



# KENTUCKY'S AIR

KENTUCKY DIVISION FOR AIR QUALITY  
FY2020 ANNUAL REPORT

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# Welcome to the Kentucky Division for Air Quality's FY2020 Annual Report.

This report details the division's accomplishments from July 1, 2019 through June 30, 2020. Due to varying schedules for data quality assurance, some data may be reported for the 2018 or 2019 calendar years.

# From the Director

On behalf of the Division for Air Quality, thank you for taking the time to read our 2020 Annual Report. Within these pages, we report on key measures our dedicated staff have taken to fulfill the division's mission, function, and commitment to protecting human health and the environment. I hope you find the report to be informative and educational.

Fiscal Year 2020 was a year of change for the division. After the gubernatorial election in November 2019, we welcomed the new administration and leadership team of the executive branch. March brought us the novel coronavirus COVID-19, which required us to quickly rethink how we accomplish our mission in a safe and socially distant way. We transitioned from working in offices to telecommuting; from in-person meetings to on-line meetings and conference calls; from reviewing and sharing paper permitting documents to video calls and screen sharing; from in-person participation in conferences and training to webinars using various on-line platforms. Despite working remotely, division staff continued to be highly productive and stay connected.

The COVID-19 emergency created challenges for regulated entities and regulators alike, as many facilities were forced to temporarily shut down or reduce staffing and visitors. To address these challenges, EEC Secretary Rebecca Goodman granted temporary regulatory flexibility to facilities providing adequate documentation of COVID-related disruptions to their operations. Compliance reporting, testing deadlines, and certification renewals were some of the things addressed under the Regulatory Flexibility memo.



## From the Director (cont'd)

As Governor Beshear initiated the Healthy at Work process in June, the majority of division staff remained on a telecommuting schedule. A limited number of staff were permitted to return to the office or field work, providing they followed several COVID-19 safety measures, including:

- Wearing face masks
- Completing a health assessment prior to entering an office or facility
- Maintaining social distancing of at least 6 feet apart

Although the pandemic altered the “where,” and to some extent the “how” we do our jobs, the essential work of protecting Kentucky’s air quality never stopped. Throughout the year, the division continued its work, including:

- Operation and maintenance of the air monitoring network and quality assuring air monitoring data by the Technical Services Branch
- Issuing appropriate permits containing all applicable requirements by the Permit Review Branch
- Developing effective regulations and control strategies by our Program Planning Branch
- Evaluating facilities for compliance, responding to air quality complaints, and enforcing emissions limitations by the Field Operations Branch

