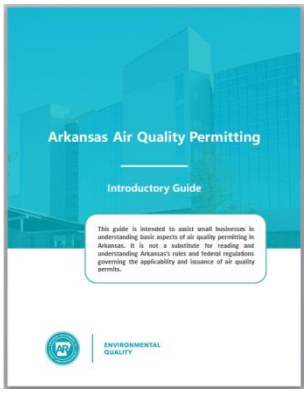
What Can I Do through E-Portal?

- Apply for a permit, permit revision, or renewal;
- Submit a registration;
- Submit requests for:
  - General permit coverage;
  - Applicability determination;
  - Alternative monitoring;
  - Testing and compliance date extensions;
  - Interim authority and temporary variance;
  - Void a permit;
- Submit reports to Compliance;
- Submit testing notifications;
- And more!!!!

EASE Permitting Workgroup

In 2019 and 2020, the Efficiency and Streamlining Effort (EASE) Permitting Workgroup met to discuss the development of a new guidance document for OAQ permitting. The EASE workgroup is made up of OAQ staff and representatives from the regulated community.

Based on workgroup feedback, OAQ developed an in-depth FAQ document and an introductory guide to OAQ's permitting program. DEQ anticipates issuing these guidance documents in 2021.



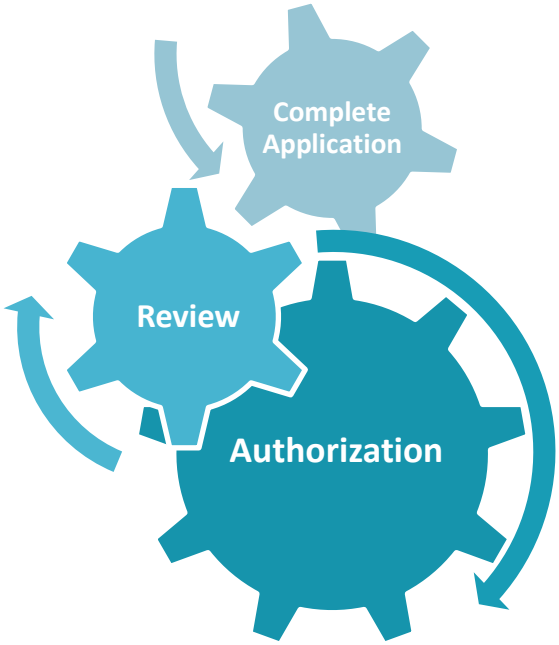
On-Track Assistance Program

In February 2020, OAQ launched the On-Track Assistance Program. This program allows permittees to request a meeting with their inspector and permit engineer to discuss permit requirements, how OAQ interprets key provisions, and what to expect during an inspection. Through the On-Track Assistance program, OAQ works with permittees to ensure a common understanding of how to interpret permit requirements and prevent potential confusion that could result in unintentional permit violations.

Permitting Action Metrics

Permitting Actions*	# Processed	Average Processing Time (Days)
Registrations	9	27
General Permits	174	20
Individual Minor Source Permit Actions	35	140
Individual Title V Permit Actions	144	182

***Excludes administrative amendments and *de Minimis* changes**



In FFY20, OAQ also processed 165 miscellaneous requests related to permitting.

Title V Program National Rankings

OAQ works to ensure timely issuance of Title V permits, including actions on significant modifications and renewals. Delays in issuance may result from late or incomplete applications or other factors that delay OAQ's ability to finalize a permitting action.

EPA collects data on Title V permitting actions from all air permitting authorities, including OAQ. The Clean Air Act established timeframes for certain Title V permitting actions. In particular, Title V renewals are timely if they occur prior to expiration of the existing permit and Title V significant modifications are timely if they are issued within 18 months of receipt of an application.

FIGURE 4: TITLE V SIGNIFICANT MODIFICATIONS NATIONAL RANKINGS

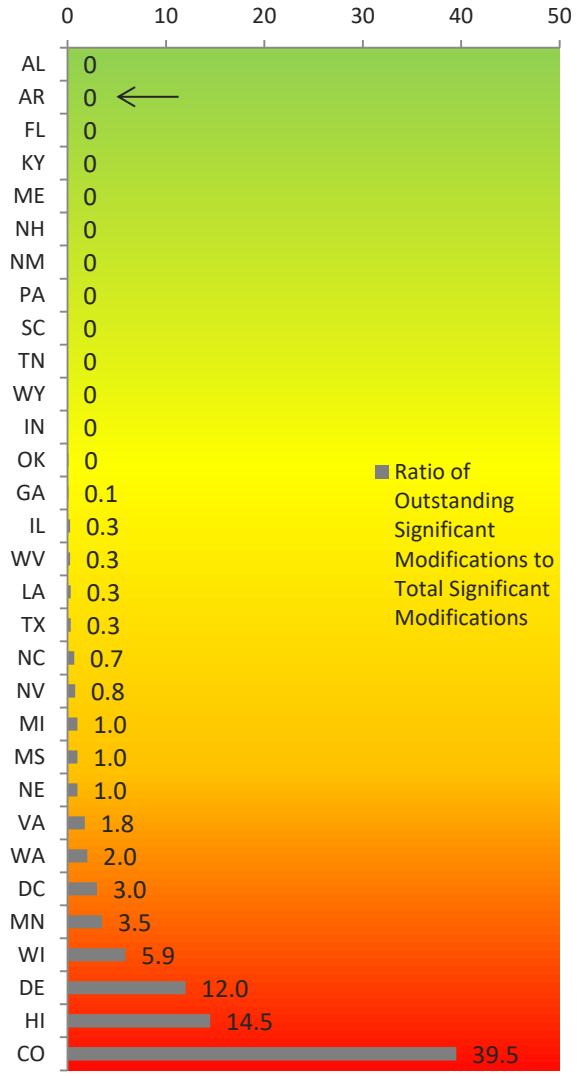
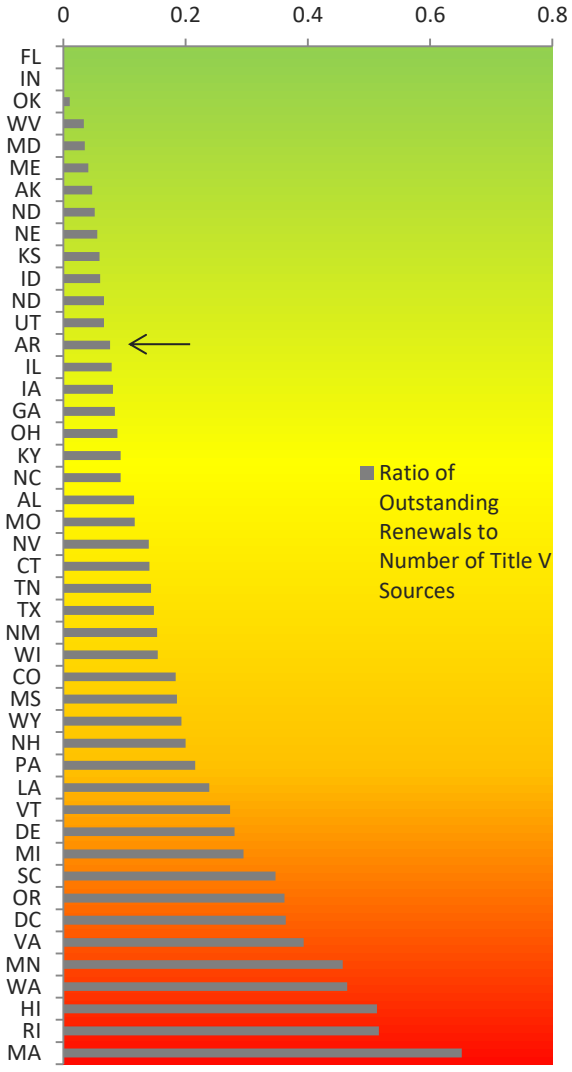


FIGURE 5: TITLE V RENEWALS NATIONAL RANKINGS



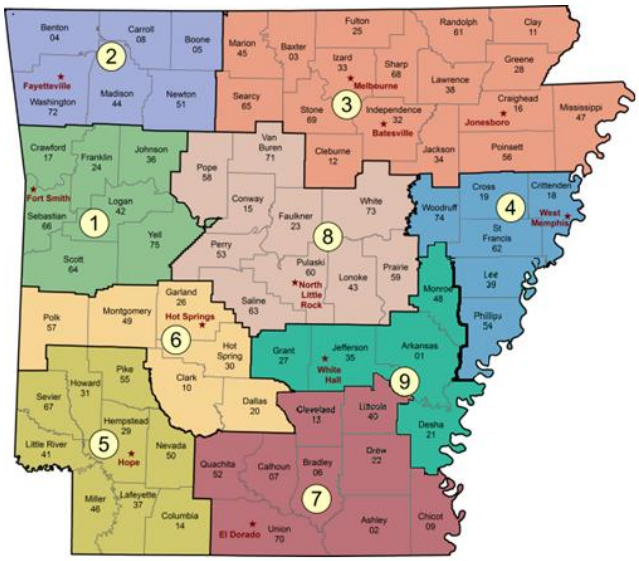
COMPLIANCE

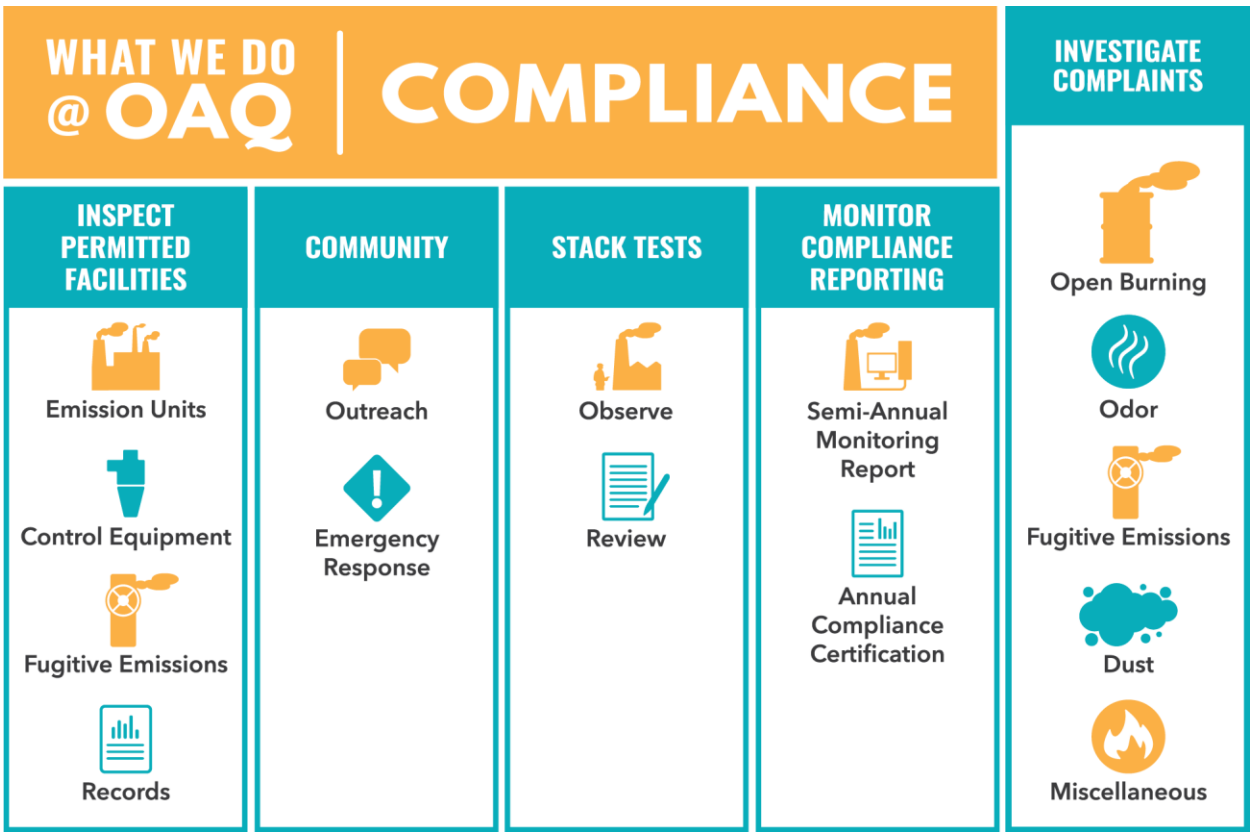
The Compliance Branch inspects permitted facilities, observes stack testing, and audits records to determine whether owners and operators are complying with state and federal air pollution regulations, as specified in each facility's permit.

The Compliance Branch inspectors also investigate citizen complaints regarding air pollution, respond to emergency situations, and perform pre-assessments of sites for the open burning of vegetative storm debris.

Visit our website for more information about OAQ's Compliance Branch: www.adeq.state.ar.us/air/compliance

FIGURE 6: OAQ INSPECTION AREA OFFICES





COMPLIANCE BRANCH ACHIEVEMENTS

All inspections, stack test observations, and complaint investigations were conducted in accordance with enhanced health and safety measures to protect both inspectors and inspected facility personnel from risks associated with COVID-19. Before inspections occur, facilities complete a pre-screening call to inform inspectors about each facility's COVID-19 protocols and any reported cases of COVID-19 among the facility's personnel. All required records and documentation are requested to be sent electronically, and facilities are requested to complete a virtual compliance inspection using a video conferencing platform such as Zoom or GoToMeetings.

COMPLIANCE BRANCH METRICS

Inspections, Stack Tests, and Compliance Documentation Review

Each year, OAQ Compliance Branch inspectors have a goal of inspecting no less than 50% of Title V sources and no less than 20% of minor sources. The Compliance Branch inspects all facilities identified to the EPA in the annual Arkansas Compliance Monitoring Strategy (ACMS). During FFY20, OAQ inspectors achieved this goal despite the challenges associated with the COVID-19 pandemic. Inspectors performed 572 inspections of minor sources and 101 inspections of Title V sources.

In addition, inspectors performed 625 stack test observations, reviewed 223 annual compliance certifications, and reviewed 438 semi-annual monitoring reports.

Inspectors also investigated 406 citizen air pollution complaints.

Innovation at Work

Filing Air Pollution Complaints via DEQ's Mobile App

With DEQ's mobile app, citizens can:

- Report environmental hazards anywhere in the state;
- Provide a description and location information; and
- Submit photos;

Complaints can also be submitted online (https://www.adeq.state.ar.us/complaints/) or via phone (501-682-0773).

Download on the App Store

ANDROID APP ON Google play

AREA OFFICE 1

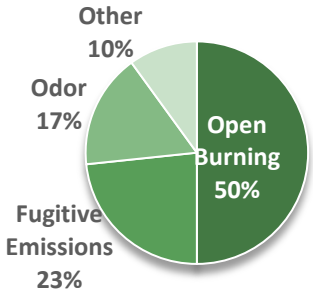
Rusty Marvel, Inspector
479-968-7339

David Miesner, Inspector
501-837-2085

Stephen Foster, Inspector Supervisor
479-968-7339

92 Inspections
33 Complaint Investigations
31 Stack Test Observations
26 Annual Compliance Reports
26 Semi-Annual Monitoring Reports

FIGURE 7: FFY20 AREA OFFICE I COMPLAINT INVESTIGATIONS



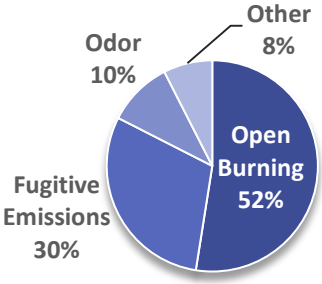
AREA OFFICE 2

Jay Ellis, Inspector
479-267-0811, Ext. 11

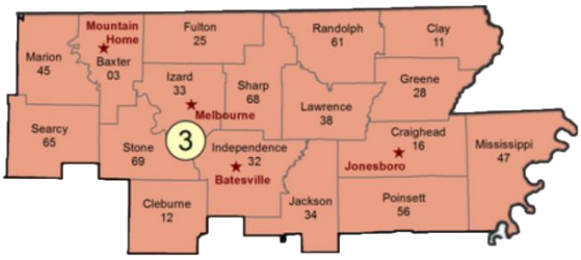
Stephen Foster, Inspector Supervisor
479-424-0333

50 Inspections
40 Complaint Investigations
39 Stack Test Observations
10 Annual Compliance Reports
10 Semi-Annual Monitoring Reports

FIGURE 8: FFY20 AREA OFFICE 2 COMPLAINT INVESTIGATIONS

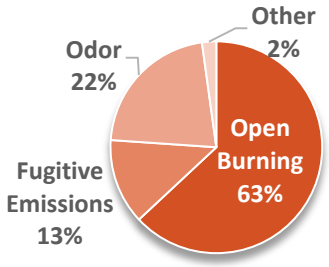


AREA OFFICE 3



133 Inspections
50 Complaint Investigations
149 Stack Test Observations
37 Annual Compliance Reports
37 Semi-Annual Monitoring Reports

FIGURE 10: FFY20 AREA OFFICE 3 COMPLAINT INVESTIGATIONS



Keith Collins, Inspector
870-793-4762

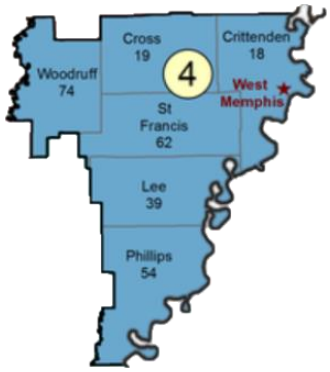
Coy Dobson, Inspector
870-935-7221, Ext. 11

Bryant Lamb, Inspector
870-368-5053

Mitchel Kennedy, Inspector
870-793-4762

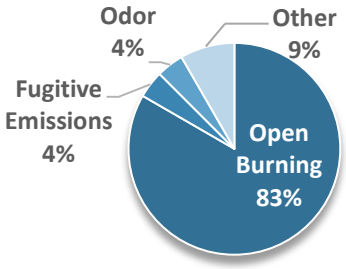
Brent Day, Inspector Supervisor
501-682-0766

AREA OFFICE 4



29 Inspections
20 Complaint Investigations
4 Stack Test Observations
5 Annual Compliance Reports
5 Semi-Annual Monitoring Reports

FIGURE 9: FFY20 AREA OFFICE 4 COMPLAINT INVESTIGATIONS



James Starling, Inspector
870-733-3526

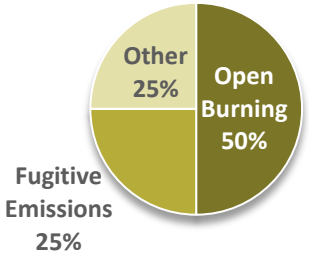
Brent Day, Inspector Supervisor
501-682-0766

AREA OFFICE 5

Gary Bortz, Inspector Supervisor
501-682-0706

34 Inspections
4 Complaint Investigations
26 Stack Test Observations
21 Annual Compliance Reports
21 Semi-Annual Monitoring Reports

FIGURE 11: FFY20 AREA OFFICE 5 COMPLAINT INVESTIGATIONS



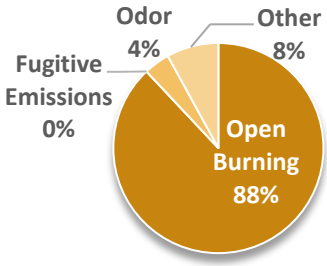
AREA OFFICE 6

Risa Parker, Inspector
501-837-6977

Stephen Foster, Inspector Supervisor
479-424-0333

36 Inspections
25 Complaint Investigations
35 Stack Test Observations
19 Annual Compliance Reports
19 Semi-Annual Monitoring Reports

FIGURE 12: FFY20 AREA OFFICE 6 COMPLAINT INVESTIGATIONS



AREA OFFICE 7

Jay Northern, Inspector
870-862-5941

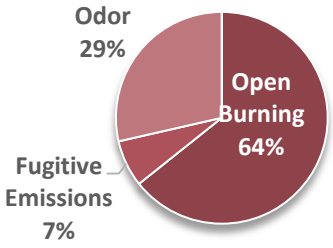
Tiffany Wooten, Inspector
870-862-5941

Gary Bortz, Inspector Supervisor
501-682-0706

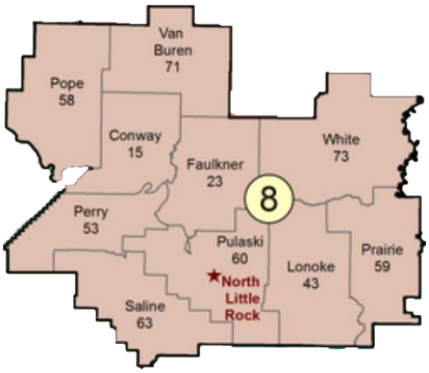
Alan Breshears,
Environmental Program Coordinator
870-862-5941

36 Inspections
14 Complaint Investigations
39 Stack Test Observations
40 Annual Compliance Reports
40 Semi-Annual Monitoring Reports

FIGURE 13: FFY20 AREA OFFICE 7 COMPLAINT INVESTIGATIONS



AREA OFFICE 8



Lori Burke, Inspector
501-682-0737

Caleb Fielder, Inspector
501-682-0775

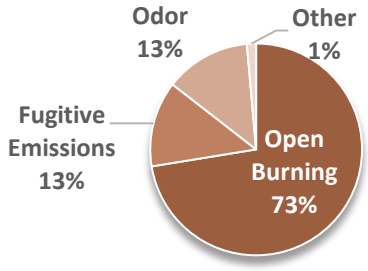
Tanisha Harper,
Inspector Supervisor
501-683-2226

Mikayla Shaddon,
Inspector
501-682-0808

Curtis Stehle,
Inspector
501-683-0962

136 Inspections
211 Complaint Investigations
260 Stack Test Observations
49 Annual Compliance Reports
49 Semi-Annual Monitoring Reports

FIGURE 14: FFY20 AREA OFFICE 8 COMPLAINT INVESTIGATIONS



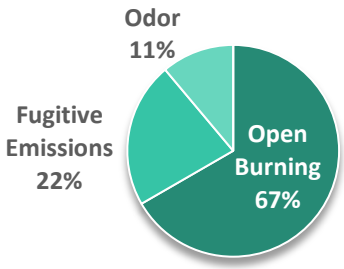
AREA OFFICE 9

Benjamin Boorman, Inspector
501-837-6963

Gary Bortz, Inspector Supervisor
501-682-0706

26 Inspections
9 Complaint Investigations
42 Stack Test Observations
16 Annual Compliance Reports
16 Semi-Annual Monitoring Reports

FIGURE 15: FFY20 AREA OFFICE 9 COMPLAINT INVESTIGATIONS



OPEN BURNING

DEQ inspectors receive more complaints about open burning than any other type of air pollution complaint. The open burning of refuse, garbage, trade waste, or any other waste material is prohibited under Arkansas law. Residential open burning of yard waste—such as grass clippings, tree leaves, gardening waste, and shrubbery trimmings—is discouraged, but is permissible in some areas of Arkansas under specific conditions. See DEQ's "Guide to Burning Yard Waste" for more information: https://www.adeq.state.ar.us/air/compliance/yardwaste.aspx

ALTERNATIVES TO BURNING YARD WASTE:

LAWN MULCHING—Leave grass clippings on your lawn to add nutrients back into the soil and improve lawn health.

CHIPPING—Add chipped brush and pruning waste to increase nutrients. Chippers are often available for rent.