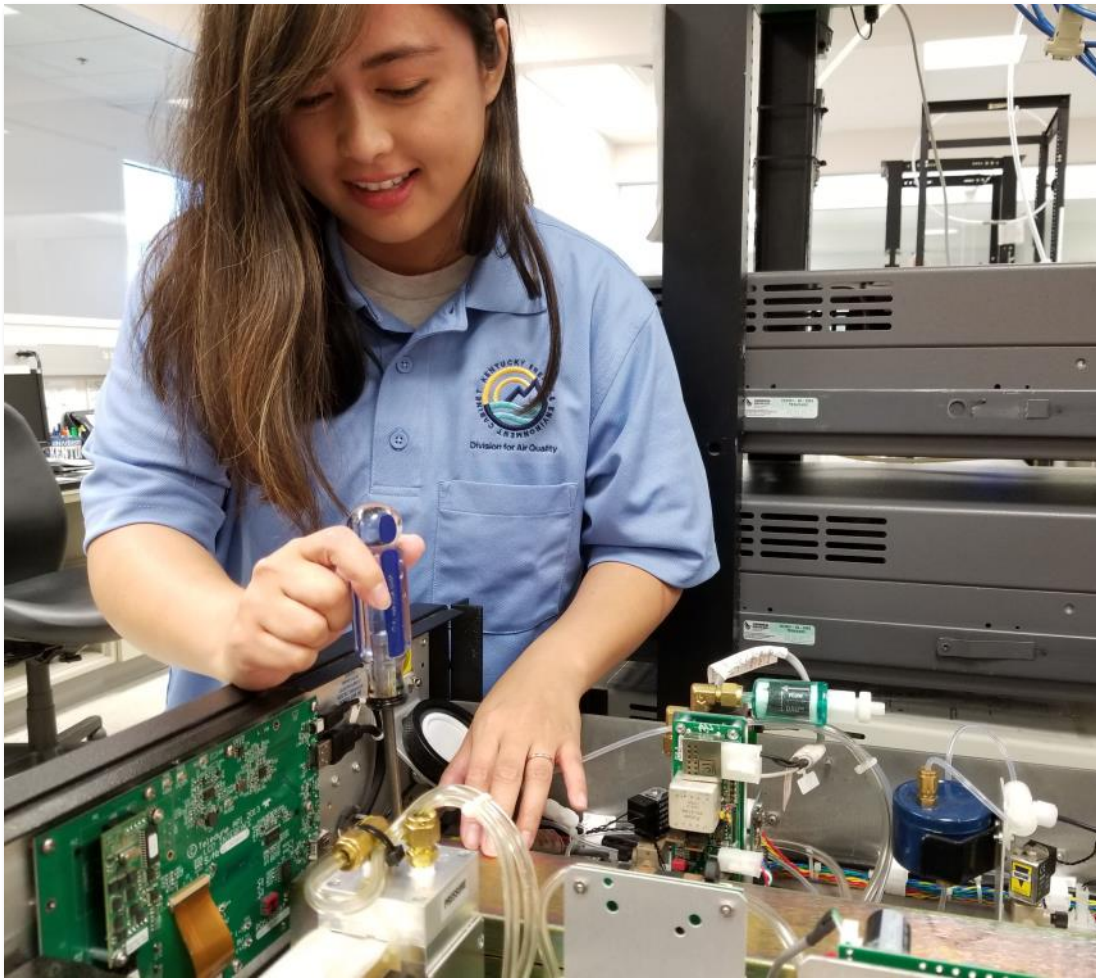
For more than 50 years, the division has implemented state and federal regulations and programs to protect and improve human health and the environment in Kentucky, while allowing economic growth and development. The continued trend of air quality improvement is evident in the charts found throughout this report. Together we can shape the future for improved public health and cleaner air.

*Melissa Duff, Director*

# Our Mission

To protect human health and the environment by achieving and maintaining acceptable air quality through:

- Operation of a comprehensive air monitoring network;
- Creating effective partnerships with air pollution sources and the public;
- Timely dissemination of accurate and useful information;
- The judicious use of program resources; and
- Maintenance of a reasonable and effective compliance assurance program.



## Who We Are

- A team of environmental professionals dedicated to protecting Kentucky's air quality
- 150 funded positions located in Frankfort and throughout the Commonwealth in eight regional offices
- The third largest division within the Department for Environmental Protection

## What We Do

- Air monitoring
- Regulation development
- Issue permits
- Respond to air quality complaints
- Ensure compliance with air quality regulations
- Education & outreach

# Why We Do It

## Protecting Human Health.

Human activities create air pollution. Too much air pollution is harmful to human health. That's why Congress enacted the Clean Air Act, which requires the U.S. Environmental Protection Agency (EPA) to set standards or "limits" for outdoor air pollutants. States, and sometimes local governments, are responsible for meeting those air quality standards.





## Why We Do It

### Protecting the Environment.

Air pollution also harms the environment. Some plants such as milkweed, tulip poplar and soybeans are sensitive to air pollution. Airborne sulfur oxide and nitrogen oxide pollution can cause acid precipitation, which in turn harms forests and aquatic organisms. Air pollution can even damage man-made structures such as buildings and monuments.

# FY 2020

## Highlights

### A Year of Change

New state government leadership, and a new global pandemic. FY 2020 was truly a year of change. DAQ staff demonstrated tremendous resilience and flexibility as our work shifted to accommodate new health and safety requirements.