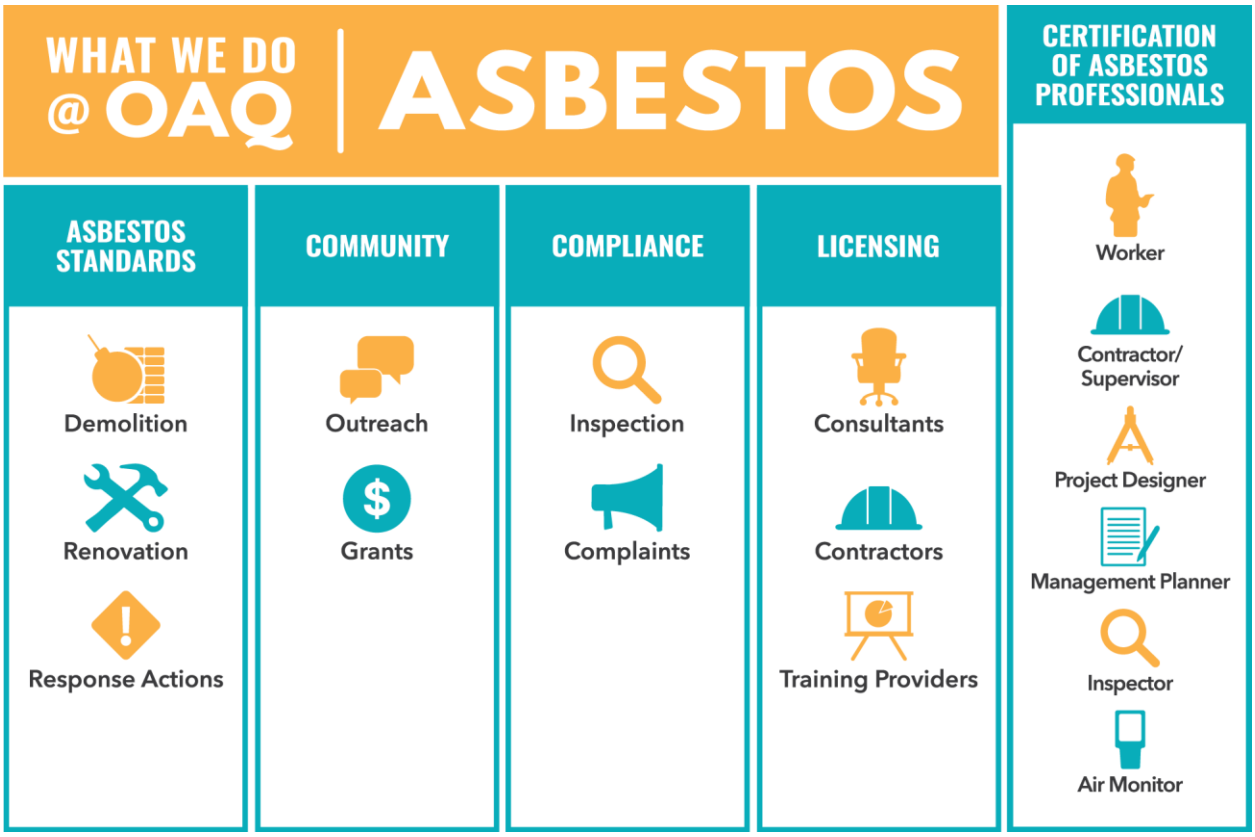
CURBSIDE PICKUP—Collect and separate yard waste, organic material, and recyclables and set them out for curbside collection. Check with your local government or waste management company for local services.

COMPOSTING—Compost yard waste to recycle organic material and add nutrients back into the soil. Composting is an effective, environmentally safe way to recycle yard waste, and the compost is used to improve lawns, vegetable gardens and flower beds, or it is applied as mulch around shrubs and trees. Generally, compost consists of not only yard waste but also kitchen waste such as eggshells, coffee grounds, and vegetable peelings.

ASBESTOS

OAQ's Asbestos Section ensures compliance with state and federal asbestos rules through complaint investigations, inspecting demolition and renovation projects, licensing and certifying asbestos professionals, and conducting outreach demonstrations. Arkansas asbestos regulations are contained in Rule 21. Asbestos is also regulated as a hazardous air pollutant by the EPA.

The Asbestos Program also administers the Arkansas Asbestos Abatement Grant Program, which assists small cities and counties in their efforts to clean up and stabilize structurally-impaired buildings containing friable asbestos. Visit DEQ's website for more information about OAQ's Asbestos Program: https://www.adeq.state.ar.us/air/asbestos/grant/



ASBESTOS ACHIEVEMENTS

All asbestos demolition and renovation inspections and complaint investigations were conducted in accordance with enhanced health and safety measures to protect inspectors and inspected facility personnel from risks associated with COVID-19.

The Asbestos Section issued substantial numbers of licenses and certifications in FFY20 as illustrated in Tables 4 and 5. The number of each type of notice of intent received is illustrated in Figure 16. Notices of Intent are required for demolitions and renovations subject to APC&EC Rule 21.

ASBESTOS METRICS

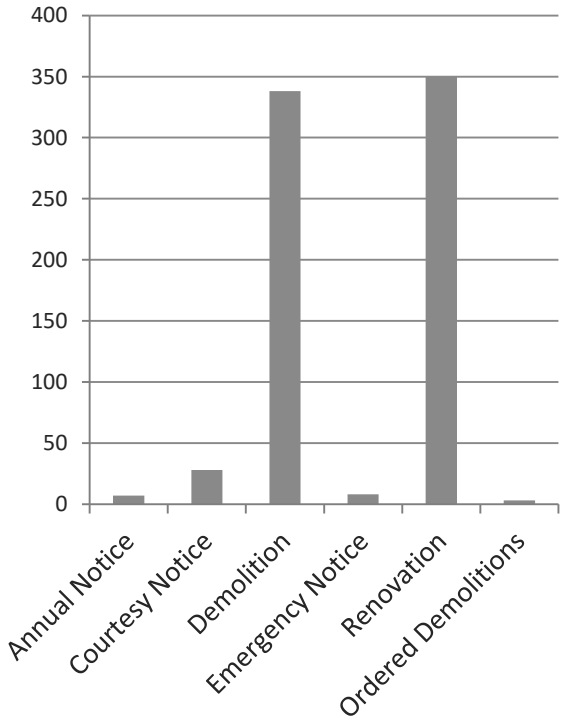
TABLE 4: FFY20 ASBESTOS LICENSES ISSUED

License Type	#
Consulting Firm	43
Contracting Firm	86
Training Firm	26

TABLE 5: FFY20 ASBESTOS CERTIFICATES ISSUED

Certification Type	#
Worker	324
Contractor/Supervisor	413
Inspector	319
Management Planner	27
Project Designer	44
Air Monitor	73

FIGURE 16: FFY20 ASBESTOS NOTICES OF INTENT PROCESSED



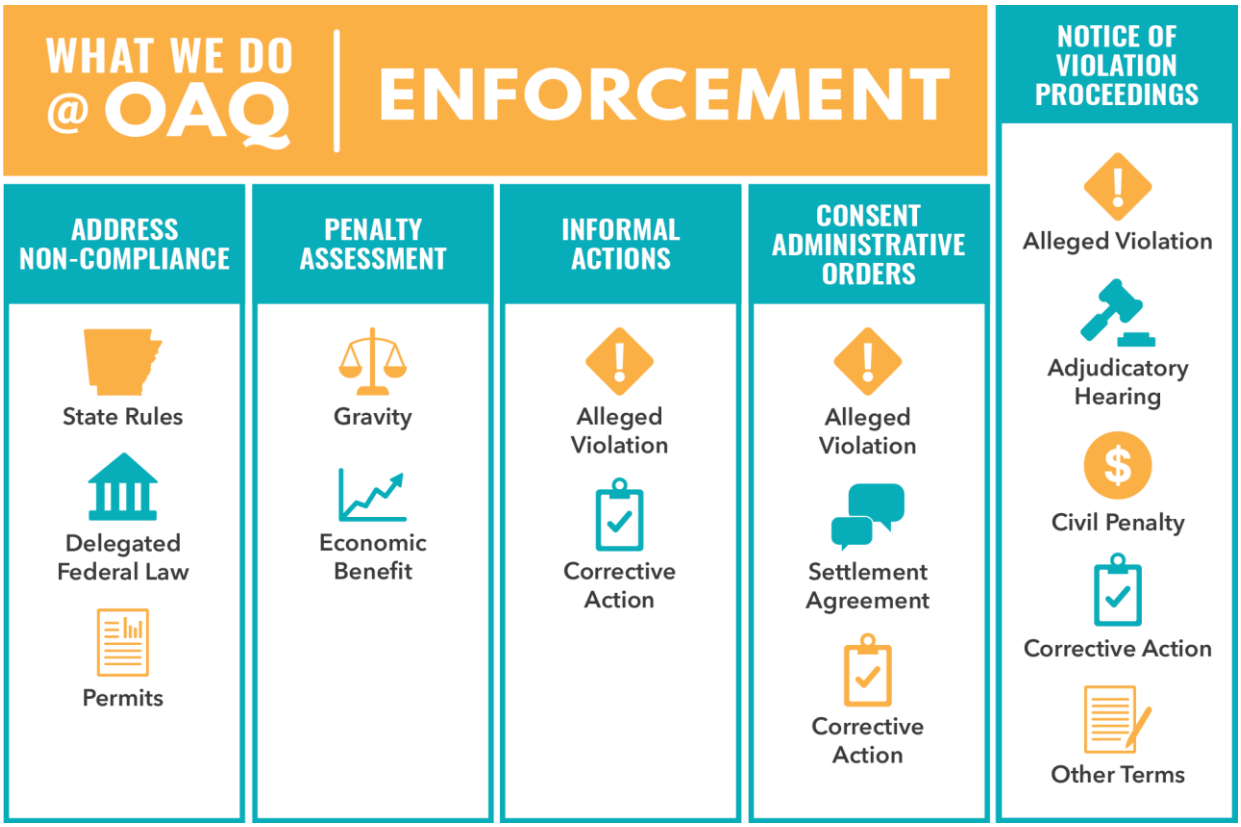
ENFORCEMENT

The Enforcement Section is responsible for administering consistent, appropriate, and timely enforcement of state and federal air pollution laws. This section provides support and assistance on OAQ enforcement issues designated for formal and informal enforcement action. These enforcement actions are taken in response to case referrals from the Asbestos Section, the Compliance Branch, and the Permit Branch. The enforcement process helps facilities successfully achieve compliance with state and federal standards and ensures compliance with air pollution laws and regulations.

For minor issues, OAQ may act informally by sending a letter detailing areas of concern and recommended corrective actions.

For permit and rule violations, DEQ typically uses one of two methods of enacting legally-binding corrective actions, civil penalities and other terms: consent administrative orders (CAO) and notices of violation (NOV).

Visit our website for more information about OAQ Enforcement:
https://www.adeq.state.ar.us/air/enforcement/



ENFORCEMENT METRICS

TABLE 6: FFY20 ENFORCEMENT ACTIONS

Program Area	Informal Action	Notice of Violation	Consent Administrative Order	Cases Referred to Enforcement
Asbestos	8	0	4	4
Air	35	0	31	74

ARKANSAS NStEP
Natural State Environmental Program

The Natural State Environmental Program (NStEP) is a voluntary environmental stewardship program which recognizes and rewards organizations that are committed to environmental leadership—those that go beyond environmental compliance and move toward the goal of sustainability. Arkansas's NStEP members are recognized as entities that inspire and challenge other organizations to maintain higher levels of environmental performance. The voluntary and substantial commitments that members make with respect to environmental protection are recognized and valued by the state of Arkansas.

Dassault Falcon Jet
Little Rock, AR
Platinum Level Member

Department of the Military
North Little Rock, AR
Platinum Level Member

Pratt & Whitney, PSD
Springdale, AR
Platinum Level Member

3M Little Rock
Little Rock, AR
Platinum Level Member

POLICY AND PLANNING

The Policy and Planning Branch is responsible for gathering information on current and projected emissions trends, analyzing air quality data, and developing state plans to help maintain clean air in Arkansas.

The Policy and Planning Branch also coordinates stakeholder engagement on air quality policy development, provides technical expertise to the other divisions and offices within E&E, and helps to educate the public about air quality issues.

Visit our website for more information about OAQ's Policy and Planning Branch: www.adeq.state.ar.us/air/planning

STATE AIR QUALITY PLANS

DEQ has the primary role of implementing programs to protect air quality in the state. OAQ staff develops plans for implementing these programs pursuant to Clean Air Act requirements. There are two types of state plans: the state implementation plan (SIP) and 111(d) state plans. State plans are subject to approval by EPA.

The SIP covers multiple program areas including implementation of the national ambient air quality standards (NAAQS), addressing interstate pollution transport obligations (Good Neighbor SIPs), and ensuring protection of visibility in designated wilderness areas (Regional Haze SIPs).

111(d) state plans establish standards of performance for existing sources of air pollution that, if new, would be subject to EPA new source performance standards.

Visit our webpage for more information on state air quality plan development: https://www.adeq.state.ar.us/air/planning/sip/

PLANS UNDER DEVELOPMENT

Existing Municipal Solid Waste Landfills 111(d) Plan

Regional Haze Planning Period II SIP

Miscellaneous Updates

PENDING EPA ACTION

2015 Ozone NAAQS Good Neighbor SIP

PROPOSED APPROVAL

2015 Ozone NAAQS Infrastructure SIP

Phase III Regional Haze Planning Period I SIP

Visibility Transport Component of Infrastructure SIP for Various NAAQS

APPROVAL FINALIZED

Regional Haze Progress Report

2010 SO2 NAAQS Good Neighbor SIP

NATIONAL AMBIENT AIR QUALITY STANDARDS

The national ambient air quality standards (NAAQS) are federal standards for common outdoor air pollutants that are considered harmful to public health and the environment. These common outdoor pollutants are referred to as "criteria pollutants." States are charged with ensuring that all areas of the state attain and maintain the NAAQS. See Appendix A for details about the health and environmental risks associated with each criteria pollutant.

Criteria Pollutants

CARBON MONOXIDE (CO)

SULFUR DIOXIDE (SO_2)

OZONE (O_3)

PARTICULATE MATTER (PM_{10} and $PM_{2.5}$)

NITROGEN DIOXIDE (NO_2)

LEAD (Pb)

AIR QUALITY MONITORING

OAQ uses air quality monitors located across the state to determine attainment with the NAAQS. These monitors are established according to federal requirements based on total population in a metropolitan statistical area as well as the following factors:

1. Where the highest pollutant concentration is expected to occur in the area covered by the monitor;
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.

OAQ also deploys special purpose monitors from time to time to evaluate specific air quality concerns raised by citizens.

See Appendix B for additional details about Arkansas's ambient air quality monitoring and trends in monitoring data.

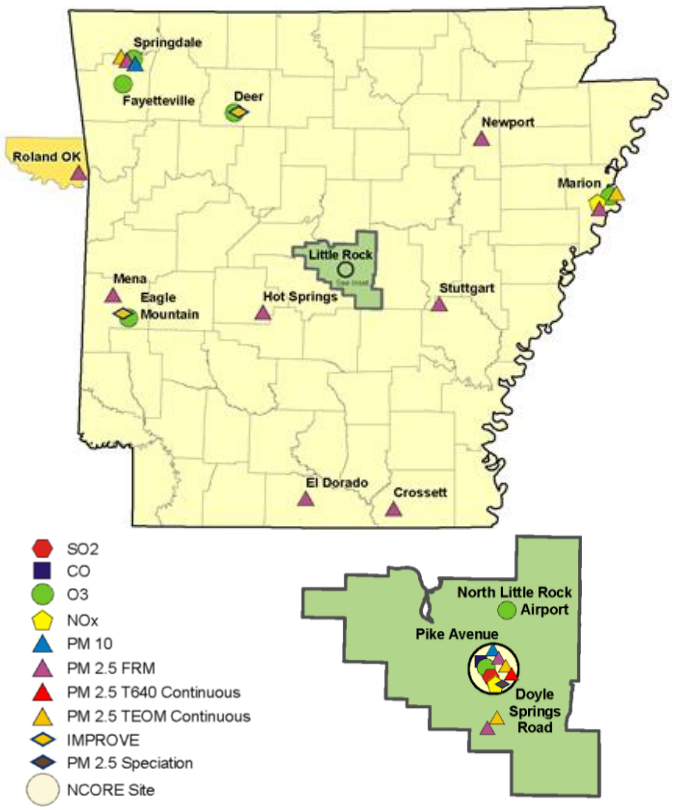
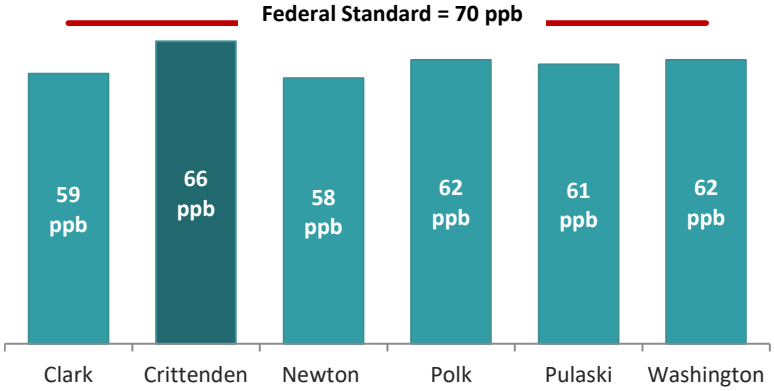
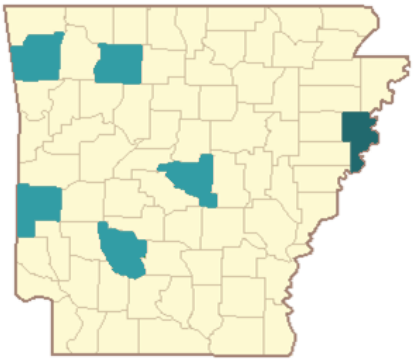


FIGURE 18: 2017 – 2019 OZONE DESIGN VALUES COMPARED TO THE NAAQS IN MONITORED COUNTIES





GOOD | CAUTIOUS | RISK OF EXCEEDANCE

FIGURE 19: 2017 – 2019 FINE PARTICLES (PM2.5) ANNUAL AVERAGE DESIGN VALUES COMPARED TO THE NAAQS IN MONITORED COUNTIES

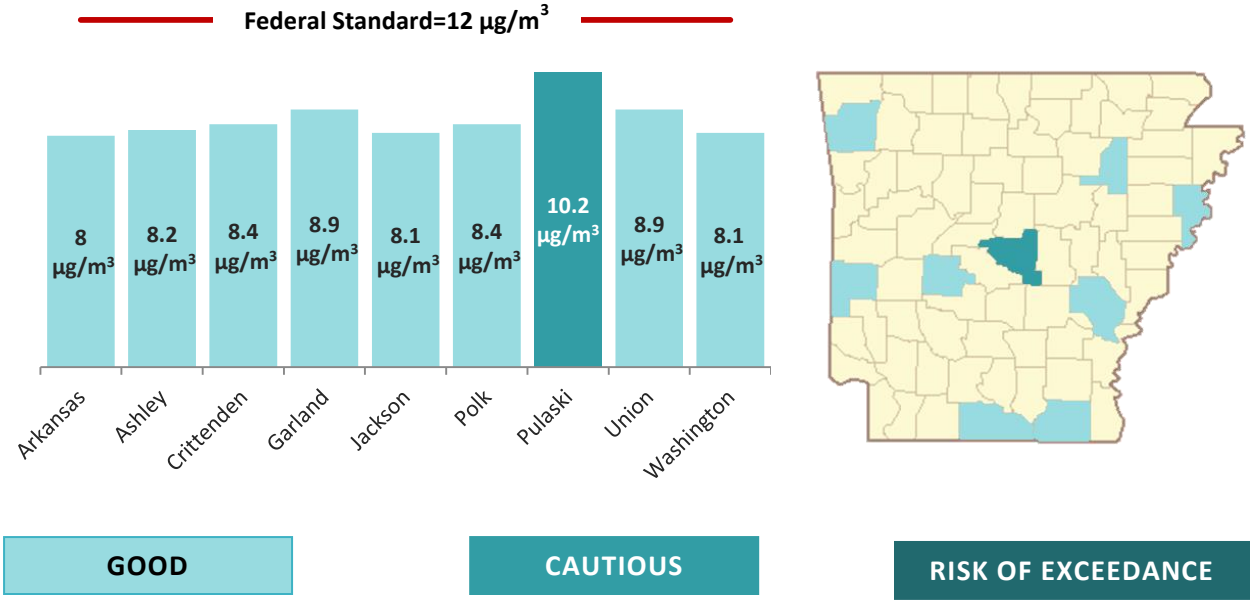


FIGURE 20: 2017 – 2019 FINE PARTICLES (PM2.5) 24-HOUR AVERAGE DESIGN VALUES COMPARED TO THE NAAQS IN MONITORED COUNTIES

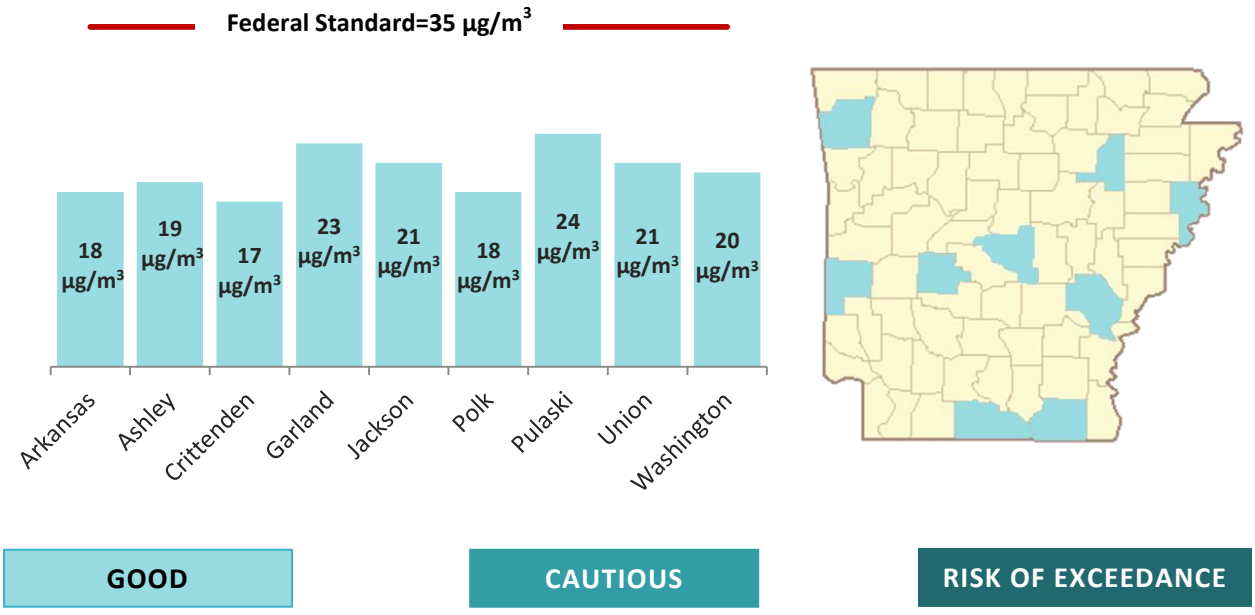
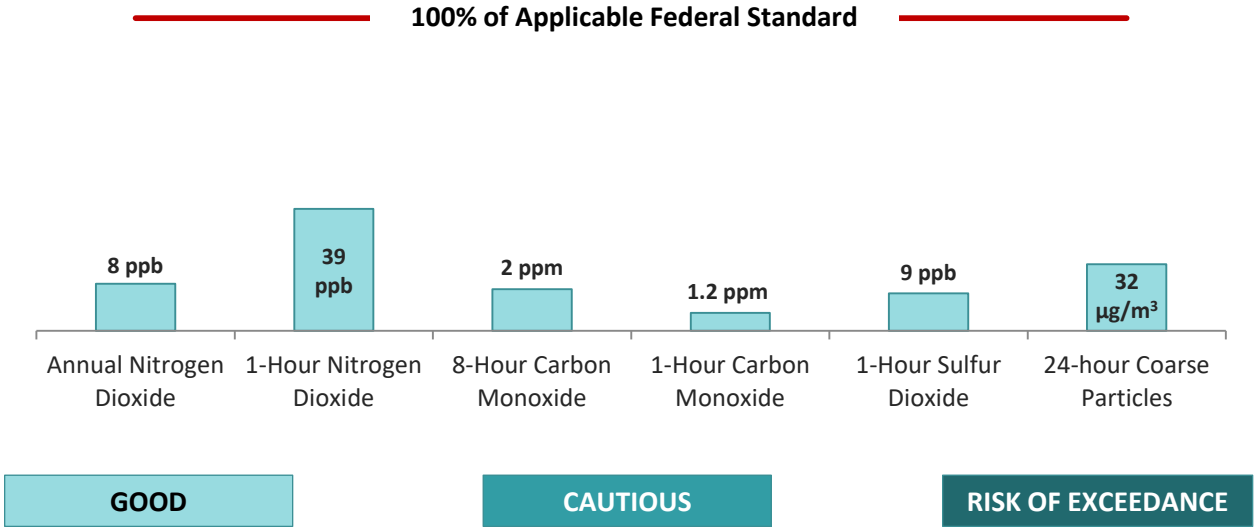


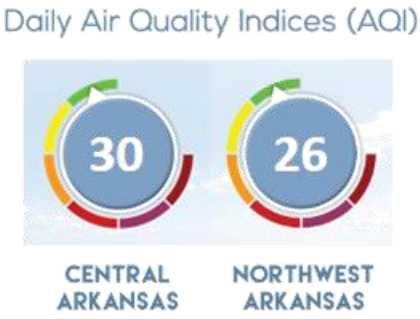
FIGURE 21: STATEWIDE AVERAGE DESIGN VALUES COMPARED TO THE NAAQS FOR OTHER CRITERIA POLLUTANTS



AIR QUALITY FORECASTING

The OAQ staff forecasts air quality conditions for northwest and central Arkansas using meteorological data and pollutant concentration data to estimate ozone and fine particulate matter. These estimates are then translated into an Air Quality Index (AQI). The AQI is color-coded to indicate the level of health concerns for the forecasted pollutant concentrations.