Key accomplishments for the fiscal year include:

- 3,613 compliance inspections performed with an 87 percent compliance rate
- 1,218 air pollution complaints investigated
- 1,002 permitting actions
- 393 air permits issued
- 11 major economic development projects
- Permit public notice page updated
- \$321,010 in Clean Diesel grants awarded to seven school districts
- Outreach programs reached 1,227 people in 8 counties

# 2019 Air Monitoring Network

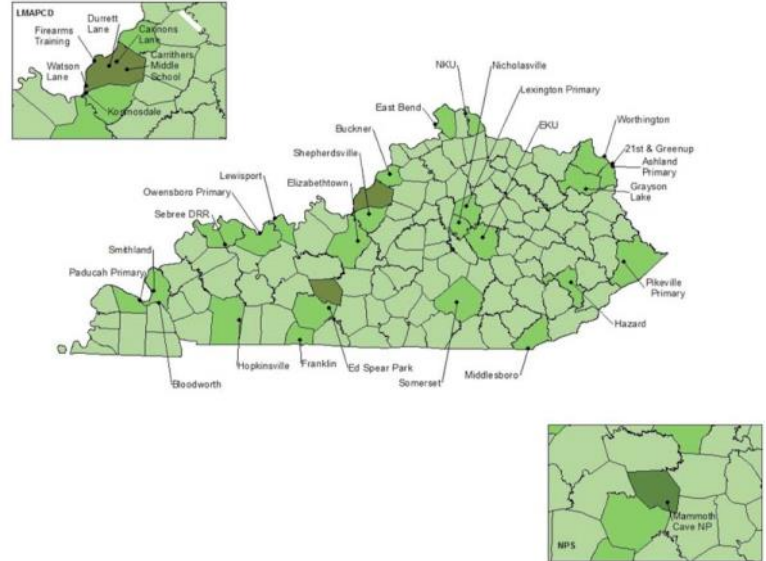
During 2019, the Kentucky Division for Air Quality operated 82 instruments, including 11 meteorological stations, located at 25 ambient air-monitoring sites in 23 Kentucky counties. The Louisville Metropolitan Air Pollution Control District operated an additional 30 instruments, including six meteorological stations, in Jefferson County.

When combined with the air-monitoring site operated at Mammoth Cave National Park, Kentucky's total ambient air monitoring network consisted of 118 instruments, including 18 meteorological stations, located at 32 sites across 25 counties of the Commonwealth. While not associated with the division's air monitoring network, the EPA also operates two additional CASTNET ozone monitoring stations in Kentucky.

## Monitoring Locations

Locations of ambient air monitoring stations are selected in accordance with EPA regulations (40 CFR 58, Appendix D). In general, monitors are placed in densely populated areas or near point sources of pollution.

The site locations are reviewed annually to ensure adequate coverage is being provided and regulatory requirements are being met. See the [2019 Kentucky Ambient Air Monitoring Network Plan](#) for more information.