The OAQ staff forecasts are highly accurate and published to DEQ's website and social media pages to inform the public. During the 2020 ozone season (May – September), OAQ's accuracy rate for predicting ozone action days (AQI >100) versus no action was 98.5%. Appendix D further details air quality forecasting for the 2020 ozone season.



AQI Value	Level of Health Concern	Colors
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

EMISSION INVENTORY

Each year, the OAQ staff collect and verify emissions from large permitted sources of air pollutant emissions. The largest sources (Type A Sources) are inventoried every year. Additional sources (Type B Sources) are inventoried every three years. Once OAQ verifies the emissions data, it is submitted to EPA. Emissions data is used for planning and air quality modeling.

During 2020, the Emissions Inventory team collected and verified the 2019 emissions data from 66 Type A sources. No Type B sources submitted emissions reports in 2020. These reports were last filed in 2018 and are not due again until 2021.

During 2020, the Emission Inventory team also updated the State and Local Emission Inventory System Electronic Service Agreement to make the form more descriptive and user-friendly.

Emissions Reporting

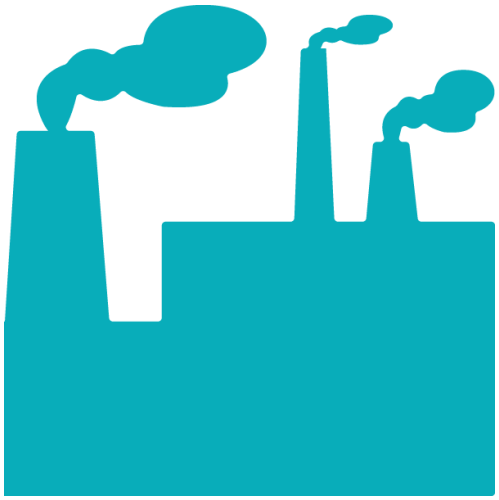
Stationary sources that must report emissions are categorized based on the annual potential to emit (PTE) of one or more pollutants. Type A sources must report emissions annually. Type B sources must report emissions every three years.

Type A Sources	Type B Sources
Annual PTE ≥	Annual PTE ≥
2500 tons SO_2, NOx, or CO	1000 tons CO
250 tons VOC, PM_{10}, $PM_{2.5}$, or NH_3	100 tons NOx, SO_2, VOC, PM_{10}, $PM_{2.5}$, NH_3
	0.5 tons lead

TABLE 7: 2019 TYPE A SOURCE EMISSIONS

Pollutant	Emissions*
SO_2	45,528.65 Tons
NOx	32,902.70 Tons
CO	23,610.19 Tons
PM_{10}	6,173.13 Tons
$PM_{2.5}$	1,179.91 Tons
Ammonia	889.32 Tons
Lead	5,127.27 LBS
VOC	18,292.23 Tons

*Data based on DEQ emissions reports and subject to change after EPA review



VOLUNTARY EFFORTS

EASE Regulatory Workgroup

In 2020, OAQ developed Phase I strawman draft mark-ups of APC&EC rules based on initial EASE Regulatory Workgroup suggestions to streamline and update APC&EC air quality rules. The EASE regulatory workgroup is made up of OAQ staff and representatives from the regulated community.

The Phase I strawman drafts and feedback received can be found at: https://www.adeq.state.ar.us/air/planning/streamlining/. Based on feedback, OAQ anticipates future workgroup meetings to discuss changes to the Phase I drafts and additional potential changes to APC&EC air quality rules.

Funding Assistance Programs

In 2020, OAQ administered three funding assistance programs that reduce emissions of air pollutants: State Agency Fleet Emission Reduction Grant (SAFER), Clean Fuels, and GoRED!

SAFER and Clean Fuels are funded using Volkswagen Settlement dollars.

GoRED! is funded under the Diesel Emission Reduction Act using a combination of dollars from EPA, the Volkswagen Settlement, and permit fees.

In addition to these three funding assistance program, OAQ provides technical assistance to the DEQ's Office of Energy on program development for electric vehicle infrastructure funding assistance programs.

Innovation at Work

Online Applications

OAQ used the E-Portal system to pilot online applications for the Clean Fuels Program. Pilot goals included:

- Simplifying the application process;
- Reducing the number of incomplete applications; and
- Providing tracking of application processing.

Based on the success of this pilot, OAQ is examining expanding the use of E-Portal to other funding assistance programs and adding the ability to submit reports online.

SAFER PROGRAM – 2020 AWARD

The SAFER program was a one-time funding opportunity to reduce emissions from state agency fleets.

Under the SAFER program, DEQ partnered with the Arkansas Department of Transportation on a vehicle replacement project.

ARDOT awarded up to $1,109,790 in assistance toward replacement of:

- 4 diesel-Powered Short-Haul Tractor Trucks
- 3 Diesel-Powered Short-Haul Dump Trucks

Anticipated Emission Reduction = 17.29 tons

GoRED! PROGRAM - 2020 AWARDS

The GoRED! Program provides funding assistance for projects that reduce diesel emissions from heavy-duty highway trucks, buses, marine engines, locomotives, and nonroad engines.

A variety of project types are eligible, including:

- Verified exhaust controls;
- Verified/certified engine upgrades;
- Idle reduction technologies;
- Engine replacements;
- Vehicle/equipment replacements; and
- Clean alternative fuel conversions.

Project Sponsors	Project	Award
Hackett School District	Replaced 2 school buses	$43,586
Fort Smith School District	Replaced 3 school buses	$75,000
Ozark Mt School District	Replaced 1 school bus	$21,397
Heber Springs School District	Replaced 1 school bus	$22,316
Ozark School District	Replaced 2 school buses	$44,000
Clinton School District	Replaced 2 school buses	$43,100
Viola School District	Replaced 1 school bus	$22,500
Wonderview School District	Replaced 2 school buses	$34,558
Yellville-Summit Schools District	Replaced 2 school buses	$49,098
Danville School District	Replaced 1 school bus	$25,000

Anticipated Emission Reduction = 22 tons

CLEAN FUELS PROGRAM – 2020 AWARDS

The Clean Fuels program provides funding assistance for projects that repower or replace diesel medium-duty trucks, heavy-duty trucks, and buses with new alternative-fueled vehicles.

Alternative fuels, such as compressed natural gas, propane, and electricity, have lower emissions than diesel and are produced domestically.

Project Sponsors	Project	Award
Pulaski County Special School District	Replacing 2 school buses with propane buses	$130,900
West Memphis Public Works Department	Replacing 1 refuse truck with a CNG refuse truck	$185,255
Jacksonville North Pulaski School District	Replacing 2 school buses with propane buses	$68,250
Rock Regional Metropolitan Transit Authority	Replacing 2 transit buses with CNG buses	$200,000

Anticipated Emission Reduction = 994 tons

CONTACTS AND ACKNOWLEDGEMENTS

CONTACT INFORMATION

We welcome your comments on the information contained in this report.

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APPENDIX A: NATIONAL AMBIENT AIR QUALITY STANDARDS

INTRODUCTION

The Clean Air Act requires that the United States Environmental Protection Agency (EPA) set national ambient air quality standards (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 (SO2), and nitrogen dioxide (NO2).

SETTING THE STANDARDS

The EPA Administrator, in consultation with the Clean Air Scientific Advisory Committee, sets primary and secondary NAAQS 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. 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.

PERIODIC REVIEW

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. If the data show that the current level of the NAAQS is not protective of public health with an adequate margin of safety, then the EPA must revise the standard.

CRITERIA POLLUTANTS

CARBON MONOXIDE (CO)

SULFUR DIOXIDE (SO_2)

OZONE (O_3)

PARTICULATE MATTER (PM_{10} and $PM_{2.5}$)

NITROGEN DIOXIDE (NO_2)

LEAD (Pb)

NAAQS BASIC ELEMENTS

Indicator
The pollutant species measured to determine attainment of the standard

Averaging Time
The period over which air quality measurement of the indicator is averaged

Level
The air quality concentration used to determine attainment of the standard

Form
An air quality statistic used to compare air quality data to the level of the standard

IMPLEMENTATION

States must develop implementation plans to ensure that all areas of the state attain and maintain any new or revised NAAQS. Areas in which the NAAQS for a particular criteria pollutant are not being met are designated as nonattainment areas and require additional planning efforts to improve air quality. The Governor makes nonattainment area designation recommendations, and the EPA promulgates them. The 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.

TABLE A-1 LIST OF CURRENT NATIONAL AMBIENT AIR QUALITY STANDARDS

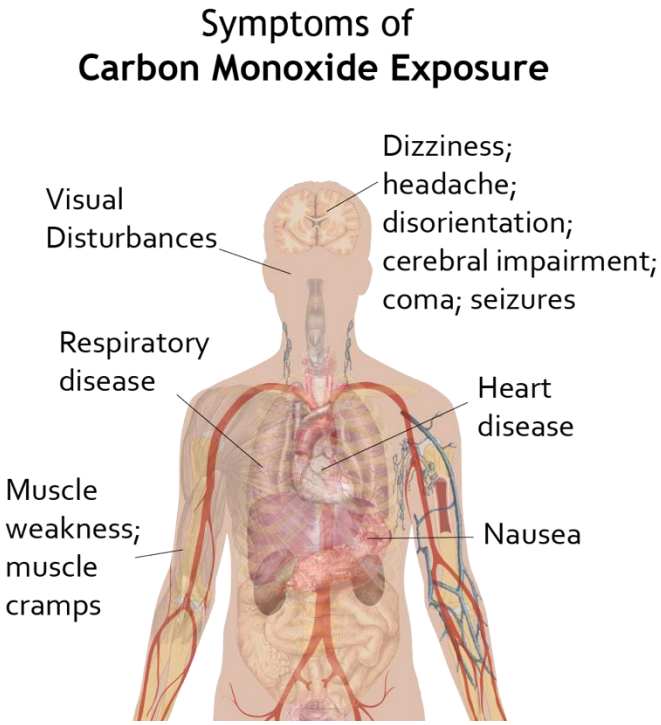
Indicator	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8-hour	9 parts per million	Not to be exceeded more than once per year
		1-hour	35 parts per million	
Lead	Primary and Secondary	Rolling 3-month average	0.15 micrograms per cubic meter	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1-hour	100 parts per billion	98th percentile, averaged over 3 years
	Primary and Secondary	Annual	53 parts per billion	Annual mean
Ozone	Primary and Secondary	8-hour	70 parts per billion	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Fine Particulate Matter ($PM_{2.5}$)	Primary	Annual	12 micrograms per cubic meter	Annual mean, averaged over 3 years
	Secondary	Annual	15 micrograms per cubic meter	
	Primary and Secondary	24-hour	35 micrograms per cubic meter	98th percentile, averaged over 3 years
Coarse Particulate Matter (PM_{10})	Primary and Secondary	24-hour	150 micrograms per cubic meter	Not to be exceeded more than once per year, on average over 3 years
Sulfur Dioxide (SO_2)	Primary	1-hour	75 parts per billion	99th percentile of 1-hour daily maximum concentration, averaged over 3 years
	Secondary	3-hour	0.5 parts per million	Not to be exceeded more than once per year

CARBON MONOXIDE (CO)

CO is a colorless, odorless gas that 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.

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 exacerbates their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.

The NAAQS is set to reduce the acute risks of exposure to carbon monoxide.



WHERE DOES CO COME FROM?

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 biogenic sources. Smaller contributions come from industrial processes, fuel combustion, solvents, and other miscellaneous sources.

COMMON EMISSIONS SOURCES

MOTOR VEHICLES

FIRE

POWER PLANTS

INDUSTRIAL PROCESSES

SOLVENTS

RESIDENTIAL FUEL COMBUSTION

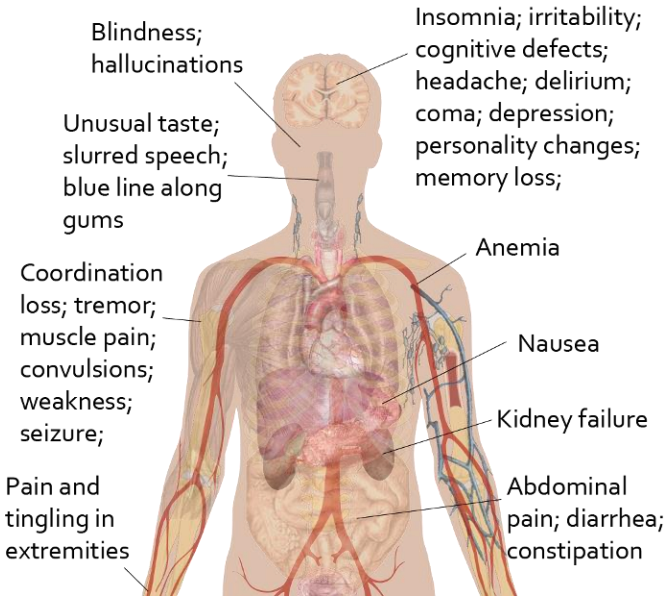
LEAD (Pb)

Lead is a metal that can cause damage to multiple body systems including the central nervous system, renal system, the liver, and the cardiovascular 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.

The NAAQS is set at this level to reduce the risk of long-term health effects due to lead exposure.

Symptoms of
Lead Exposure



WHERE DOES LEAD COME FROM?

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.

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.

In Arkansas, lead emissions come primarily from aircraft, electricity generation, and other industrial processes.

COMMON EMISSIONS SOURCES

AIRCRAFTS

VEHICLES BURNING LEADED FUELS

POWER PLANTS

ORE AND METAL PROCESSING

WASTE INCINERATORS

LEAD ACID BATTERY MANUFACTURERS

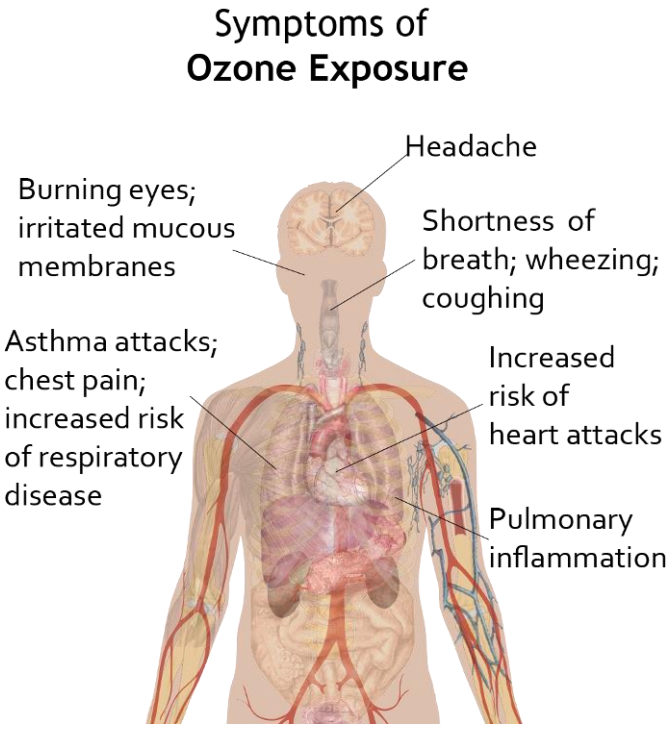
LEAD SMELTERS

OZONE (O_3)

Ozone is a highly reactive gas that can cause damage to the respiratory and cardiovascular systems. Short-term exposures to ground-level ozone can cause the muscles in the airway to constrict leading to wheezing and shortness of breath. Long-term exposures to ground-level ozone can aggravate asthma, is likely to be one of many factors in the development of asthma, and can cause permanent lung damage.

Ground-level ozone also can damage plants by reducing photosynthesis, slowing growth, and increasing a plant's sensitivity to other stressors.

The primary NAAQS is set to reduce the risk of acute and chronic health effects due to ozone exposure. The secondary NAAQS is set equal to the primary NAAQS.



WHERE DOES OZONE COME FROM?

Ozone is ubiquitous in the natural environment. Ozone is formed by photochemical reactions involving nitrogen oxides (NOx), volatile organic compounds (VOCs), and sunlight. The formation of ozone is highly weather dependent, and ozone can be transported long distances by wind.

VOCs can be emitted from both biogenic (naturally occurring in organisms) and anthropogenic (caused by people) sources.

NOx is formed primarily by the combustion of fossil fuels. NOx can also be formed by lightning.

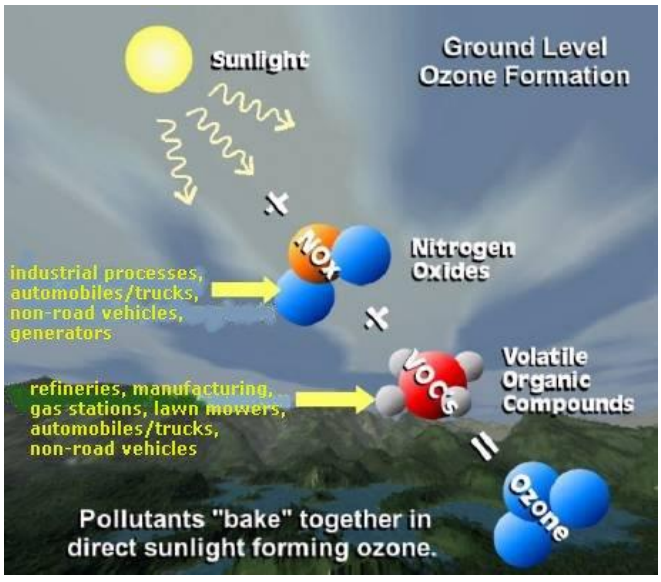


Image Credit: Harris County, Texas

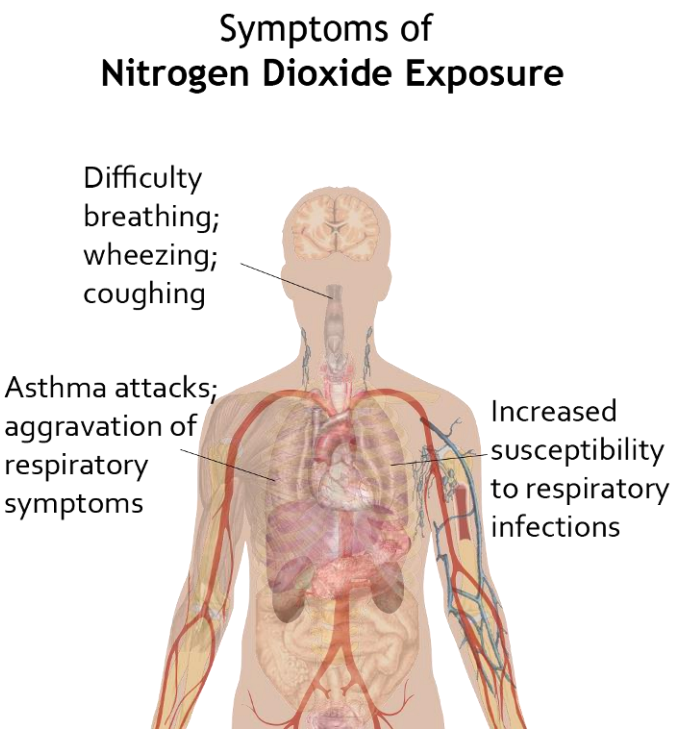
NITROGEN DIOXIDE (NO_2)

NO_2 is one of a group of highly reactive gases known as "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.

Short-term exposure to NOx can result in adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

Evidence suggests that long-term exposure to NOx may contribute to the development of asthma in children.

NOx in the air can damage plants, interfere with photosynthesis, and slow plant growth. Deposition of NOx on land and in water acidifies and over fertilizes the ecosystem.



The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to NOx. The secondary NAAQS is set equal to the primary annual NAAQS.

WHERE DOES NOx COME FROM?

NOx forms from emissions from cars, trucks, buses, power plants, and non-road equipment. NOx may be transported over 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. Smaller sources include biogenic sources, industrial processes, fires, solvents and other miscellaneous sources.