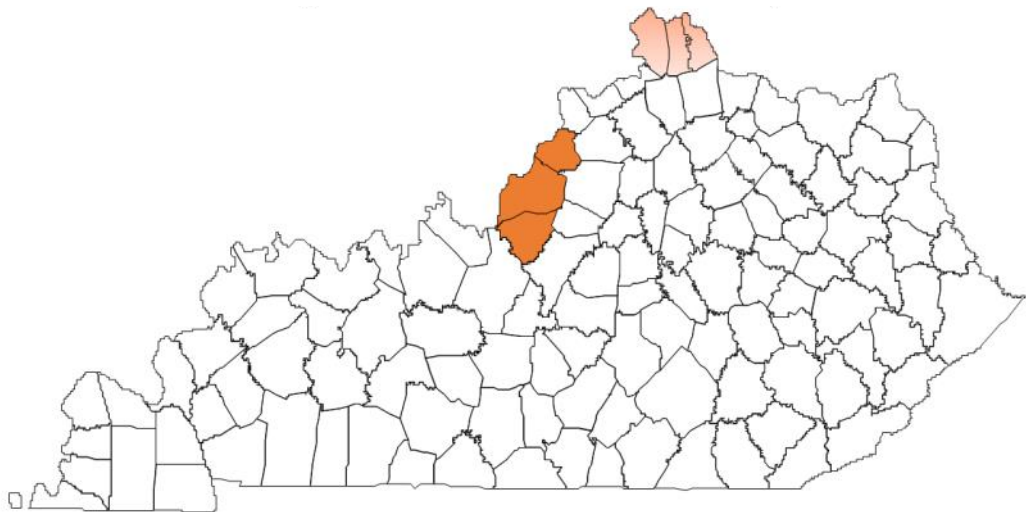


# National Ambient Air Quality Standards

The Clean Air Act directs the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS) for six criteria pollutants that are considered harmful to human health and the environment. The **primary standard** is designed to protect public health. The **secondary standard** is designed to protect public welfare. Welfare includes damage to plants and animals, impairment of visibility, and property damage.

## National Ambient Air Quality Standards

<b>Carbon Monoxide</b>	Primary Standard	Secondary Standard
8-Hour Average	9 ppm	none
1-Hour Average	35 ppm	none
<b>Lead</b>	Primary Standard	Secondary Standard
Rolling 3-Month Average	0.15 $\mu\text{m}^3$	Same as primary
<b>Nitrogen Dioxide</b>	Primary Standard	Secondary Standard
Annual Average	53 ppb	Same as primary
1-Hour Average	100 ppb	none
<b>Particulate Matter (PM<sub>10</sub>)</b>	Primary Standard	Secondary Standard
24-Hour Average	150 $\mu\text{m}^3$	Same as primary
<b>Particulate Matter (PM<sub>2.5</sub>)</b>	Primary Standard	Secondary Standard
Annual Average	12 $\mu\text{m}^3$	15 $\mu\text{m}^3$
24-Hour Average	35 $\mu\text{m}^3$	Same as primary
<b>Ozone</b>	Primary Standard	Secondary Standard
8-Hour Average	0.070 ppm	Same as primary
<b>Sulfur Dioxide</b>	Primary Standard	Secondary Standard
1-Hour Average	75 ppb	none
3-Hour Average	none	0.5 ppm



## 2020 Kentucky Nonattainment Areas

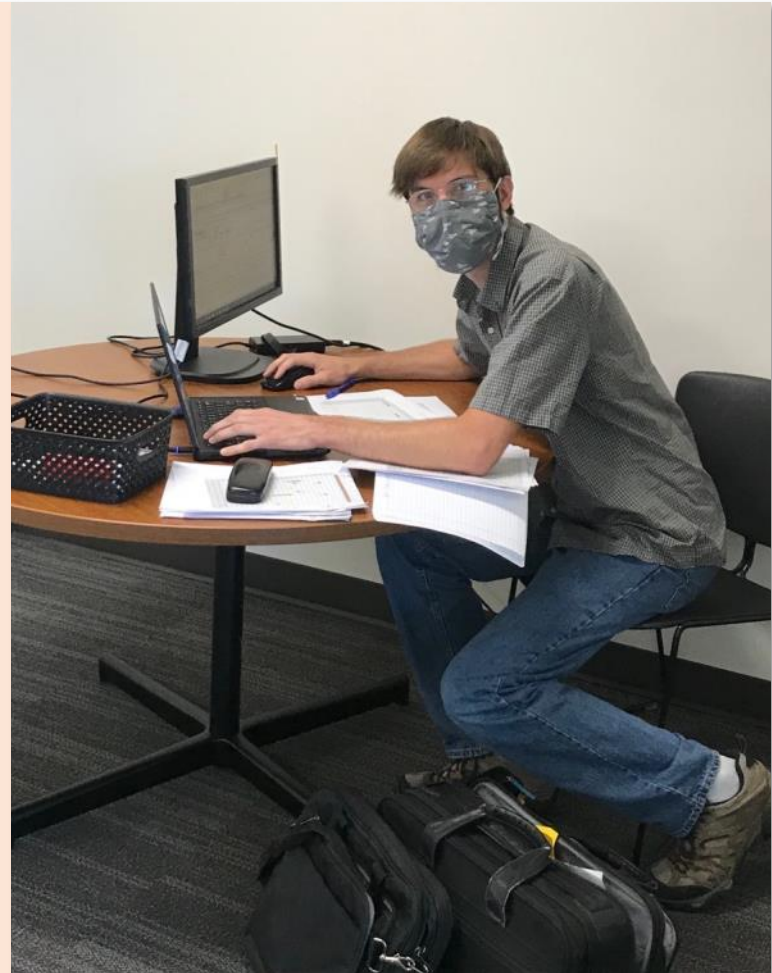
In 2020, six Kentucky counties were designated nonattainment. Bullitt, Jefferson and Oldham counties were nonattainment for the 2015 ozone standard, while Boone, Campbell and Kenton counties were designated “partial nonattainment” for the 2015 ozone standard. A localized portion of Jefferson County near Mill Creek was also designated nonattainment for the 2010 sulfur dioxide standard. However, recent air monitoring data show this area to be meeting the  $\text{SO}_2$  standard. At the time of writing this report, a formal redesignation of the area was pending.

## Technical Services & COVID-19

COVID-19 brought about many changes and challenges to the Technical Services Branch (TSB). TSB is a dynamic and diverse branch, involving data, facilities, air monitoring stations, and highly technical equipment. TSB has continued to adapt to the constantly changing situation while maintaining safety and job obligations.

Like the rest of the division, TSB staff have mainly been telecommuting. Only a few TSB staff members are allowed to enter the office or lab at a time. Coworkers may no longer sit in adjacent workspaces to one another, ride in the same vehicle, or be inside an air monitoring station shelter simultaneously.

Supporting an extensive, statewide air monitoring network means constant maintenance and continued certification of numerous samplers and equipment. To continue to work effectively and safely, staff have taken equipment into hallways, unoccupied rooms, and even home to ensure a properly functioning air-monitoring network.



# Understanding the Data

This annual report contains quality-assured data collected during calendar year 2019, as well as statewide trends for each of the criteria pollutants. The data summarizes concentrations and **design values** of pollutants measured in Kentucky during the 2019 calendar year. A design value is a calculated metric that is used to determine compliance with a particular National Ambient Air Quality Standard (NAAQS). For many pollutants, a design value is calculated for each year and then averaged over a three-year period before being compared to a standard. However, some design values use alternative time intervals for calculation. For example, lead uses a 3-month rolling average and one of the primary NAAQS for nitrogen dioxide uses an annual average.

It is important to note that an exceedance of a particular pollutant is not the same as a violation of the NAAQS for that pollutant. Violations are determined according to the formula for each standard and involve the average of multiple measured values over a specific amount of time. Any data contained in this report is subject to change. The most current quality assured data-set can be obtained through a Kentucky Open Records request.



## Carbon Monoxide

**Primary NAAQS:** 8-hour average not to exceed 9 parts per million (ppm) more than once per year; 1-hour average not to exceed 35 ppm more than once per year

**Secondary NAAQS:** None

Carbon monoxide (CO) is an odorless, colorless gas that is produced by the incomplete combustion of carbon-containing fuels. The primary source of carbon monoxide is exhaust from motor vehicles, including highway and off-road vehicles. Other sources include industrial processes, open burning, and kerosene or wood-burning stoves in homes.

There were no exceedances of the CO standards in 2018. The last exceedance of a standard occurred on Jan. 7, 1998, in Ashland when an 8-hour average of 11.7 ppm was recorded. All Kentucky counties are currently in attainment of the standards for carbon monoxide.

### 2019 Carbon Monoxide 1-Hour Averages

Method: Instrumental/Non-Dispersive Infrared Photometry

Data Interval: Hourly

Units: Parts per Million (ppm)

Station	1st Max	2nd Max
Mammoth Cave (NPS)	1.546	1.136
Cannons Lane (LMAPCD)	1.72	1.69
Durrett Lane (LMAPCD)	1.92	1.85

*LMAPCD = Louisville Metro Air Pollution Control District*

*NPS = National Park Service*

# Statewide Averages for Carbon Monoxide

Statewide averages for carbon monoxide (CO) have declined substantially since 1986, primarily due to improved emission controls on motor vehicles.