COMMON EMISSIONS SOURCES

MOTOR VEHICLES

FIRE

POWER PLANTS

INDUSTRIAL PROCESSES

RESIDENTIAL FUEL COMBUSTION

NON-ROAD EQUIPMENT

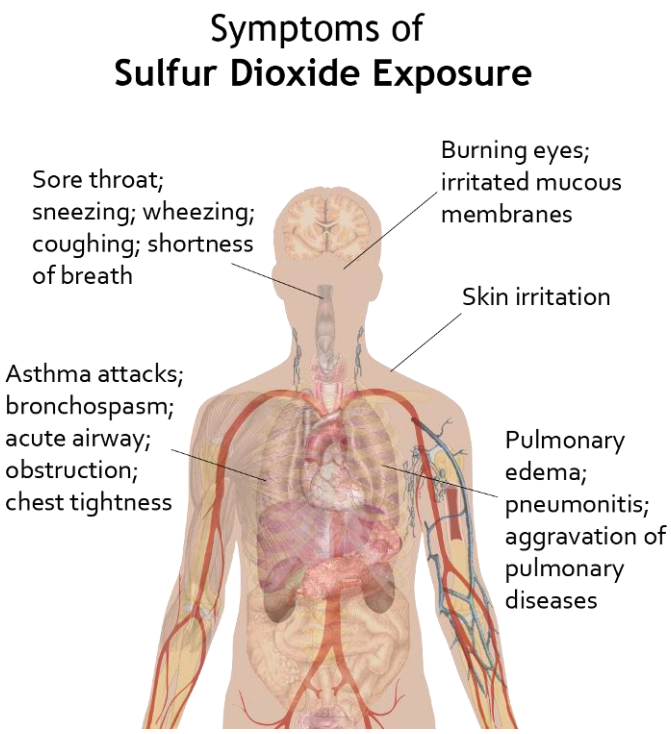
SULFUR DIOXIDE (SO_2)

SO_2 is one of a group of highly reactive gases known as "oxides of sulfur."

Current scientific evidence links short-term exposures to SO_2, ranging from five minutes to twenty-four 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).

Evidence suggests that long-term exposure to SO_2 may contribute to the development of asthma in children.

SO_2 in the air can damage plants, interfere with photosynthesis, and slow plant growth. Deposition of SO_2 on land and in water acidifies the ecosystem.



The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to SO_2 The secondary NAAQS is set to address the direct effects on vegetation of oxides of sulfur.

WHERE DOES SO_2 COME FROM?

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.

SO_2 emissions in Arkansas result primarily from power plants, with much smaller contributions from fires, industrial processes, mobile sources, solvents and other miscellaneous sources.

COMMON EMISSIONS SOURCES

POWER PLANTS

INDUSTRIAL PROCESSES

VEHICLES THAT BURN HIGH SULFUR CONTENT FUELS

PARTICULATE MATTER (PM_{10} & $PM_{2.5}$)

The health effects of particulate matter are a function of size. Coarse particulate matter (PM_{10}) primarily affects the respiratory system. Fine particulate matter ($PM_{2.5}$) can affect the respiratory system and cardiovascular system.

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 diseases.

$PM_{2.5}$ particles are microscopic solids and liquid droplets that are small enough to penetrate deep into the lungs when inhaled. 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.

The primary NAAQS is set to reduce the risk of acute and chronic health effects due to exposure to particulate matter.

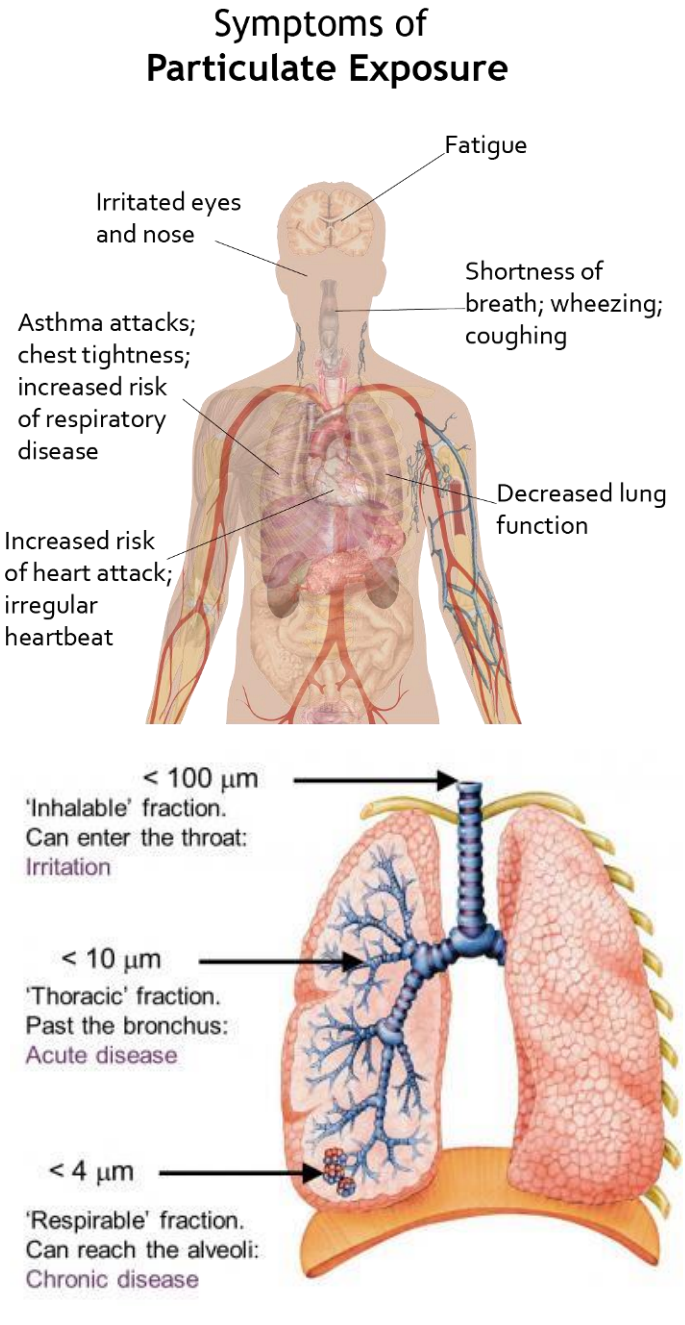


Image Credit: United States Geological Survey

WHERE DOES PM_{10} COME FROM?

PM_{10} particles originate from a variety of mobile and stationary sources, and their chemical composition varies widely. Actions that generate PM_{10} particles include grinding or crushing operations, mineral processing, agricultural operations, fuel combustion, and fires.

PM_{10} particles often settle in areas relatively near their sources.

COMMON EMISSIONS SOURCES

FIRE

VEHICLES

INDUSTRIAL PROCESSES

DUST

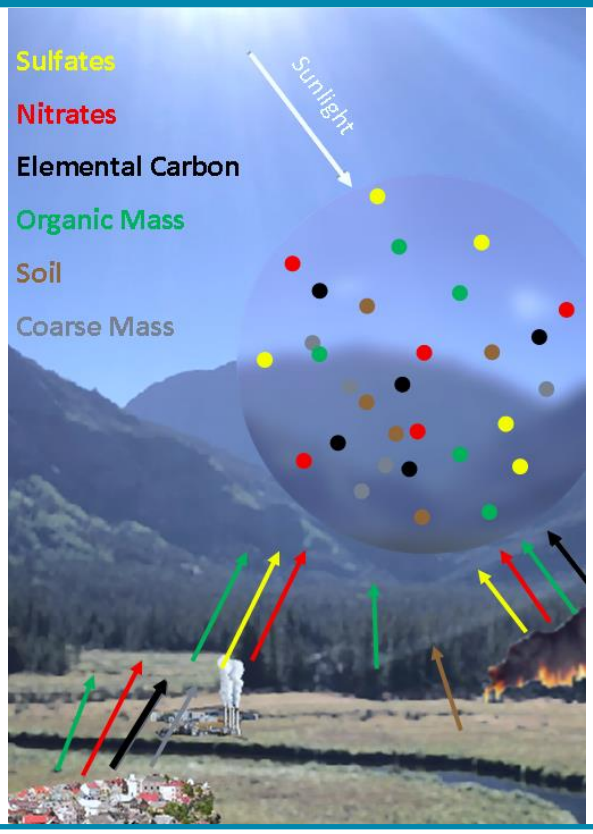
POWER PLANTS

AGRICULTURE

WHERE DOES $PM_{2.5}$ COME FROM?

PM2.5 is emitted directly from diesel engines, smelters, and other combustion sources. PM2.5 can also form in the atmosphere due to complex reactions of precursor compounds, such as SO2 and NOx. PM2.5 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.

PM2.5 particles may stay suspended in the atmosphere for long periods of time and may be transported hundreds of miles.



APPENDIX B: ARKANSAS AIR QUALITY MONITORING

INTRODUCTION

DEQ has monitored air quality in the State of Arkansas for more than thirty-five years. DEQ's air monitoring network is composed of various types of intermittent and continuous monitors that are strategically located throughout the state. Using the high-quality information provided by the monitoring network, DEQ can confirm that air quality programs in the state are adequately protecting public health and that environmental goals are being achieved.

Arkansas's ambient air quality monitoring network is used to determine attainment with the national ambient air quality standards (NAAQS) for the following criteria pollutants: ozone, particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2). Attainment is determined based on a comparison of time-weighted averages (design values) to the level of the NAAQS.

There are also two particulate matter speciation monitors in Arkansas that are part of the IMPROVE network, which tracks visibility conditions in Class I national parks and wilderness areas. In Arkansas, IMPROVE monitors are located in the Upper Buffalo Wilderness Area and the Caney Creek Wilderness Area.

POLLUTANT	NUMBER OF MONITORS	LOCATIONS
Ozone	8	Clark County Crittenden County Newton County Polk County Pulaski County[1] Washington County[2]
PM_{10}	4	Pulaski County[3] Washington County
$PM_{2.5}$	12	Arkansas County Ashley County Crittenden County Garland County[4] Jackson County Polk County Pulaski County[5] Union County Washington County
CO	1	Pulaski County
NO_2	2	Crittenden County Pulaski County
SO_2	1	Pulaski County

[1] Pulaski County contains two monitors for ozone.
[2] Washington County contains two monitors for ozone.
[3] Pulaski County contains three monitors for PM_{10}.
[4] Garland County contains two monitors for $PM_{2.5}$.
[5] Pulaski County contains three monitors for $PM_{2.5}$.

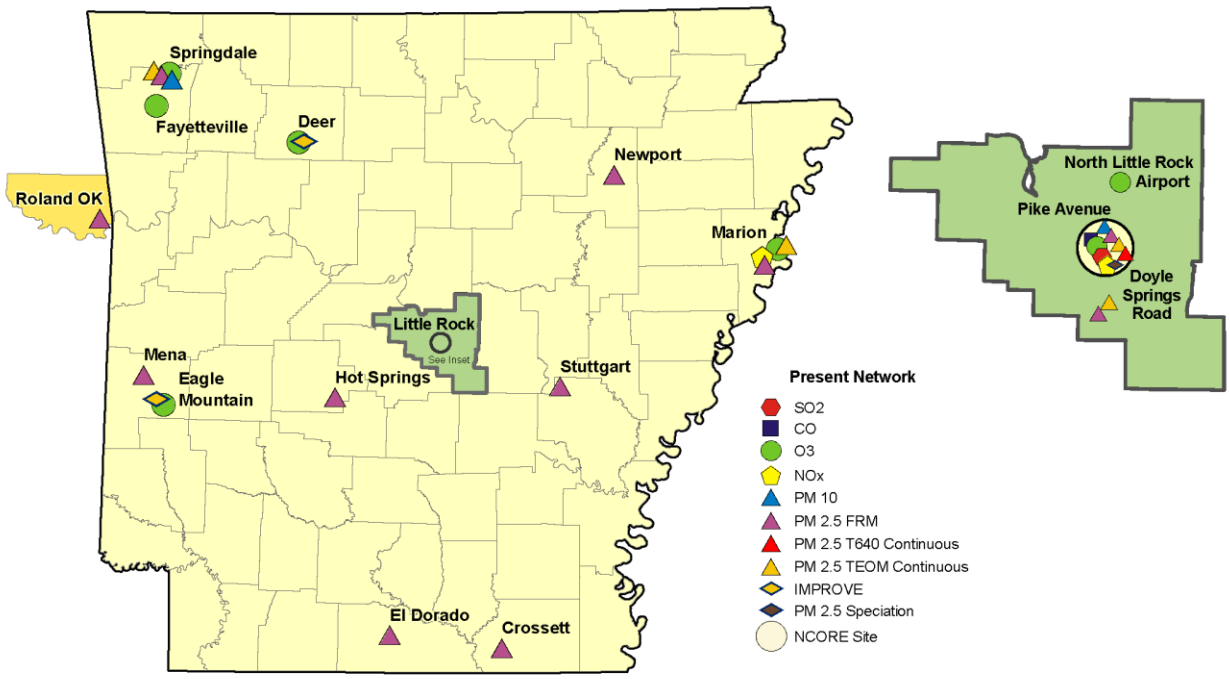
ARKANSAS AMBIENT AIR QUALITY NETWORK

Determining Locations for Ambient Air Monitors

Ambient air monitoring networks are established according to federal requirements based on total population in a metropolitan statistical area and the following factors:

1. Where the highest concentration is expected to occur in the area covered by the monitor (usually determined through modeling);
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.

FIGURE B-1: ARKANSAS AMBIENT AIR MONITORING NETWORK AS OF 2020



Periodic Review of Monitoring Network

DEQ 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 network is evaluated every five years to determine whether the current number and location of monitors meets DEQ's environmental monitoring objectives and satisfies federal monitoring requirements for each pollutant.

CARBON MONOXIDE (CO)

Arkansas is in attainment with the primary one-hour and primary eight-hour NAAQS for CO. This attainment status is based on results from the Arkansas CO ambient air monitoring network. No more than one observed ("Obs") average value can exceed the level of the standard for each CO NAAQS.

Table B-1 provides a summary of CO monitor activity for 2019. Figures B-2 and B-3 illustrate trends relative to the corresponding NAAQS.

NAAQS DESIGN VALUES

1-HOUR PRIMARY NAAQS
35 ppm,
Not to be exceeded more than once per year

8-HOUR PRIMARY NAAQS
9 ppm,
Not to be exceeded more than once per year

THERE ARE NO SECONDARY CO NAAQS

TABLE B-1: 2019 ARKANSAS CO MONITOR VALUES SUMMARY DATA

COUNTY	SITE ADDRESS	#OBS	EIGHT-HOUR AVERAGES (ppm)			ONE-HOUR AVERAGES (ppm)		
			1st Max	2nd Max	Obs > 9	1st Max	2nd Max	Obs>35
Pulaski	Pike Ave. at River Rd., North Little Rock	8698	1.3	1.2	0	2.6	2	0

ARKANSAS CO MONITORS

Method
Instrumental/Nondispersive Infrared Photometry

Data Interval
Hourly

Units
Parts per million (ppm)

FIGURE B-2: SECOND HIGHEST OBSERVED 1-HOUR AVERAGE CO CONCENTRATIONS BETWEEN 2010 AND 2019

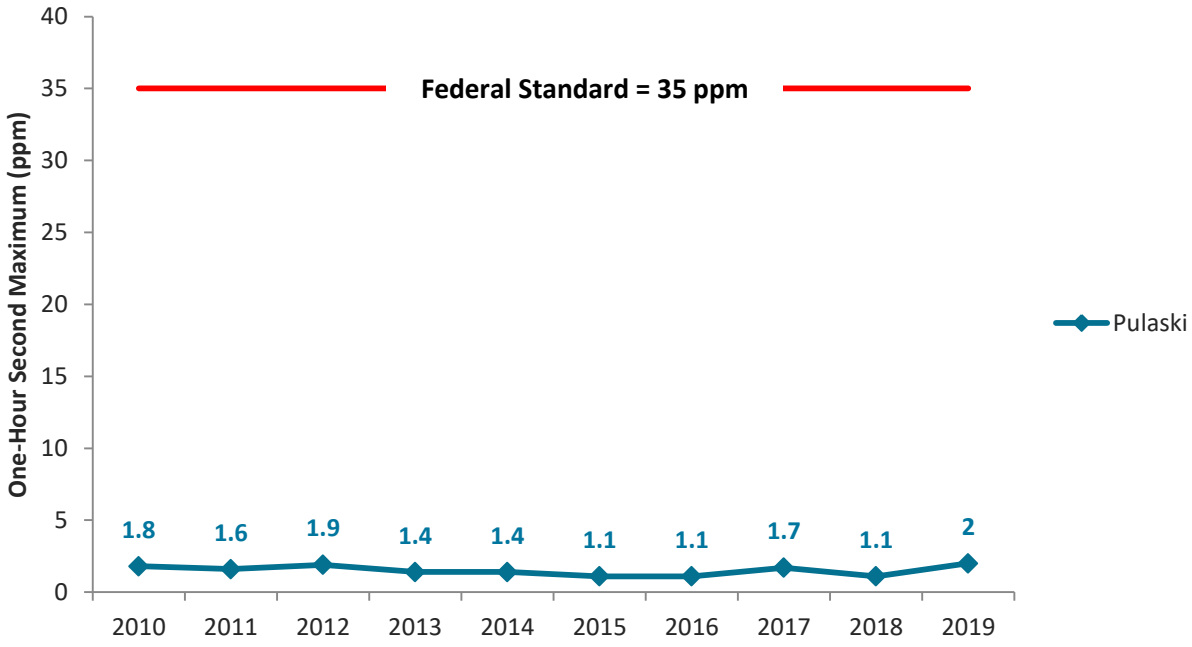
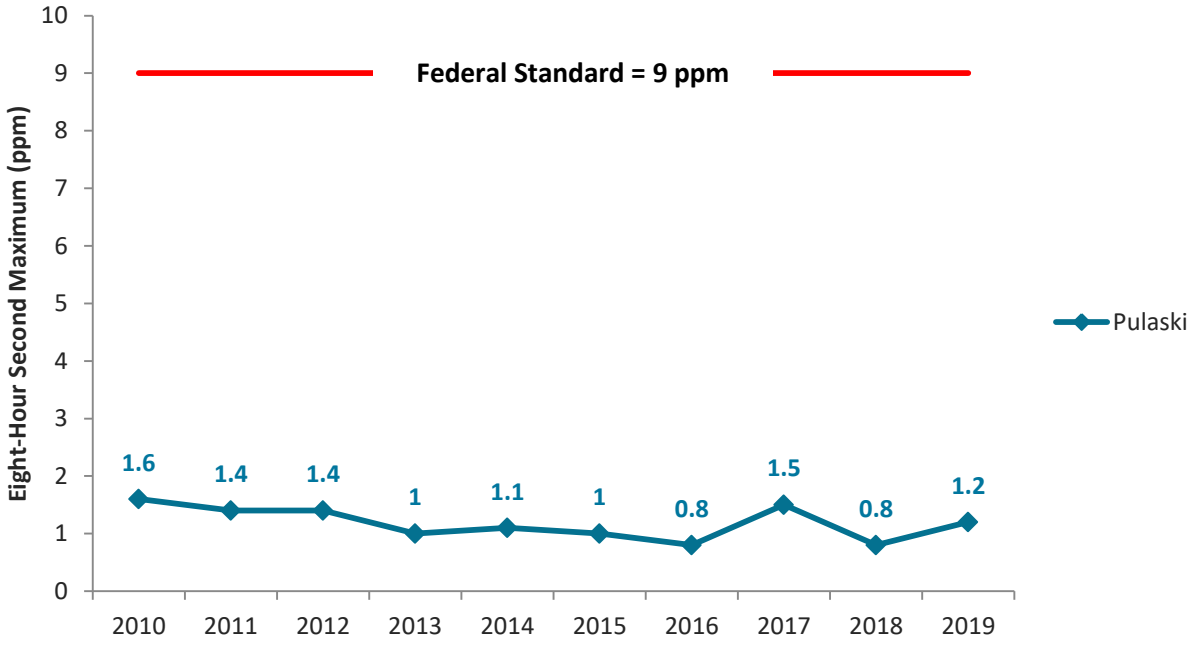


FIGURE B-3: SECOND HIGHEST OBSERVED 8-HOUR AVERAGE CO CONCENTRATIONS BETWEEN 2010 AND 2019



NITROGEN DIOXIDE (NO_2)

Arkansas is in attainment with all NO_2 NAAQS. This attainment status is based on results from the Arkansas NO_2 ambient air monitoring network. Design values are based on time-weighted averages of monitor data.

Table B-2 provides a summary of NO_2 monitor activity for 2019. Figures B-4 and B-5 illustrate trends over the past ten years in nitrogen dioxide design values relative to the corresponding NAAQS.