This table presents the statewide 1-hour and 8-hour averages of the second highest reading of CO from 1986 through 2019. For reference, the current 1-hour primary standard for CO is 35 ppm and the current 8-hour primary standard for CO is 9 parts per million (ppm).

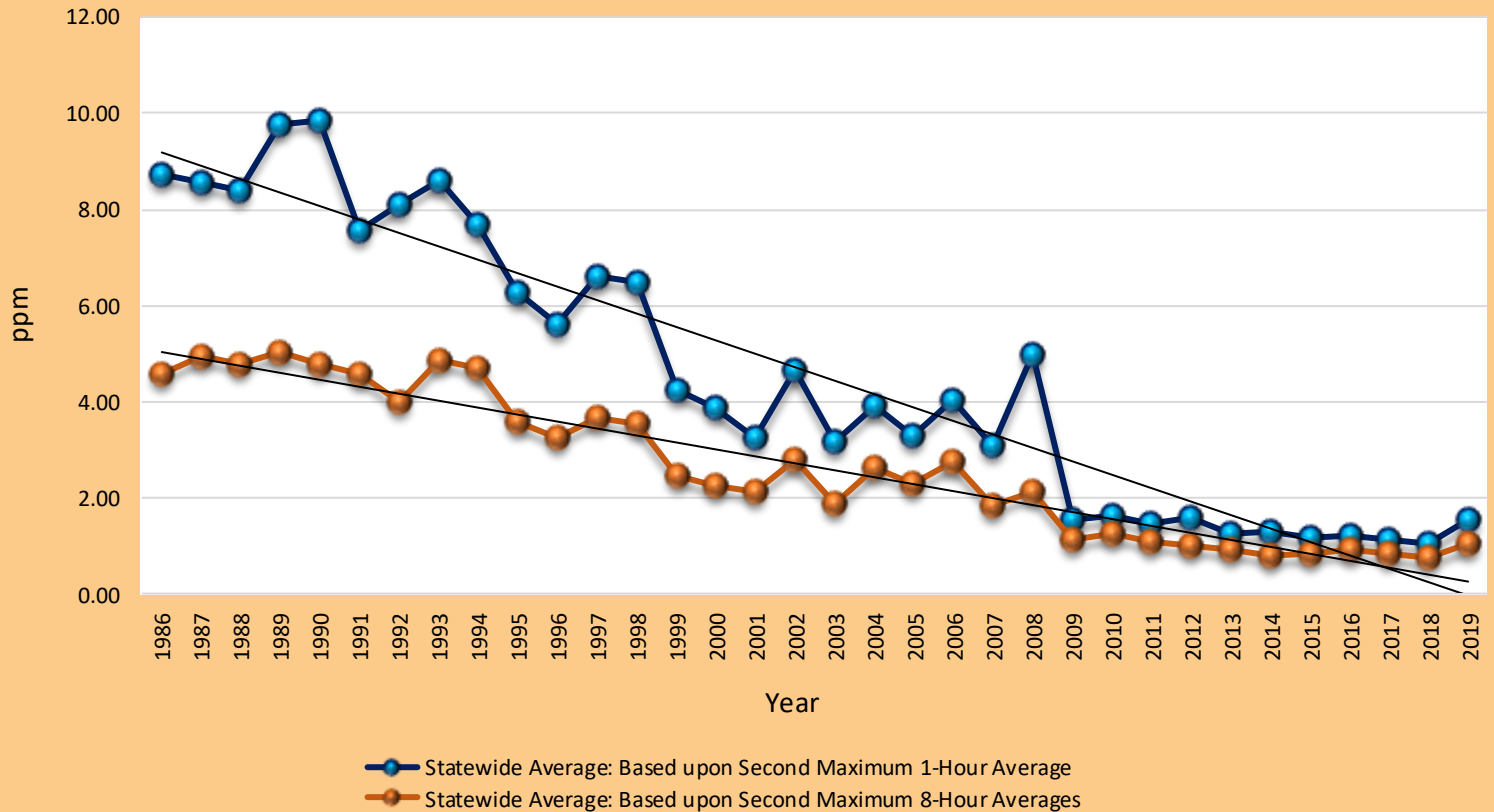
These data are graphed on the following page, with the downward trend lines clearly visible.