NAAQS DESIGN VALUES

1-HOUR PRIMARY NAAQS

100 ppb,
98th percentile of 1-hour daily maximum concentrations over three years

ANNUAL PRIMARY AND SECONDARY NAAQS

53 ppb,
Annual mean

TABLE B-2: 2019 ARKANSAS NO_2 MONITOR VALUES SUMMARY DATA

COUNTY	SITE ADDRESS	#OBS	98TH PERCENTILE 1-HOUR AVERAGE (ppb)	ANNUAL MEAN (ppb)
Pulaski	Pike Ave. at River Rd., North Little Rock	8468	40	7.56
Crittenden	L.H. Polk St. and Colonial Dr., Marion	8717	38	7.86

ARKANSAS NO_2 MONITORS

Method
Instrumental/Gas-Phase Chemiluminescence

Data Interval
Hourly

Units
Parts per billion (ppb)

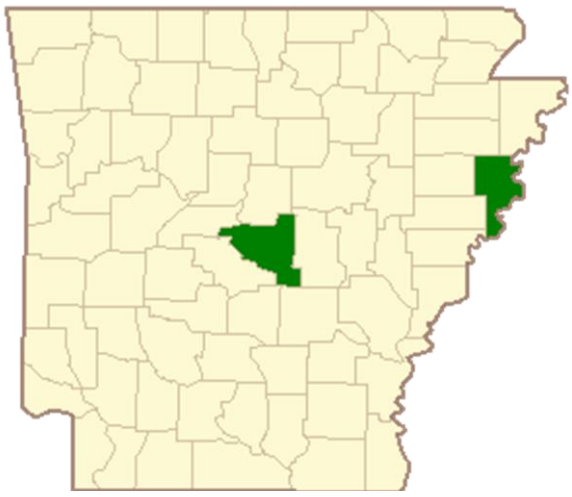


FIGURE B-4: ANNUAL NITROGEN DIOXIDE DESIGN VALUES BETWEEN 2010 AND 2019

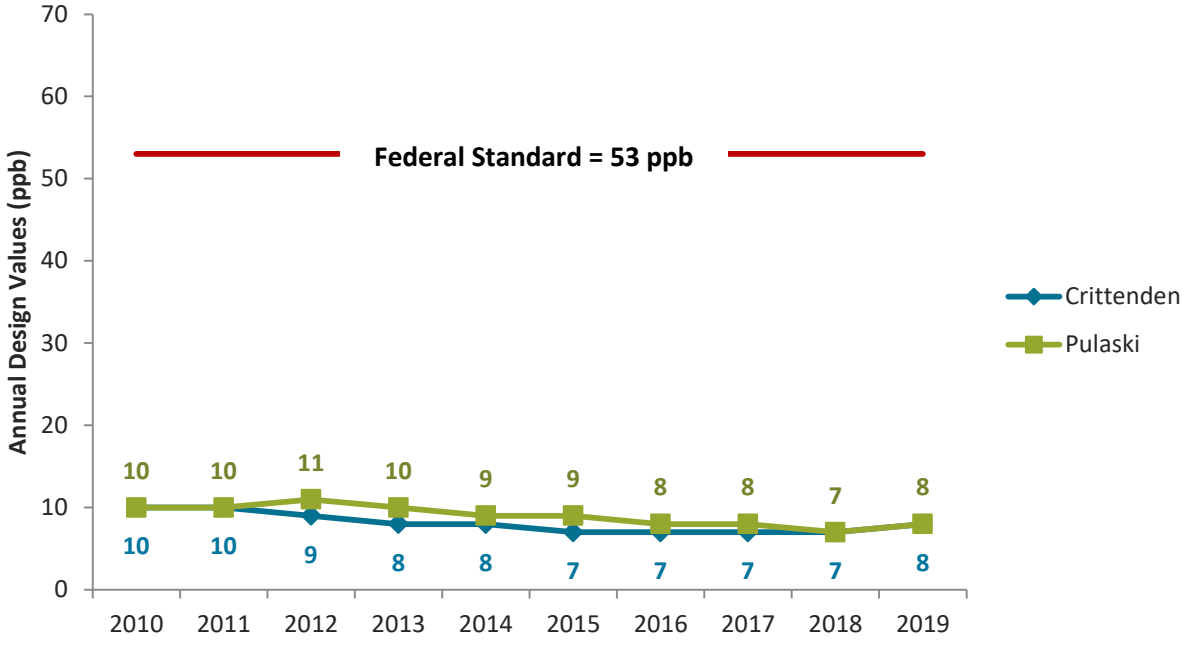
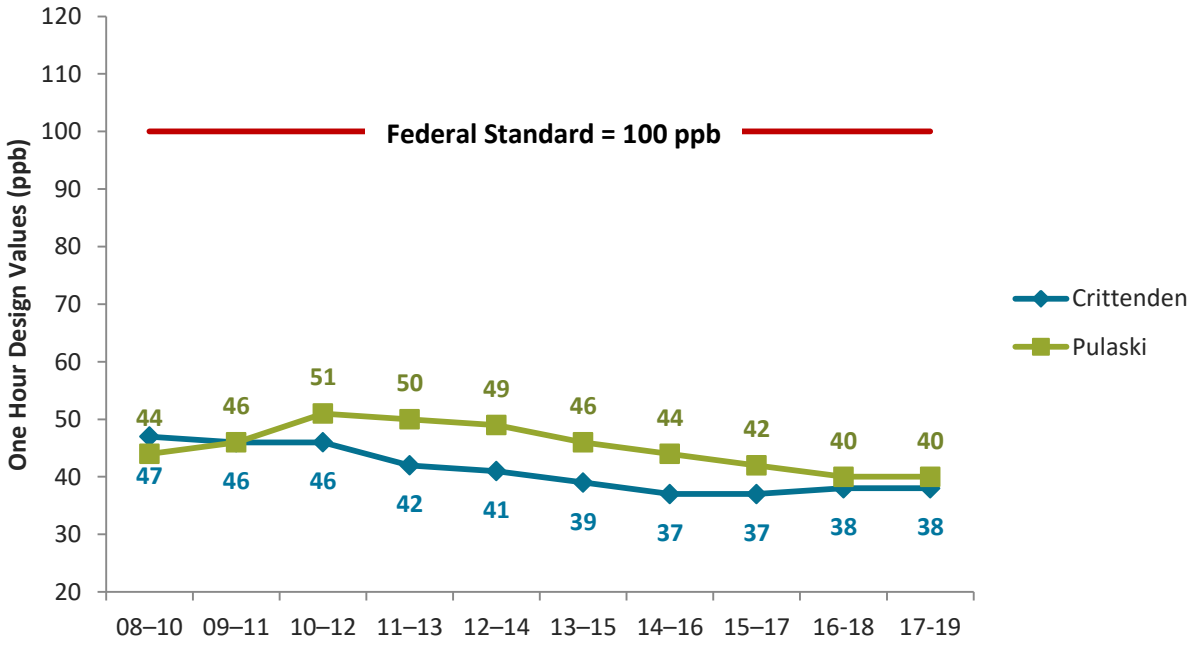


FIGURE B-5: 1-HOUR NITROGEN DIOXIDE DESIGN VALUES BETWEEN 2010 AND 2019



OZONE (O_3)

Arkansas is in attainment with the ozone NAAQS. This attainment status is based on data generated by the Arkansas ozone ambient air monitoring network. Design values are based on time-weighted averages of monitor data. The level of the NAAQS changed from 75 ppb to 70 ppb in 2015.

Table B-3 provides a summary of ozone monitor activity for 2019. Figure B-6 illustrates trends over the past ten years in ozone design values relative to the NAAQS in effect for that year.

NAAQS DESIGN VALUES

8-HOUR PRIMARY AND SECONDARY NAAQS

70 ppb (0.070 ppm),
Annual 4th highest daily maximum 8-hour concentration averaged over 3 years

TABLE B-3: 2019 ARKANSAS OZONE MONITOR VALUES SUMMARY DATA

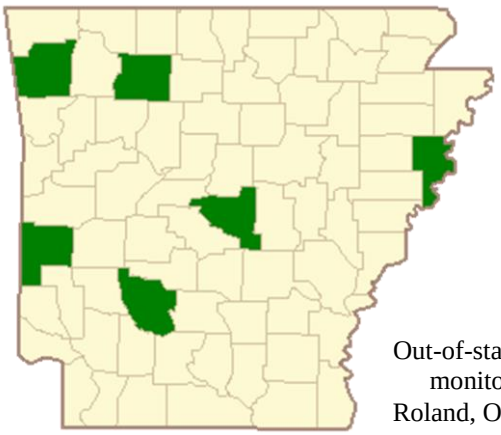
COUNTY	SITE ADDRESS	VALID DAYS	DAILY MAXIMUM 8-HOUR AVERAGE	
			4TH HIGHEST DAILY MAX (ppm)	OBS>0.070 ppm
Clark	Lower Lake Recreation Area, Caddo Valley	268	0.057	0
Crittenden	L.H. Polk and Colonial Dr., Marion	274	0.064	1
Newton	Hwy. 16	275	0.058	0
Polk	463 Polk 631, Mena	268	0.062	1
Pulaski	Pike Ave. at River Rd., North Little Rock	364	0.057	0
Pulaski	Remount Rd., North Little Rock	274	0.06	0
Washington	600 South Old Missouri Rd., Springdale	275	0.061	0
Washington	429 Ernest Lancaster Dr., Fayetteville	270	0.06	0

ARKANSAS OZONE MONITORS

Method
Ultra-Violet Photometry

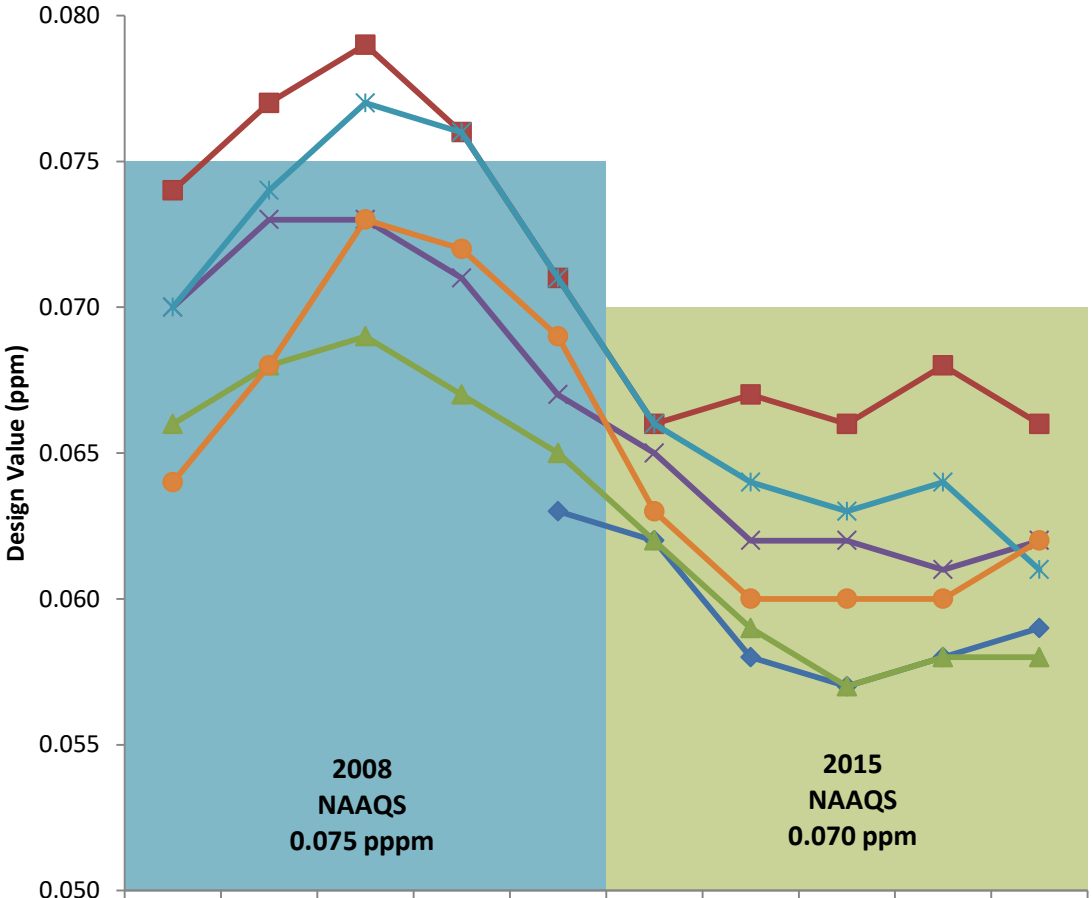
Data Interval
Hourly

Units
Parts per million (ppm)



Out-of-state monitor: Roland, OK

FIGURE B-6: 8-HOUR OZONE DESIGN VALUES BETWEEN 2010 AND 2019



	08–10	09–11	10–12	11–13	12–14	13–15	14–16	15–17	16-18	17-19
2008 NAAQS	0.075	0.075	0.075	0.075	0.075					
2015 NAAQS						0.07	0.07	0.07	0.07	0.07
Clark					0.063	0.062	0.058	0.057	0.058	0.059
Crittenden	0.074	0.077	0.079	0.076	0.071	0.066	0.067	0.066	0.068	0.066
Newton	0.066	0.068	0.069	0.067	0.065	0.062	0.059	0.057	0.058	0.058
Polk	0.07	0.073	0.073	0.071	0.067	0.065	0.062	0.062	0.061	0.062
Pulaski	0.07	0.074	0.077	0.076	0.071	0.066	0.064	0.063	0.064	0.061
Washington	0.064	0.068	0.073	0.072	0.069	0.063	0.06	0.06	0.06	0.062

SULFUR DIOXIDE (SO_2)

All areas of Arkansas are designated attainment, attainment/unclassifiable, or unclassifiable with all SO_2 NAAQS. There are no SO_2 nonattainment areas in Arkansas. Attainment status is based on results from the Arkansas SO_2 ambient air monitoring network and SO_2 designations modeling. DEQ operates one monitor at the NCORE site in Pulaski County. DEQ previously monitored SO_2 in Union County, along with Pulaski County. However, the Union County monitor was removed in 2017 because its continued operation was no longer necessary to fulfill state or federal air quality monitoring requirements.

Table B-4 provides a summary of SO_2 monitor activity for 2019. Figure B-7 illustrates the trend over the past ten years in SO_2 design values relative to the primary NAAQS.

NAAQS DESIGN VALUES

1-HOUR PRIMARY NAAQS
75 ppb,
99th percentile of 1-hour daily maximum concentrations averaged over 3 years

3-HOUR SECONDARY NAAQS
0.5 ppm,
Not to be exceeded more than once per year

TABLE B-4: 2019 ARKANSAS SO_2 MONITOR VALUES SUMMARY DATA

COUNTY	SITE ADDRESS	#OBS	99TH PERCENTILE (ppb)
Pulaski	Pike Ave. at River Rd., North Little Rock	8714	13

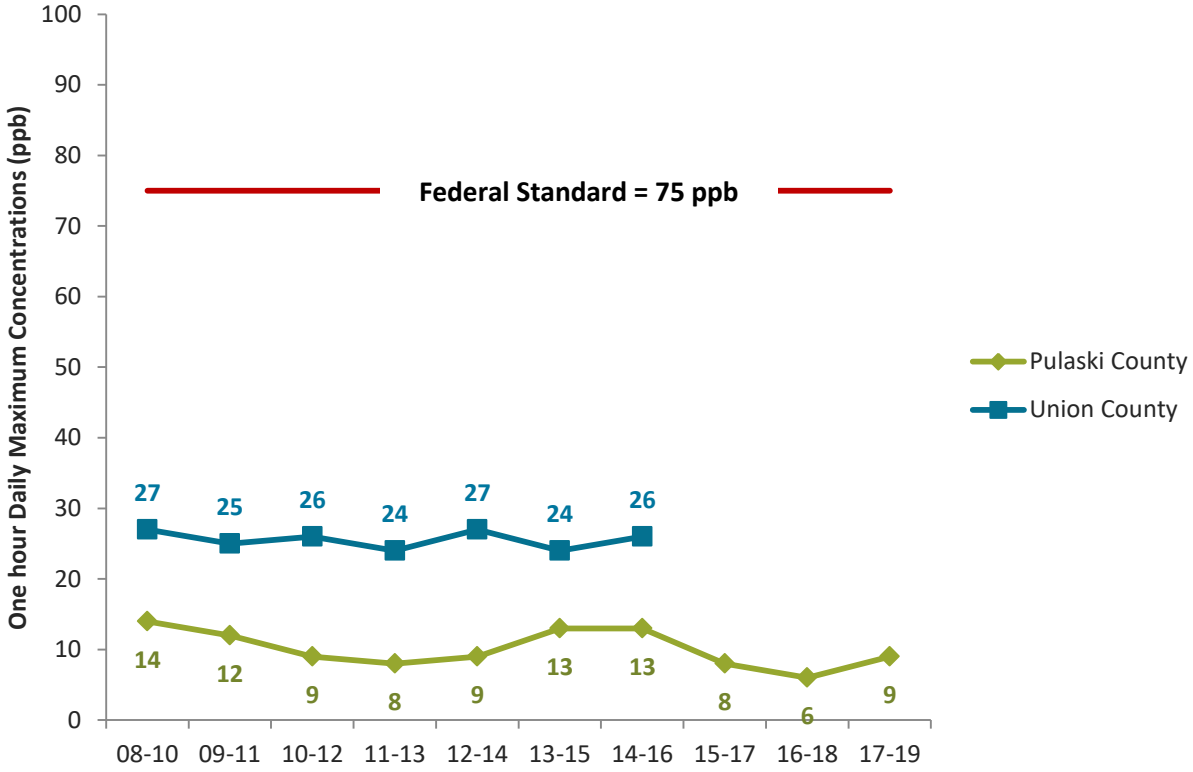
ARKANSAS SO_2 MONITORS

Method
Instrumental/Nondispersive Infrared Photometry

Data Interval
Hourly

Units
Parts per million (ppm)

FIGURE B-7: 1-HOUR SO_2 DESIGN VALUES BETWEEN 2010 AND 2019



COARSE PARTICULATE MATTER (PM_{10})

Arkansas is in attainment with the PM_{10} NAAQS. This attainment status is based on results from the Arkansas PM_{10} ambient air monitoring network.

Table B-5 provides a summary of PM_{10} monitor activity for 2019. Figure B-8 illustrates trends over the past ten years in maximum PM_{10} twenty-four hour concentrations relative to the PM_{10} NAAQS.

NAAQS DESIGN VALUES

24-HOUR PRIMARY AND SECONDARY NAAQS

150 µg/m^3,

Not to be exceeded more than once per year on average over 3 years

TABLE B-5: 2019 ARKANSAS PM_{10} MONITOR VALUES SUMMARY DATA

COUNTY	SITE ADDRESS	VALID DAYS	DAILY MAXIMUM AVERAGE (µg/m^3)		DAYS > 150
			1ST MAX	2ND MAX	
Pulaski	Pike Ave. at River Rd., North Little Rock	61	40	36	0
Pulaski	Pike Ave. at River Rd., North Little Rock	29	41	28	0
Pulaski	Remount Rd., North Little Rock	61	42	38	0
Washington	600 South Old Missouri Rd.	61	37	26	0

ARKANSAS PM_{10} MONITORS

Method
Gravimetric

Data Interval
24 Hour

Units
Micrograms per cubic meter (µg/m^3)

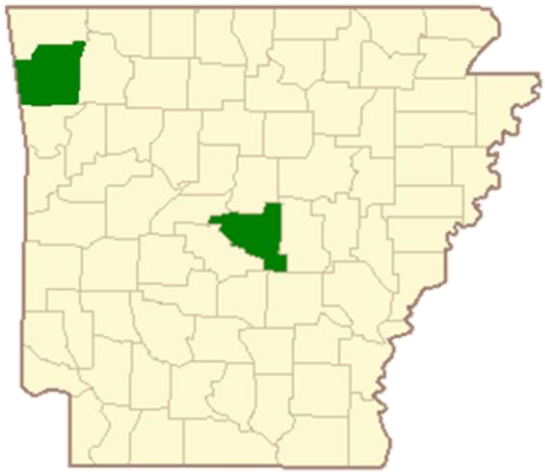
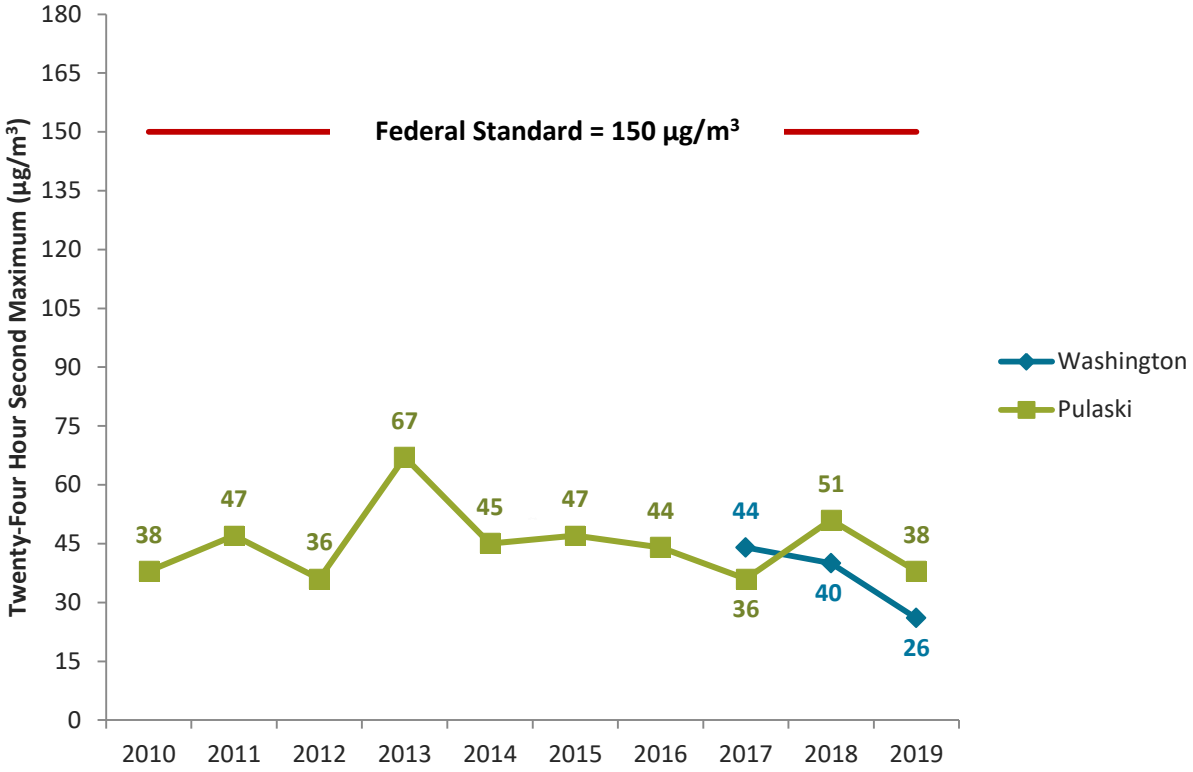


FIGURE B-8: 24-HOUR HOUR MAXIMUM PM_{10} CONCENTRATIONS BETWEEN 2010 AND 2019



FINE PARTICULATE MATTER ($PM_{2.5}$)

Arkansas is in attainment with all $PM_{2.5}$ NAAQS. This attainment status is based on monitored concentrations from the Arkansas $PM_{2.5}$ ambient air monitoring network. The $PM_{2.5}$ NAAQS are based on time-weighted averages. EPA revised the level of the annual primary NAAQS from 15 µg/m^3 to 12 µg/m^3 in 2012.

Table B-6 provides a summary of $PM_{2.5}$ monitor activity for 2019. Figures B-9 and B-10 illustrate trends over the past ten years in $PM_{2.5}$ design values relative to the corresponding, concurrent primary NAAQS.

NAAQS DESIGN VALUES

ANNUAL PRIMARY NAAQS
12 µg/m^3,
Annual mean averaged over 3 years

ANNUAL SECONDARY NAAQS
15 µg/m^3,
Annual mean averaged over 3 years

24-HOUR PRIMARY AND SECONDARY NAAQS
35 µg/m^3,
98th percentile averaged over 3 years

TABLE B-6: 2019 ARKANSAS $PM_{2.5}$ MONITOR VALUES SUMMARY DATA

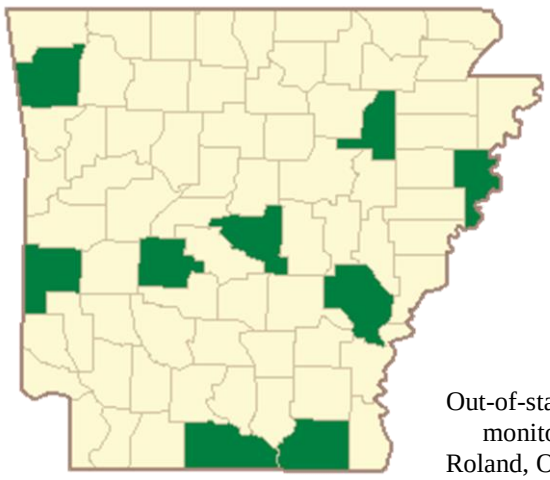
COUNTY	SITE ADDRESS	# OBS	98TH PERCENTILE 24-HOUR (µg/m^3)	ANNUAL MEAN (µg/m^3)
Arkansas	1703 North Beurkle – Hwy. 63, Stuttgart	118	19	7.9
Ashley	1015 Unity Rd., Crossett	120	17	8.2
Crittenden	L.H. Polk and Colonial Dr., Marion	119	18	8.3
Garland	300 Werner St., Hot Springs	121	20	8.8
Garland	300 Werner St., Hot Springs	29	16	8.8
Jackson	7648 Victory Blvd., Newport	117	22	8.2
Polk	Hornbeck Rd., Mena	120	17	8.6
Pulaski	Pike Ave. at River Rd., North Little Rock	358	19	9.5
Pulaski	Pike Ave. at River Rd., North Little Rock	29	23	9.9
Pulaski	Doyle Springs Rd., Little Rock	118	24	10.3
Union	Union Memorial Hospital, El Dorado	120	19	9
Washington	600 South Old Missouri Rd., Springdale	120	19	8

ARKANSAS $PM_{2.5}$ MONITORS

Method
Gravimetric

Data Interval
24 Hour

Units
Micrograms per cubic meter (µg/m^3)



Out-of-state monitor: Roland, OK

FIGURE B-9: 24-HOUR $PM_{2.5}$ DESIGN VALUES BETWEEN 2010 AND 2019

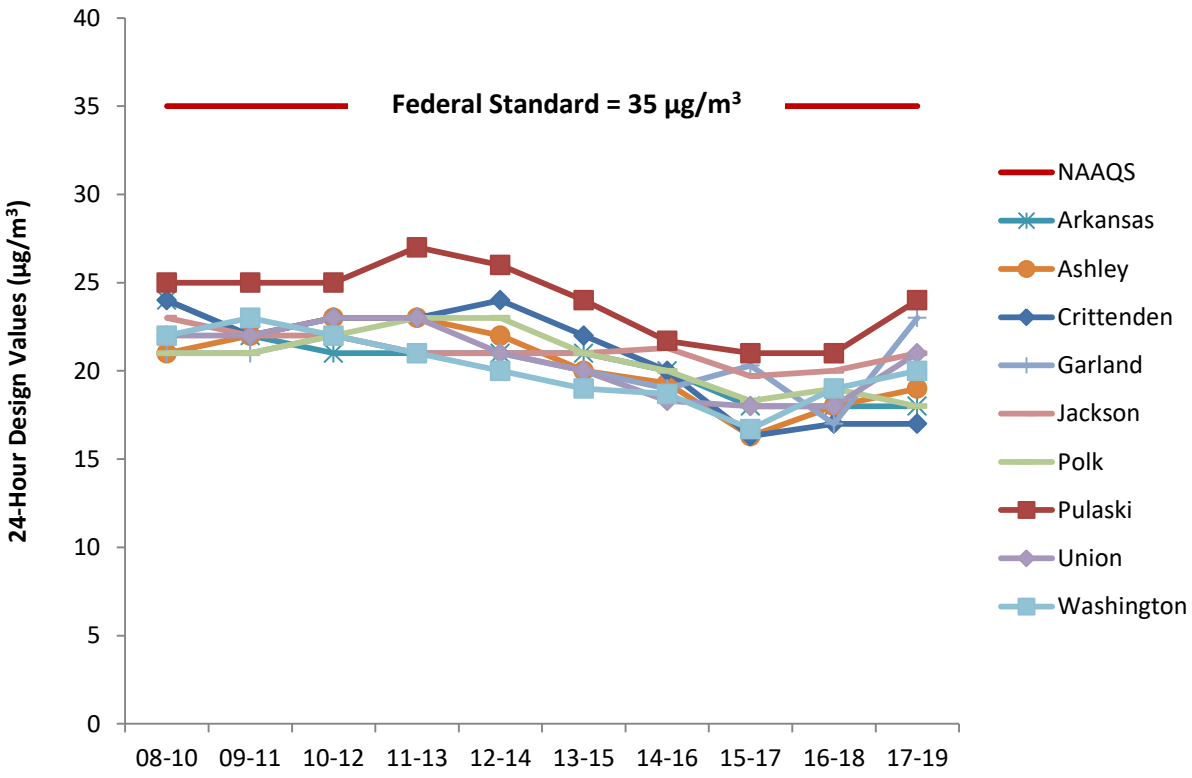
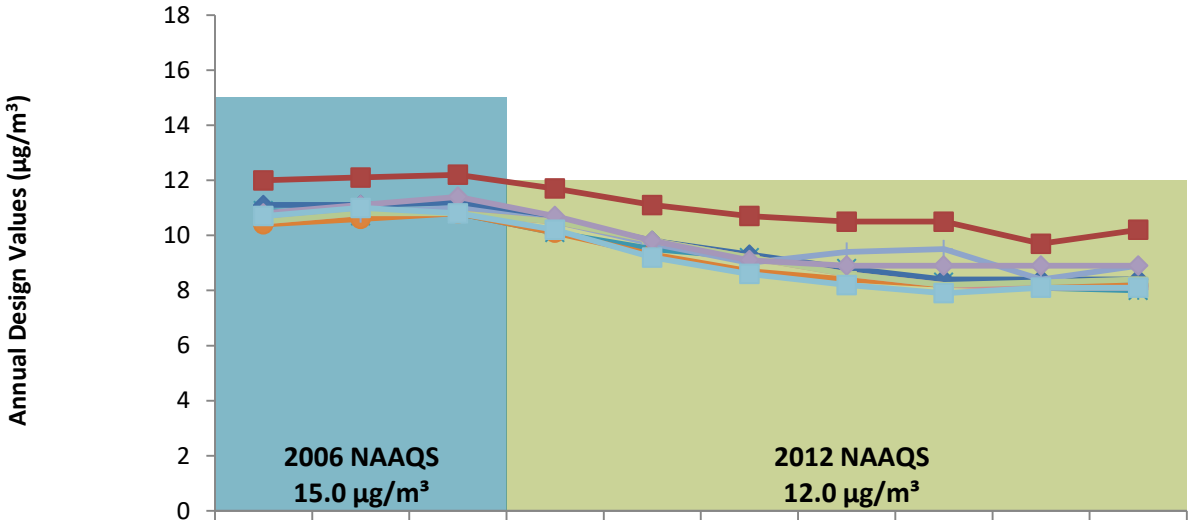


TABLE B-7: 24-HOUR $PM_{2.5}$ DESIGN VALUES BETWEEN 2010 AND 2019

County	08-10	09-11	10-12	11-13	12-14	13-15	14-16	15-17	16-18	17-19
Arkansas	24	22	21	21	21	21	20	18	18	18
Ashley	21	22	23	23	22	20	19.3	16.3	18	19
Crittenden	24	22	23	23	24	22	20	16.3	17	17
Garland	21	21	22	21	21	20	19	20.3	17	23
Jackson	23	22	22	21	21	21	21.3	19.7	20	21
Polk	21	21	22	23	23	21	20	18.3	19	18
Pulaski	25	25	25	27	26	24	21.7	21	21	24
Union	22	22	23	23	21	20	18.3	18	18	21
Washington	22	23	22	21	20	19	18.7	16.7	19	20

FIGURE B-10: ANNUAL $PM_{2.5}$ DESIGN VALUES BETWEEN 2010 AND 2019



	08-10	09-11	10-12	11-13	12-14	13-15	14-16	15-17	16-18	17-19
<NAAQS				12	12	12	12	12	12	12
<NAAQS	15	15	15							
Arkansas	10.9	10.7	10.8	10.1	9.5	9.2	8.8	8.3	8.1	8
Ashley	10.4	10.6	10.8	10.1	9.3	8.7	8.4	8.2	8.2	8.2
Crittenden	11.1	11.1	11.2	10.6	9.8	9.3	8.8	8.4	8.4	8.4
Garland	10.7	10.8	11	10.5	9.7	9	9.4	9.5	8.4	8.9
Jackson	10.5	10.8	10.8	10.5	9.8	9.2	8.6	8.2	8.1	8.1
Polk	10.5	10.8	10.8	10.5	9.8	9.2	8.6	8.2	8.3	8.4
Pulaski	12	12.1	12.2	11.7	11.1	10.7	10.5	10.5	9.7	10.2
Union	10.8	11.1	11.4	10.7	9.8	9.1	8.9	8.9	8.9	8.9
Washington	10.7	11	10.8	10.2	9.2	8.6	8.2	7.9	8.1	8.1

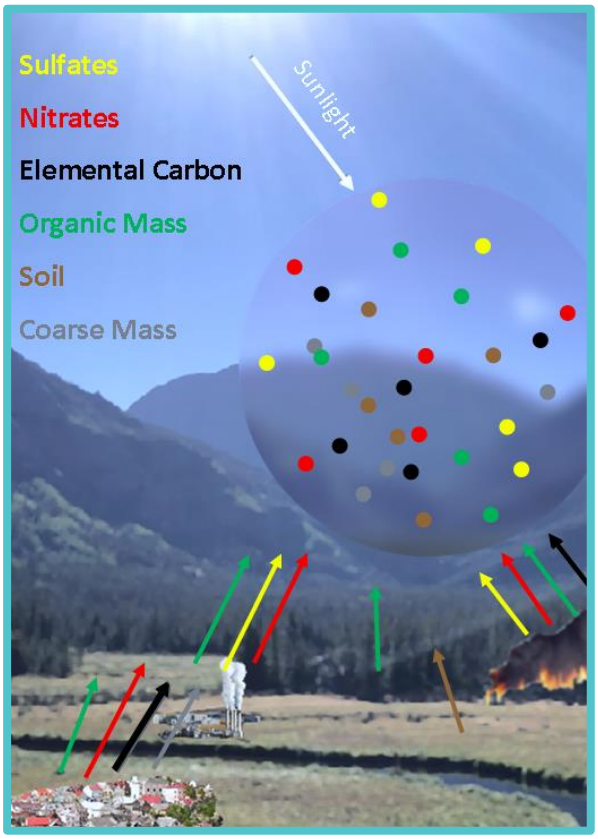
VISIBILITY CONDITIONS MONITORING IN PROTECTED AREAS

Regional Haze

The Clean Air Act mandates that the states and federal partners work to restore natural visibility conditions in designated Class I areas and prevent future visibility impairment. There are 156 Class I areas, which include national parks, wildlife refuges, and wilderness areas. States, EPA, and federal land managers are charged to work together to monitor and address visibility impairment from anthropogenic sources.

The Regional Haze Program was established by the EPA pursuant to this Clean Air Act mandate. Under the Regional Haze regulations, states must develop successive plans covering ten year periods with the goal of achieving natural visibility conditions at designated Class I areas by 2064.

DEQ is the lead agency in Arkansas for implementing a strategy to reduce haze at Arkansas Class I areas.



Interagency Monitoring of Protected Visual Environments (IMPROVE) Network

The IMPROVE network is a long-term monitoring program that tracks changes in visibility. The IMPROVE monitors are capable of speciation of haze-causing pollutants so that the causal mechanism of visibility impairment in each Class I area can be determined.

There are two IMPROVE monitors in Arkansas: one near the Caney Creek Wilderness Area and the other in the Upper Buffalo Wilderness Area.

IMAGE CREDIT: U.S. FOREST SERVICE
CANEY CREEK IMPROVE MONITOR (CACR1)

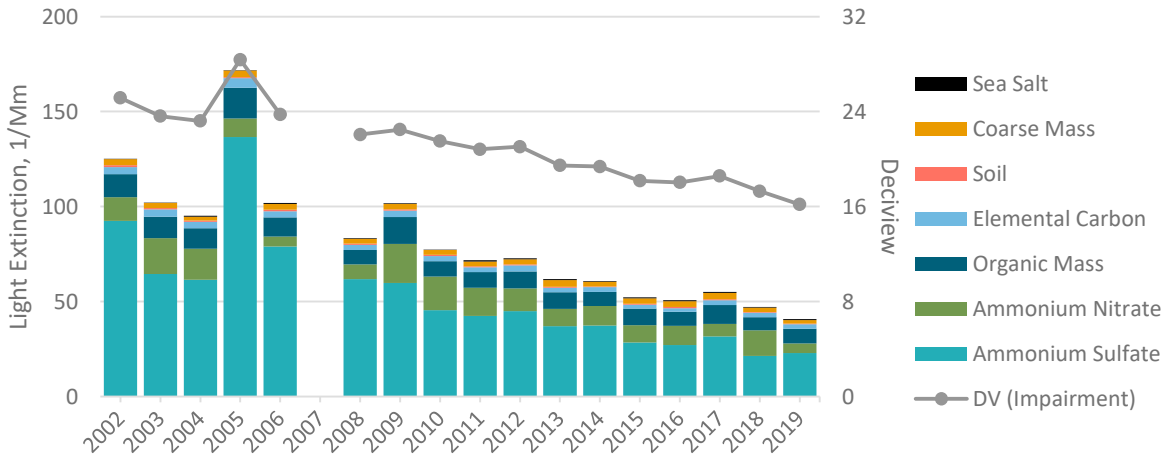
Caney Creek Wilderness Area

The Caney Creek Wilderness includes 14,460 acres of forested area, streams, and hiking trails.[6] It is located in the Ouachita National Forest in southwest Arkansas. Caney Creek supports multiple recreational activities including hiking, horse riding, and camping.

Visibility impairment on the most impaired days has decreased over time at Caney Creek concurrent with reductions in emissions of visibility impairing pollutants. Figure B-11 illustrates how a vista at Caney Creek Wilderness would look during the most impaired days in 2002 (left), 2019 (center), and under natural conditions (right). The improvement between the center image and the left image shows how the visibility has improved over time on the most impaired days. Figure B-12 shows trends in extinction composition on the most impaired days at the Caney Creek Monitor.

FIGURE B-11: CANEY CREEK WILDERNESS WINHAZE VISUALIZATION TWENTY PERCENT MOST IMPAIRED: 2002, 2017, AND NATURAL CONDITIONS

FIGURE B-12: ANNUAL EXTINCTION COMPOSITION, MOST IMPAIRED DAYS AT CANEY CREEK, 2002–2019



[6] U.S. National Forest Service, https://www.fs.usda.gov/recarea/ouachita/recarea/?recid=10792

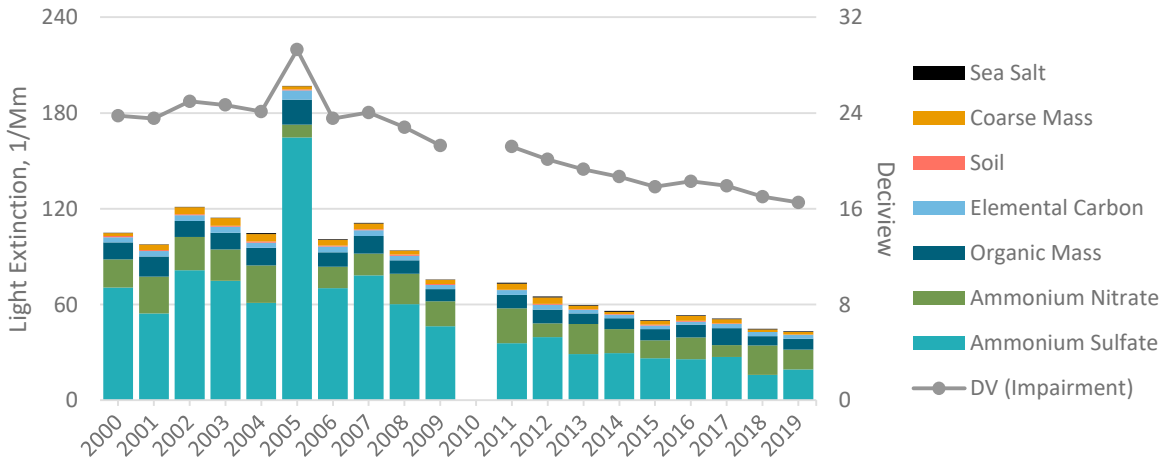
Upper Buffalo Wilderness Area

The Upper Buffalo Wilderness Area, located in Northwest Arkansas, includes 12,000 acres of forested area, streams, hiking trails, and the Buffalo National River. The Upper Buffalo Wilderness Area supports multiple recreational activities including camping, kayaking and canoeing, fishing, hiking, and hunting.

Visibility impairment on the most impaired days has decreased over time at Upper Buffalo concurrent with reductions in emissions of visibility impairing pollutants. Figure B-13 illustrates how a vista at Upper Buffalo Wilderness Area would look during the most impaired days in 2002 (left), 2019 (center), and under natural conditions (right). The improvement between the center image and the left image shows how the visibility has improved over time on the most impaired days. Figure B-14 shows trends in extinction composition on the most impaired days at the Upper Buffalo monitor.

FIGURE B-13: UPPER BUFFALO WILDERNESS WINHAZE VISUALIZATION TWENTY PERCENT MOST IMPAIRED: 2000, 2019, AND NATURAL CONDITIONS

FIGURE B-14: ANNUAL EXTINCTION COMPOSITION, MOST IMPAIRED DAYS AT UPPER BUFFALO, 2000–2019



APPENDIX C: ARKANSAS EMISSIONS INVENTORY

INTRODUCTION

Every three years, the United States Environmental Protection Agency (EPA), in collaboration with the states, collects data on criteria pollutant emissions. EPA publishes the data in the National Emissions Inventory (NEI), which provides information about the estimated emissions of criteria pollutants and their precursors from various source categories. The Division of Environmental Quality (DEQ) 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.

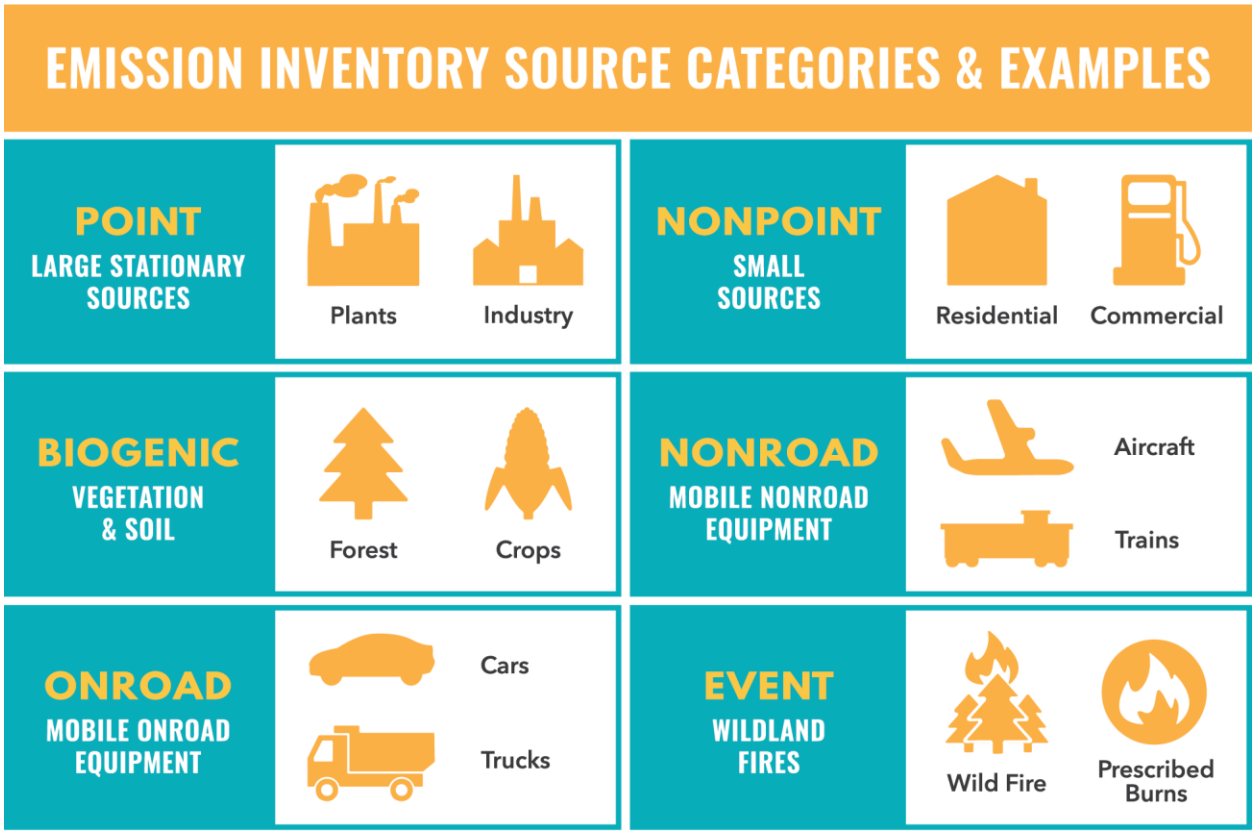
ANTHROPOGENIC VERSUS NATURAL

ANTHROPOGENIC EMISSION SOURCES

Anthropogenic emissions are a result of human activities. Emission sources in the following categories are anthropogenic: point, onroad, and nonroad. Most nonpoint sources, with the exception of biogenic sources are also anthropogenic.

NATURAL EMISSION SOURCES

Natural emission sources include event sources and biogenic sources in the nonpoint source category. There is some disagreement as to whether prescribed burns, which fall in the Event category, should be considered anthropogenic.



TRENDS IN ANTHROPOGENIC NITROGEN OXIDES EMISSIONS

Nitrogen oxides (NOx) are precursors for multiple criteria pollutants including ozone and fine particulate matter ($PM_{2.5}$). Nitrogen dioxide (NO_2) is a nitrogen oxide and a criteria pollutant.

In the 2017 Arkansas emission inventory, 81% of NOx was emitted by anthropogenic sources, 13% was emitted from biogenic sources, and 6% was emitted from event sources, such as wildfires and prescribed fires. Point sources and onroad sources contribute the most to anthropogenic emissions of NOx.

Overall, anthropogenic NOx emissions in Arkansas decreased by 61,142 tons between 2008 and 2017. NOx emissions decreased from all anthropogenic source categories between 2008 and 2017. Point sources and onroad sources dramatically decreased their NOx emissions during this time with a 34% reduction and a 39% reduction, respectively.

FIGURE C-1: 2017 NOx EMISSIONS IN ARKANSAS (ALL SOURCES)[7]

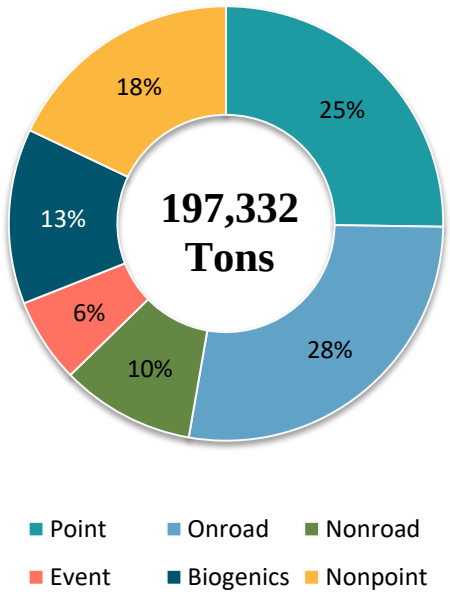
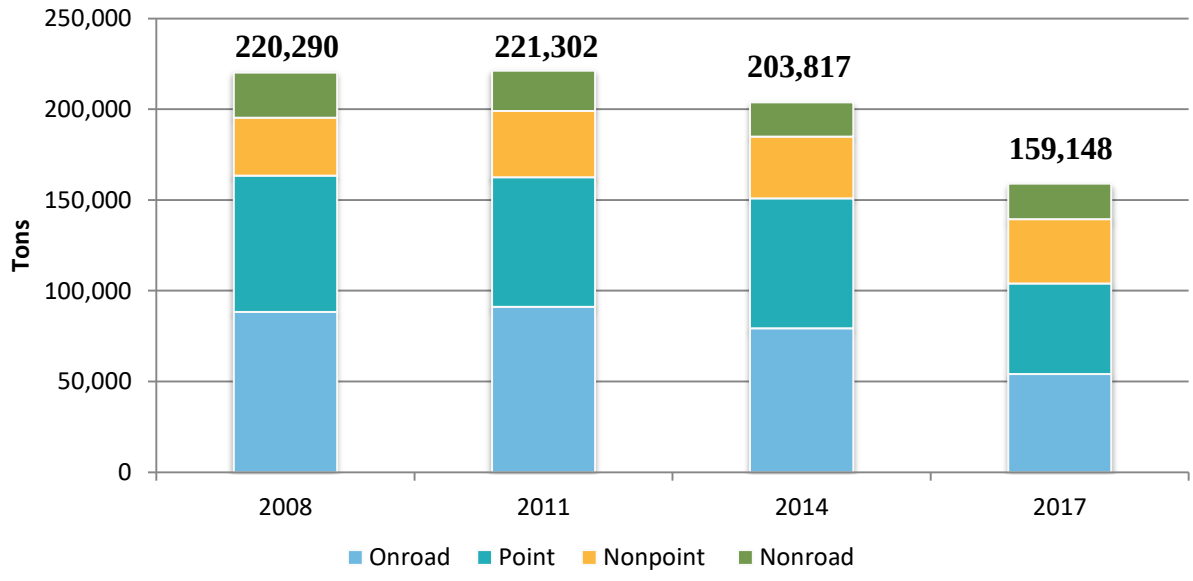


FIGURE C-2: NOX EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[8]



[7] Data sets: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[8] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020, 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC VOLATILE ORGANIC COMPOUNDS EMISSIONS

Volatile organic compounds (VOCs) are precursors for multiple criteria pollutants including ozone and fine particulate matter ($PM_{2.5}$).