*Disclaimer:* These charts show generalized pollution trends through time. They do not show trends for specific sites, nor do they demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

Year	Statewide Average (ppm) Based upon Second Maximum	Statewide Average (ppm) Based upon Second Maximum
1986	8.71	4.60
1987	8.56	4.93
1988	8.39	4.80
1989	9.76	5.04
1990	9.83	4.77
1991	7.57	4.57
1992	8.09	3.99
1993	8.62	4.88
1994	7.69	4.68
1995	6.26	3.58
1996	5.64	3.24
1997	6.63	3.68
1998	6.51	3.53
1999	4.27	2.47
2000	3.88	2.28
2001	3.25	2.17
2002	4.66	2.79

Year	Statewide Average (ppm) Based upon Second Maximum 1-Hour Averages	Statewide Average (ppm) Based upon Second Maximum 8-Hour Averages
2003	3.15	1.88
2004	3.90	2.65
2005	3.30	2.30
2006	4.05	2.75
2007	3.10	1.85
2008	5.00	2.15
2009	1.55	1.20
2010	1.67	1.33
2011	1.50	1.17
2012	1.66	1.20
2013	1.28	0.93
2014	1.30	0.80
2015	1.16	0.87
2016	1.21	0.93
2017	1.15	0.83
2018	1.07	0.77
2019	1.56	1.03

## Statewide Averages for Carbon Monoxide



# Lead

**Primary NAAQS:** Rolling 3-month average not to exceed 0.15 micrograms per meter squared ( $\mu\text{g}/\text{m}^3$ )

**Secondary NAAQS:** Same as primary standard

Lead is a soft, blue-gray metal that has historically been used in motor fuels, paint, plumbing and batteries. Since the 1970s when the U.S. EPA mandated the phase out of lead in gasoline, airborne lead concentrations have plummeted. By regulation, lead monitoring is now only required near major sources of lead.

In 2018, the division operated one lead monitoring site at Eastern Kentucky University in Richmond. There were several exceedances of the lead NAAQS in 2012 and 2018; all were related to a compliance issue with a single stationary source.

## 2019 Lead Rolling Three-Month Average

Method: High Volume Sampler;