In the 2017 Arkansas emission inventory, 9% of VOCs were emitted by anthropogenic sources, 79% were emitted by biogenic sources, and 12% were emitted by event sources, such as wildfires and prescribed fires.

Overall, anthropogenic VOC emissions in Arkansas decreased by 47,403 tons between 2008 and 2017. VOC emissions decreased from all anthropogenic source categories in Arkansas during this period.

FIGURE C-3: 2017 VOC EMISSIONS IN ARKANSAS (ALL SOURCES)[9]

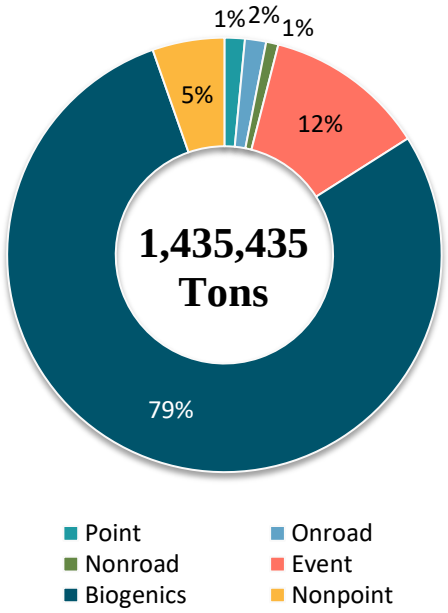
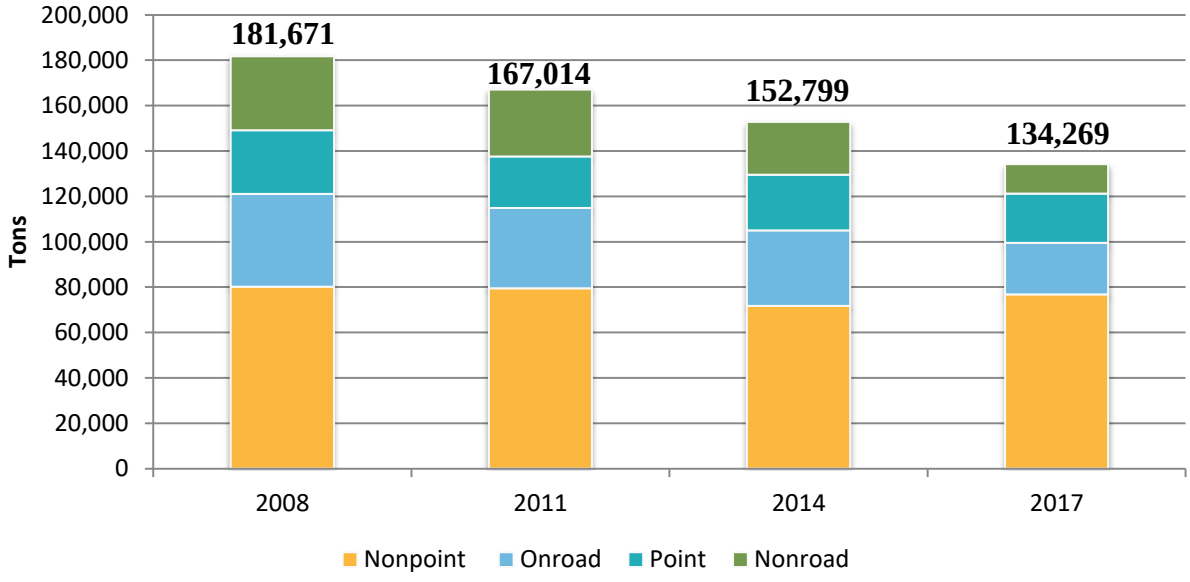


FIGURE C-4: VOC EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[10]



[9] Data set: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[10] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020, and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC CARBON MONOXIDE EMISSIONS

Carbon monoxide (CO) is a criteria pollutant and precursor to ozone.

In the 2017 Arkansas emission inventory, 39% of CO was emitted by anthropogenic sources, 8% by biogenic sources, and 53% by event sources, such as wildfires and prescribed fires.

Overall, anthropogenic CO emissions in Arkansas decreased by 299,890 tons between 2008 and 2017. CO emissions decreased from the two largest anthropogenic source categories, onroad and nonroad, by 47% and 40%, respectively. Annual CO emissions increased for nonpoint sources, which makeup approximately 9% of the Arkansas CO emission inventory.

FIGURE C-5: 2017 CO EMISSIONS IN ARKANSAS (ALL SOURCES)[11]

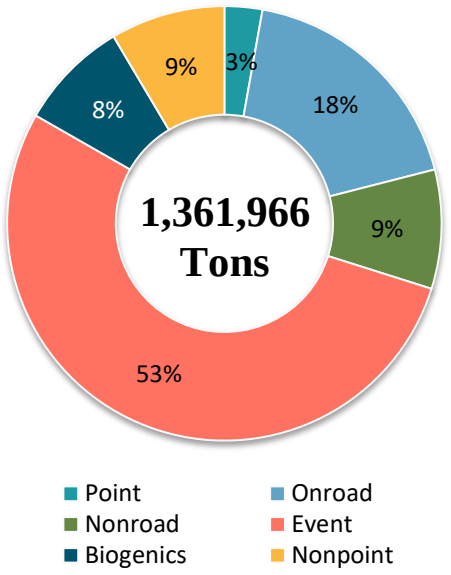
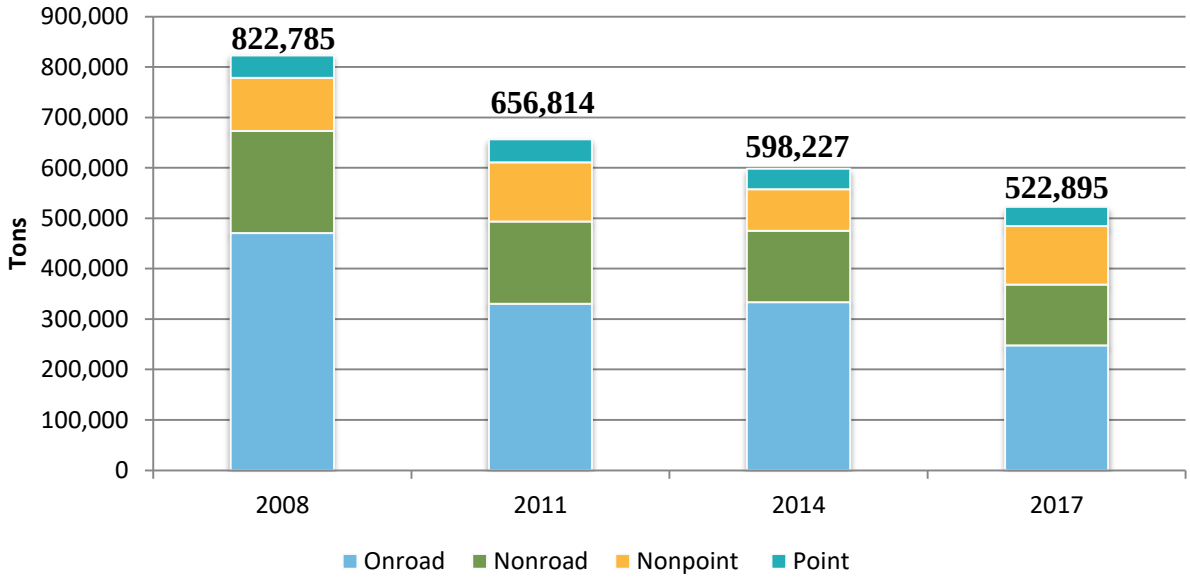


FIGURE C-6: CO EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[12]



[11] Data set: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[12] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020, and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC SULFUR DIOXIDE EMISSIONS

Sulfur dioxide (SO_2) is a criteria pollutant and a precursor to fine particulate matter ($PM_{2.5}$)

In the 2017 Arkansas emission inventory, 90% of SO_2 was emitted by anthropogenic sources, which is primarily composed of point sources (86%). Ten percent was emitted from event sources, which include wildfires and prescribed fires.

Overall, anthropogenic SO_2 emissions in Arkansas decreased by 32,331 tons between 2008 and 2017. SO_2 decreased from point, onroad and nonroad sources.

SO_2 from nonpoint sources increased by 43%. However, nonpoint sources make up a very small fraction (3%) of the overall SO_2 inventory in Arkansas.

FIGURE C-7: 2017 SO_2 EMISSIONS IN ARKANSAS (ALL SOURCES)[13]

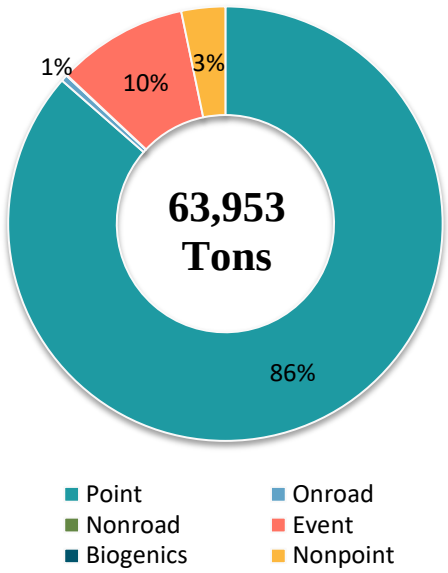
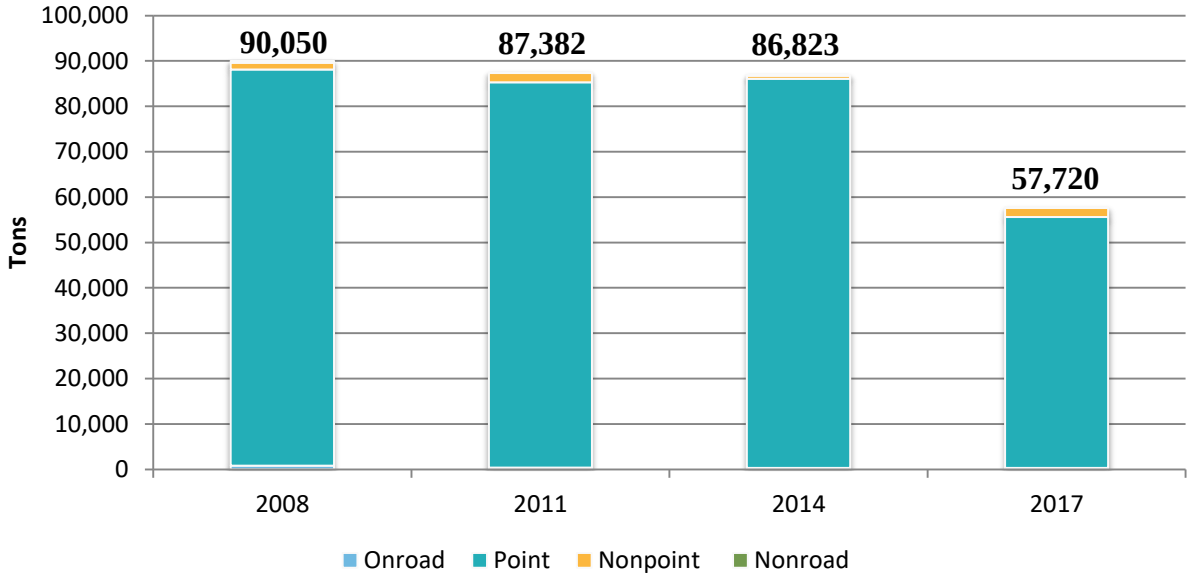


FIGURE C-8: SO_2 EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[14]



[13] Data set: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[14] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020, and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC PRIMARY COARSE PARTICULATE MATTER EMISSIONS

The emission inventory collects information about primary PM_{10} emissions, which includes both filterable and condensable particulates less than 10 microns in diameter.

In 2017, 82% of primary PM_{10} emissions came from anthropogenic sources, with nonpoint sources contributing 79% of total emissions. The other 18% was emitted from event sources, such as wildfires and prescribed fires.

Overall, anthropogenic primary PM_{10} emissions decreased by 44,396 tons between 2008 and 2017. Primary PM_{10} emissions decreased from all anthropogenic source categories between 2008 and 2017. Emissions from nonpoint sources increased between 2014 and 2017, but they remained below 2008 levels.

FIGURE C-9: 2017 PRIMARY PM_{10} EMISSIONS IN ARKANSAS (ALL SOURCES)[15]

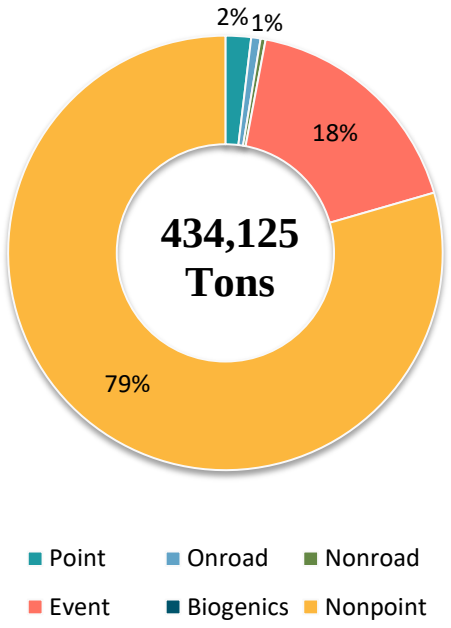
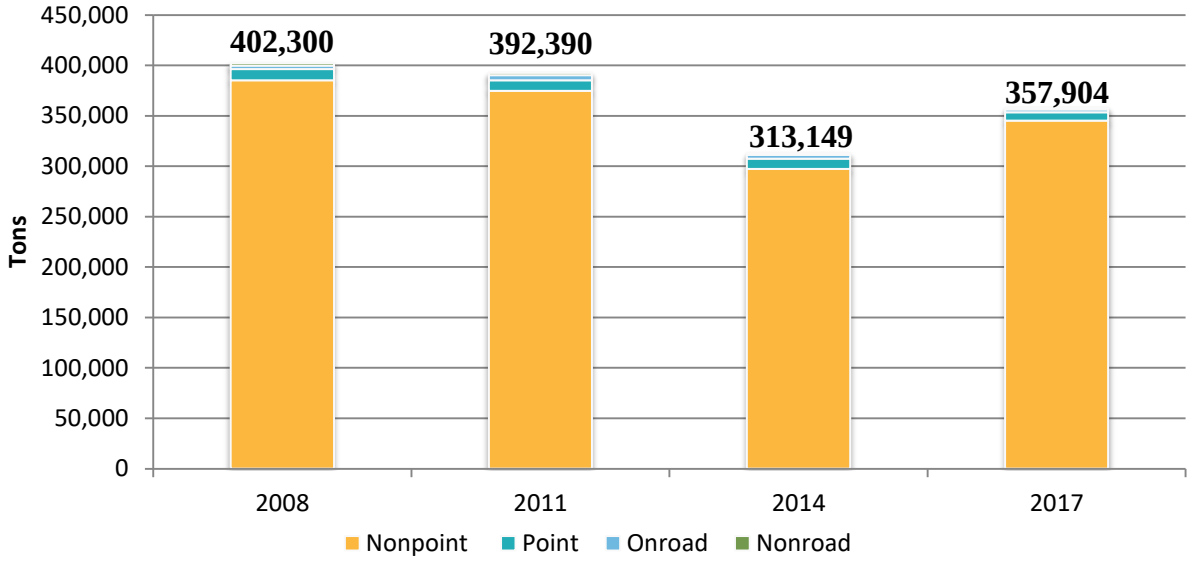


FIGURE C-10: PRIMARY PM_{10} EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[16]



[15] Data sets: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[16] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC PRIMARY FINE PARTICULATE MATTER EMISSIONS

The emission inventory collects information about primary $PM_{2.5}$ emissions, which includes both the filterable and condensable fine particulates less than 2.5 microns in diameter that are emitted directly from a source. Primary $PM_{2.5}$ emissions do not include fine particulate matter formed by reactions of precursor pollutants downwind from a source.

In 2017, 55% of primary $PM_{2.5}$ emissions came from anthropogenic sources. The other 45% was emitted from event sources, such as wildfires and prescribed fires.

Overall, anthropogenic primary $PM_{2.5}$ emissions decreased by 2,637 tons between 2008 and 2017. Primary $PM_{2.5}$ emissions decreased from the point, onroad, and nonroad source categories and emissions increased from nonpoint sources between 2008 and 2017.

FIGURE C-11: 2017 PRIMARY $PM_{2.5}$ EMISSIONS IN ARKANSAS (ALL SOURCES)[17]

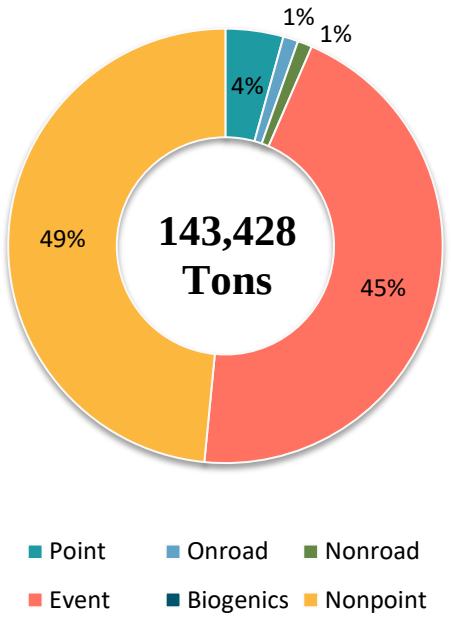
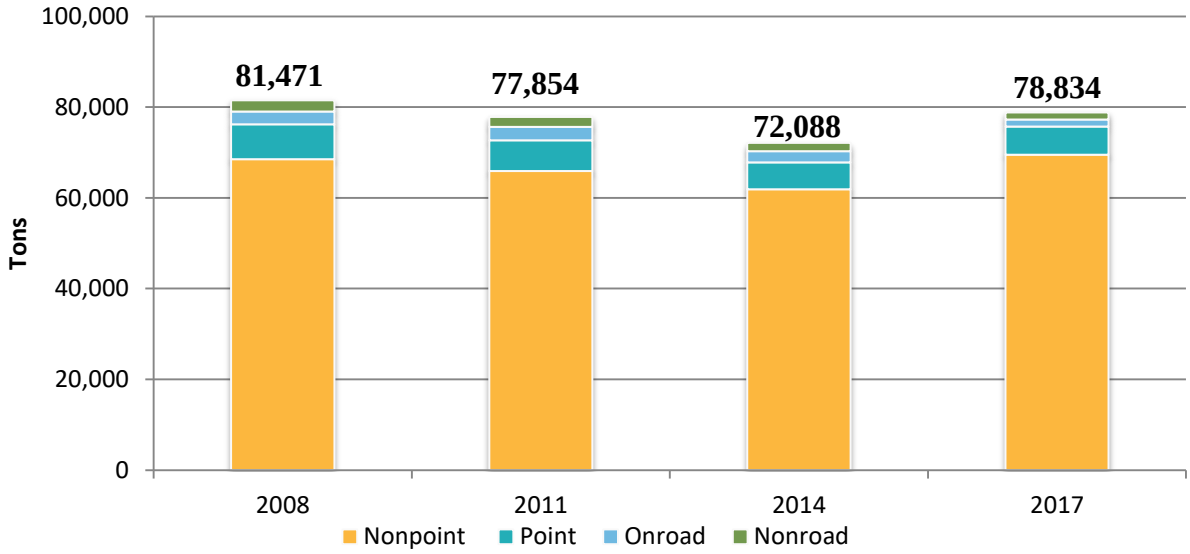


FIGURE C-12: PRIMARY $PM_{2.5}$ EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[18]



[17] Data sets: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[18] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC AMMONIA EMISSIONS

Ammonia is a precursor for $PM_{2.5}$.

In the 2017 Arkansas emission inventory, 87% of ammonia emissions came from anthropogenic sources, primarily nonpoint sources (84%). The other 13% was emitted from event sources, such as wildfires and prescribed fires.

Overall, anthropogenic NH_3 emissions in Arkansas decreased by 40,606 tons between 2008 and 2017. Nonpoint and onroad NH_3 emissions decreased and point emissions increased during this period. Nonroad annual emissions remained the same.

FIGURE C-13: 2017 NH_3 EMISSIONS IN ARKANSAS (ALL SOURCES)[19]

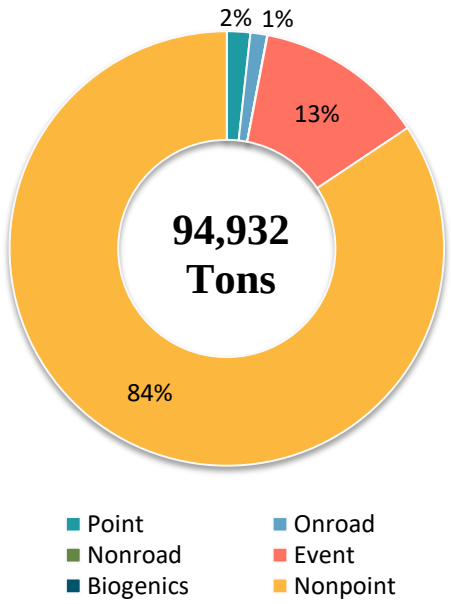
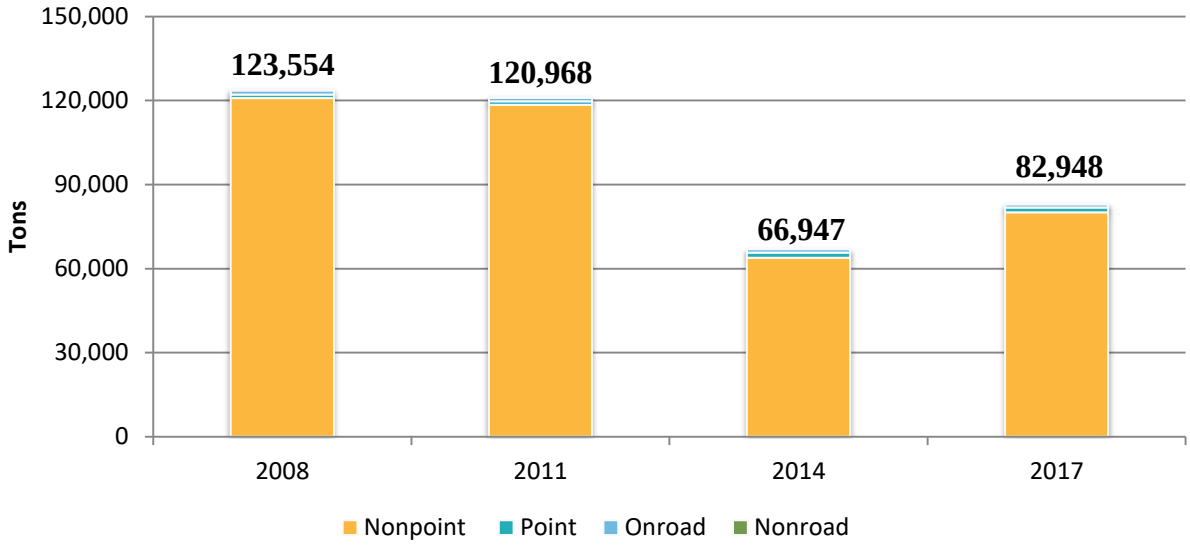


FIGURE C-14: NH_3 EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[20]



[19] Data sets: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[20] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT

TRENDS IN ANTHROPOGENIC LEAD EMISSIONS

Lead is both a criteria pollutant and a hazardous air pollutant.

In the 2017 Arkansas emission inventory, all lead emissions came from anthropogenic sources. Point sources emitted 67% and nonpoint sources emitted 33% of Arkansas's 2017 lead emissions.

Annual lead emissions in Arkansas increased by 978 pounds (0.49 tons) between 2008 and 2017. Point source lead emissions increased and nonpoint lead emissions decreased during this time period.

FIGURE C-15: 2017 LEAD EMISSIONS IN ARKANSAS (ALL SOURCES)[21]

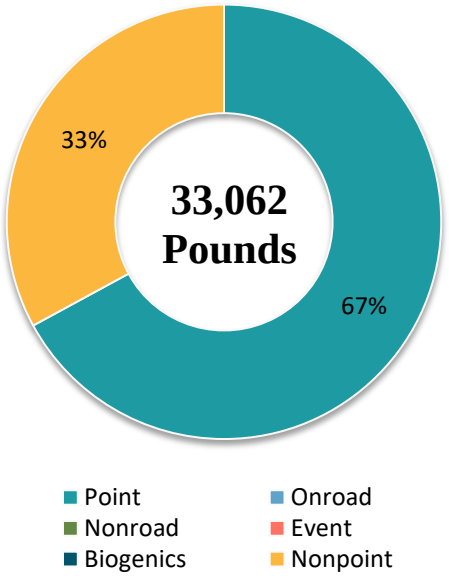
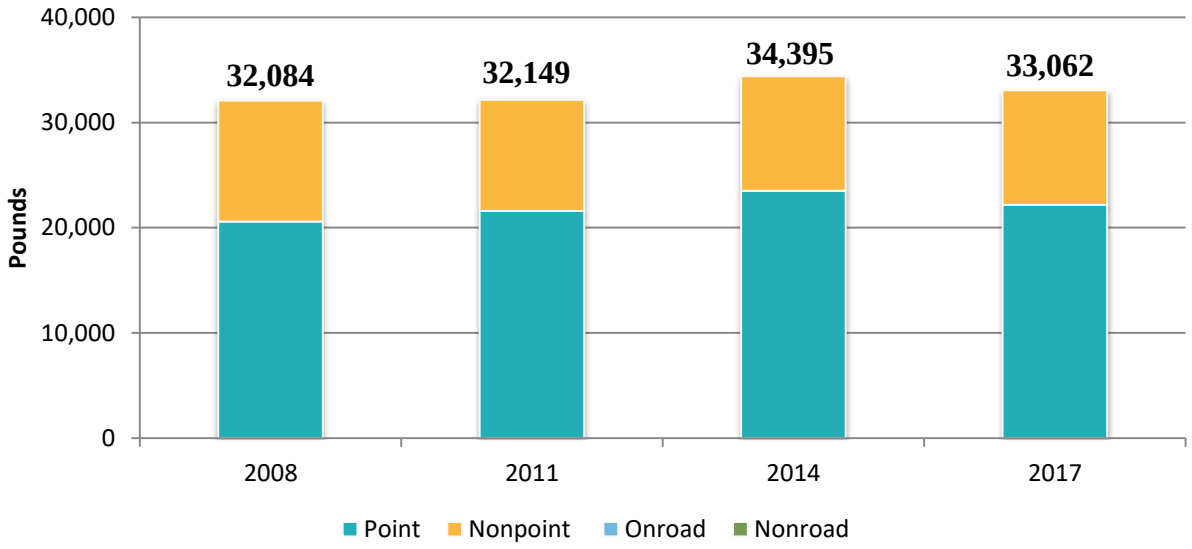


FIGURE C-16: LEAD EMISSIONS FROM ANTHROPOGENIC SOURCE CATEGORIES IN ARKANSAS (2008 – 2017)[22]



[21] Data sets: 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT
[22] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020 and 2017 NEI Jun2020_PT

CARBON DIOXIDE EMISSION TRENDS

Carbon dioxide (CO_2) is naturally present in the atmosphere, but is also emitted by human activities, including fossil fuel combustion, industrial processes, and land-use changes. Carbon dioxide (CO_2) accounts for 81% of all United States anthropogenic greenhouse gas emissions.[23]

The United States Energy Information Administration (EIA) inventories energy-related CO_2 emissions. In Arkansas, the largest source of anthropogenic CO_2 emissions is the electric power sector followed by the transportation sector.

Overall, CO_2 emissions in Arkansas have increased by 0.2 million metric tons between 2008 and 2017. Residential, industrial, and transportation sectors reduced CO_2 emissions in this period. The electric power sector increased emissions.

FIGURE C-17: 2017 CO_2 EMISSIONS IN ARKANSAS[24]

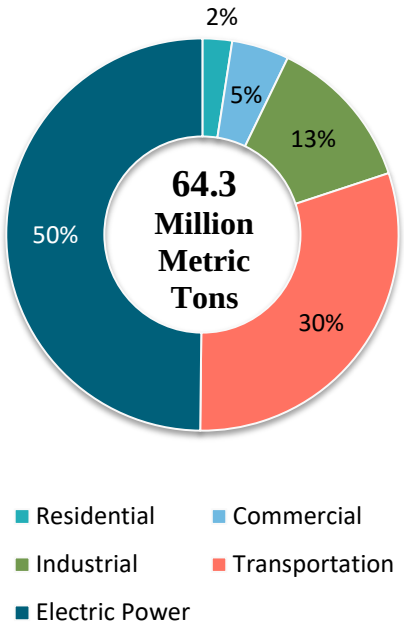
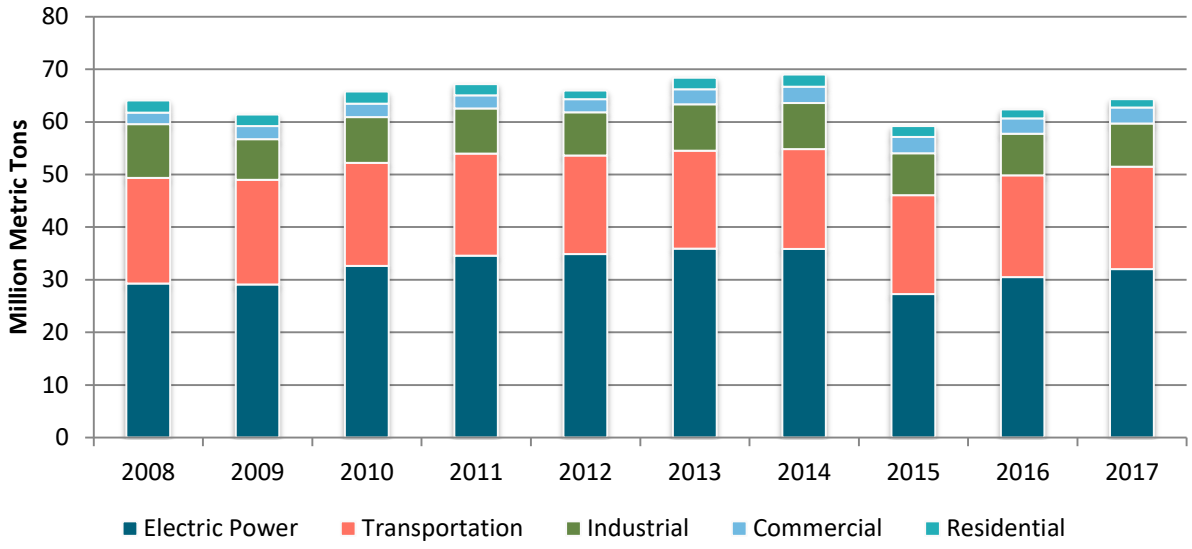


FIGURE C-18: CO_2 EMISSIONS FROM FOSSIL FUEL CONSUMPTION IN ARKANSAS (2008 – 2017)[25]



[23] EPA (2018). "Overview of Greenhouse Gases" https://www.epa.gov/ghgemissions/overview-greenhouse-gases
[24] Arkansas Carbon Dioxide Emissions from Fossil Fuel Consumption (1980-2017) obtained from EIA on 12_22_2020
[25] Data sets: 2008 NEI V3, 2011 NEI V2, 2014 NEI V2, 2017 NEI Apr 2020

APPENDIX D: 2020 OZONE FORECASTING SEASON SUMMARY

EXECUTIVE SUMMARY

Arkansas has an ozone forecasting season, which lasts from May 1 to September 30, with predominantly healthy ozone concentrations. The Little Rock–North Little Rock–Conway Metropolitan Statistical Area (MSA) experienced 143 days within the Air Quality Index's (AQI) green or "Good" category, nine days in the yellow or "Moderate" category, and one day in the orange or "Unhealthy for Sensitive Groups" category. Similarly, the Fayetteville-Springdale-Rogers MSA experienced 150 days in the green or "Good" category, three days in the yellow or "Moderate" category, and no days in the orange or "Unhealthy for Sensitive Groups" category. The Memphis MSA, which includes Crittenden County, Arkansas, experienced 132 days in the green or "Good" category, 19 days in the yellow or "Moderate" category, and two days in the orange or "Unhealthy for Sensitive Groups" category. The Shelby County Health Department conducts the ozone forecasting for the Memphis MSA.

In addition, the entire State of Arkansas remains in attainment for all National Ambient Air Quality Standards including the 2015 Ozone Standard of 70 ppb. The regulatory design value which is compared against the 2015 Ozone Standard is 63 ppb for the Little Rock–North Little Rock–Conway MSA and 60 ppb in the Fayetteville–Springdale–Rogers MSA. The design value for the Memphis MSA is 67 ppb. The design value for all other monitors is less than 63 ppb.

GROUND-LEVEL OZONE FORMATION

Ozone is a colorless gas made up of three oxygen atoms. Anthropogenic ground-level ozone is not emitted directly into the air. It is formed by a complex chemical reaction of pre-cursor volatile organic compounds (VOCs) and nitrogen oxides (NO_X) in the presence of solar radiation.

In general, slow to stagnant ground-level wind speeds are conducive for the accumulation of the ozone precursors. The presence of moderate to fast upper-level winds can transport the precursors from one area to another. Higher ambient temperature enhances the reaction rates and increases the evaporative emissions of precursor VOCs. Low humidity, lack of cloud cover, and lack of precipitation can increase ozone formation.

Sources of Ozone Precursors

- Fuel combustion (NO_X) and evaporation (VOCs) associated with stationary sources, such as power plants, industrial boilers, refineries, chemical plants, and other sources
- Fuel combustion (NO_X) and fueling evaporation (VOCs) associated with on-road motor vehicles, such as cars, trucks, buses, etc.
- Organic compound evaporation (VOCs) such as paints, cleaners, and solvents
- Fuel combustion (NO_X) and fueling evaporation (VOCs) associated with engines such as aircraft, trains, agricultural operations, lawn and garden equipment, etc.
- Biogenic VOCs are also produced by species of trees and are released into the ambient air.

EFFECTS OF GROUND LEVEL OZONE

Ozone can inflame and irritate the respiratory tract, causing breathing difficulty, coughing, and throat irritation, particularly among individuals with preexisting respiratory conditions, as well as in the elderly, in children, or even in otherwise healthy individuals during activities requiring prolonged exertion. Exposure can also increase the lung's susceptibility to infections and allergens.

Long-term exposures to ground-level ozone can aggravate asthma, is likely to be one of many factors in the development of asthma, and can cause permanent lung damage.

Ground-level ozone also can damage plants by reducing photosynthesis, slowing growth, and increasing a plant's sensitivity to other stressors.

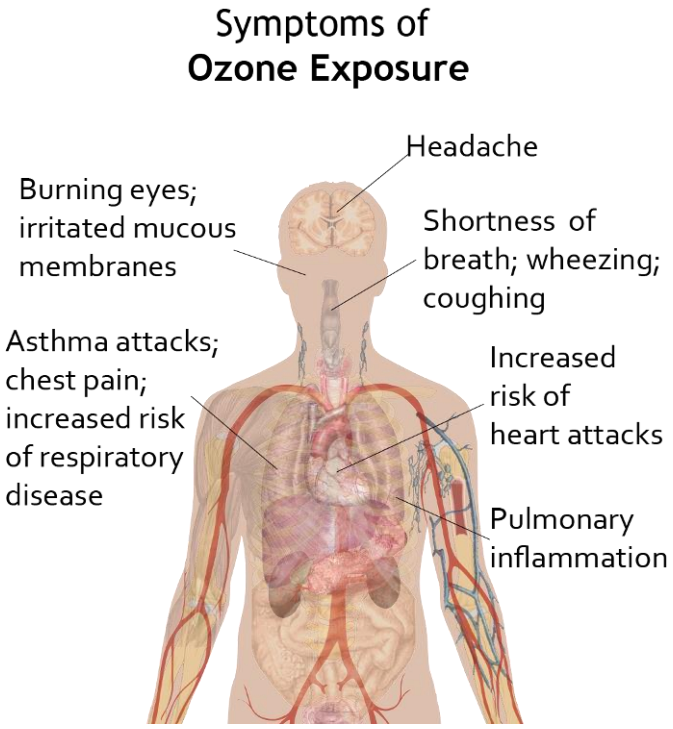
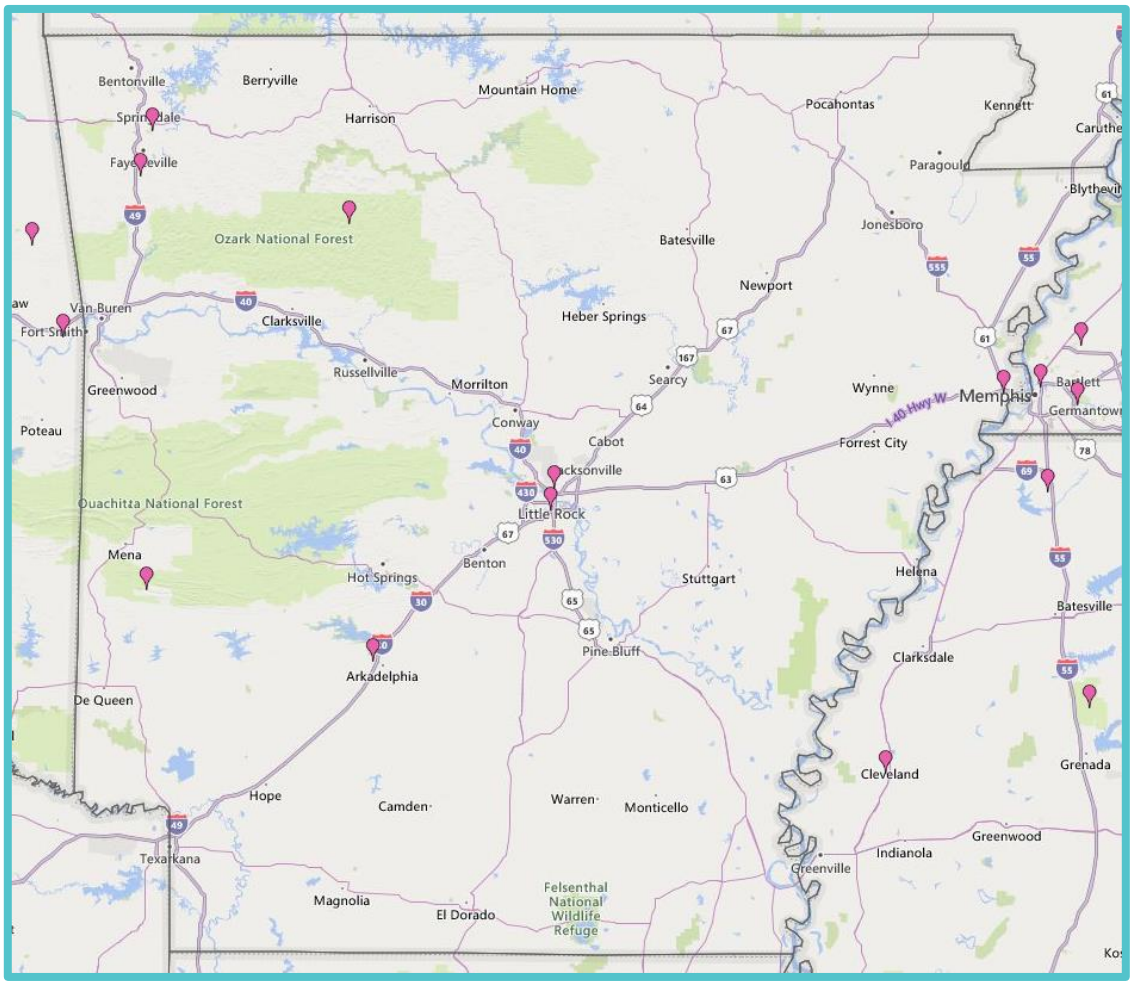


PHOTO OF HEALTHY (LEFT) AND OZONE-INJURED (RIGHT) TULIP POPLAR TREE FOLIAGE. IMAGE CREDIT: NATIONAL PARK SERVICE

OZONE NATIONAL AMBIENT AIR QUALITY STANDARD

The EPA sets national ambient air quality standards (NAAQS) to protect human health, with an adequate margin of safety, including for sensitive populations such as children, the elderly, and individuals with respiratory diseases, as well as to prevent damage to property, transportation hazards, to protect economic values, and ensure personal comfort. Arkansas currently operates eight ozone monitors (Figure D-1) to measure ambient concentrations for comparison with the NAAQS.

FIGURE D-1: OZONE MONITORS IN ARKANSAS AND ON THE PERIPHERY IN ADJACENT STATES



The NAAQS concentration for ground-level ozone is 0.070 parts per million (ppm), which is also sometimes expressed as 70 parts per billion (ppb). The regulatory averaging time and form of the ozone NAAQS is calculated as the annual fourth-highest daily maximum 8-hour average concentration at each monitor averaged over three consecutive years, which is referred to as the design value. Design values are used to determine attainment of the NAAQS.

AIR QUALITY INDEX

The Air Quality Index (AQI) is a value for reporting daily air quality in a specific area. The Division of Environmental Quality (DEQ) produces air quality forecasts using meteorological data and pollutant concentration data to predict the AQI each day for both central Arkansas and northwestern Arkansas throughout the "ozone forecasting season."

TABLE D-1: OZONE AIR QUALITY INDICES

AQI Value	Ozone 8-Hour Concentration (ppm)	Level of Health Concern
0 to 50	0.000 – 0.054	Good
51 to 100	0.055 – 0.070	Moderate
101 to 150	0.071 – 0.085	Unhealthy for Sensitive Groups
151 to 200	0.086 – 0.105	Unhealthy
201 to 300	0.106 – 0.200	Very Unhealthy
301 to 500	0.201 & above	Hazardous

OZONE ACTION DAYS

Ozone Action Days are days when the forecasted AQI is unhealthy for sensitive groups or unhealthy for everyone. On Ozone Action Days, DEQ recommends avoiding prolonged outdoor exertion and taking steps to reduce emissions of ozone precursors, such as limiting driving, avoiding refueling your vehicle, and avoiding the use of oil-based paints and solvents.

Ozone Action Advisory–Code Orange
100 < AQI <150
Unhealthy for Sensitive Populations

Ozone Action Alert–Code Red
AQI >150
Unhealthy for everyone

OZONE FORECASTING SEASON

The ozone forecasting season is a period of time during which ground-level anthropogenic ozone typically reaches its highest concentrations. The ozone forecasting season in Arkansas consists of 153 days and lasts from May 1 to September 30. Since 2016, the highest ozone AQI days for both central and northwest Arkansas have occurred in May and June.

TABLE D-2: ANNUAL HIGHEST AQI IN CENTRAL ARKANSAS (2016 – 2020)

Index Value	Date
105	6/17/2020
87	5/31/2019
122	6/06/2018
115	6/09/2017
100	6/09/2016

TABLE D-3 ANNUAL HIGHEST AQI IN NORTHWEST ARKANSAS (2016 – 2020)

Index Value	Date
54	5/01/2020
74	5/31/2019
87	8/01/2018
64	6/09/2017
77	6/09/2016

2020 OZONE SEASON FORECASTING

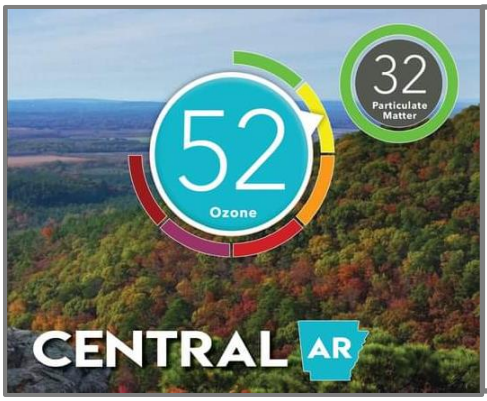
DEQ forecasts the ozone AQI for Central Arkansas and Northwest Arkansas and publishes these forecasts each morning to social media and on the DEQ website (http://www.adeq.state.ar.us/).

DEQ's ozone forecasting statistics for the 2020 ozone forecasting season are:

- No action versus Action day forecast accuracy was 98.5%.
- Good versus Moderate AQI level forecast accuracy was 92.5%.

Fayetteville-Springdale-Rogers MSA (Northwest Arkansas)

- 150 days (98%) in the green "Good" AQI category
- 3 days (2%) in the yellow "Moderate" AQI category
- Zero Ozone Action Advisory Days (orange AQI "Unhealthy for Sensitive Groups" category)
- Zero Ozone Action Alert Days (red AQI "Unhealthy for Everyone"



Little Rock-North Little Rock-Conway MSA (Northwest Arkansas)

- 143 days (93%) in the green "Good" AQI category
- 9 days (6%) in the yellow "Moderate" AQI category
- 1 Ozone Action Advisory Days (orange AQI "Unhealthy for Sensitive Groups" category)
- Zero Ozone Action Alert Days (red AQI "Unhealthy for Everyone"

Memphis-West Memphis MSA

- 132 days (86%) in the green "Good" AQI category
- 19 days (12%) in the yellow "Moderate" AQI category
- 2 Ozone Action Advisory Days (orange AQI "Unhealthy for Sensitive Groups" category)
- Zero Ozone Action Alert Days (red AQI "Unhealthy for Everyone"

The Shelby County Health Department forecasts the ozone AQI for the Memphis-West Memphis metropolitan statistical area. (MSA).

2020 OZONE SEASON DESIGN VALUES

The design value, calculated as the consecutive 3-year average of the annual 4th highest daily maximum 8-hour ozone concentration at each monitor, is the value used to determine attainment with the NAAQS of 0.070 ppm (70 parts per billion or ppb). Note that if multiple pollutant-specific monitors occur in a MSA, then the monitor with the highest design value is considered the "controlling monitor" and determines attainment/non-attainment in that MSA.

FIGURE D-2: 2018 – 2020 PRELIMINARY DESIGN VALUES