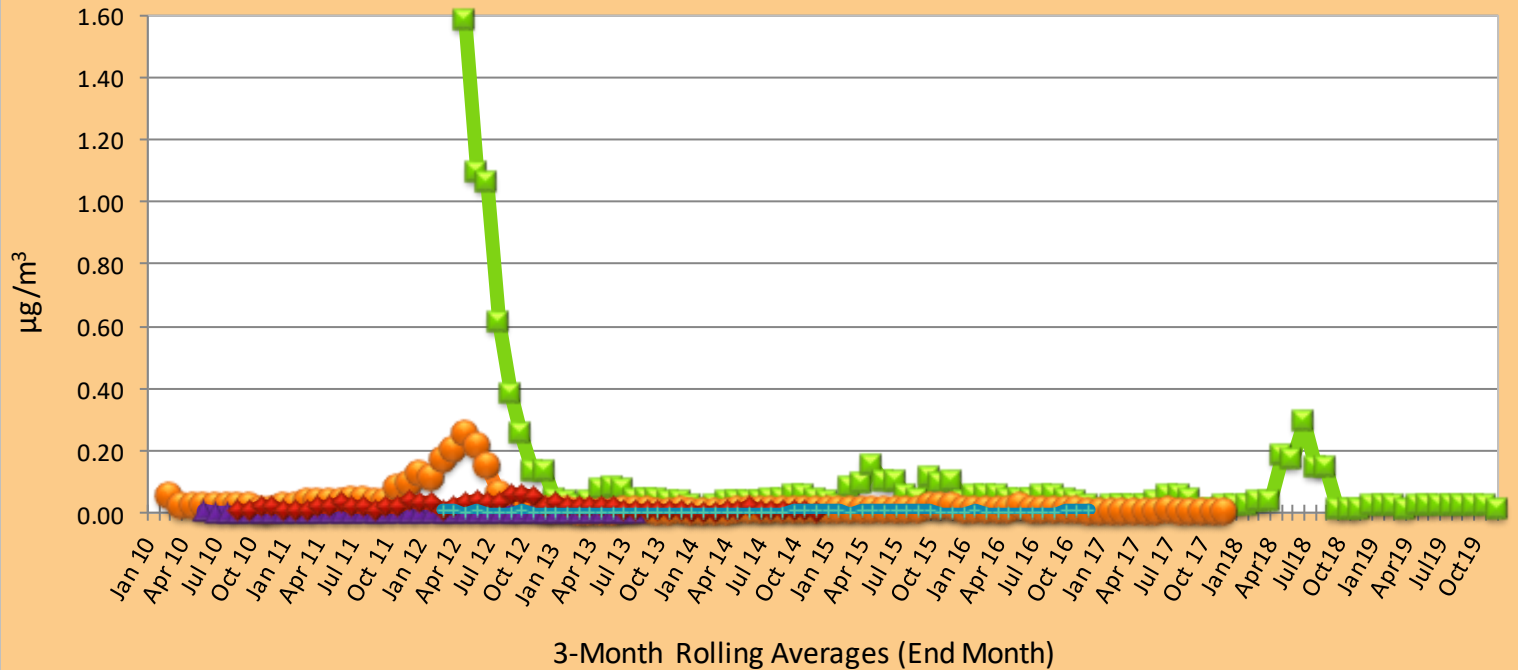
Inductively Coupled Plasma-Mass Spectroscopy

Data Interval: 24-Hour

Units: Micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

Site Name	1st Max	2nd Max	3rd Max	4th Max	Observations > 0.15
EKU	0.02	0.02	0.02	0.02	0

## Three-Month Rolling Averages for Lead



EKU

Salem Elementary \*

Mayfield Elementary\*

Cannons Lane (LMAPCD)\*

Lockwood \*

\*Monitoring Discontinued

# Nitrogen Dioxide

## Primary NAAQS:

3-year average of the 98th percentile of daily maximum one-hour averages must not exceed 100 ppb

Annual arithmetic mean must not exceed 53 parts per billion (ppb)

**Secondary NAAQS:** Annual arithmetic mean must not exceed 53 ppb

Nitrogen dioxide is a reddish brown gas that is produced during high-temperature combustion. During combustion, nitrogen and oxygen combine to form a family of highly reactive gases called nitrogen oxides (NO<sub>x</sub>), which include nitrogen dioxide (NO<sub>2</sub>) and nitrogen oxide (NO). Major combustion sources that produce NO<sub>2</sub> include motor vehicles, power plants, incinerators, boilers, and chemical processes. NO<sub>2</sub> is also produced through a photochemical reaction between NO and sunlight.

There have been no recorded exceedances of an NO<sub>2</sub> NAAQS since the inception of sampling in 1970. All Kentucky counties are currently in attainment of the standards for nitrogen dioxide.

## 2019 Nitrogen Dioxide Results: Three-Year Average of 98th Percentile of Daily Maximum One-Hour Averages

Method: Chemiluminescence

Data Interval: Hourly

Units: Parts per billion (ppb)

County/Site Name	2017	2018	2019	3-Yr Avg
Boyd	30	27	27	28
Campbell	24	25	27	25
Daviess	28	28	27	28
Fayette	35	31	42	36
Cannons Lane (LMAPCD)	39.9*	38	41.6	40 *
Durrett Lane (LMAPCD)	47	46.2	48.8	47
McCracken	31	28	32	30

LMAPCD = Louisville Metro Air Pollution Control District

\* Incomplete data set

# Statewide Averages for Nitrogen Dioxide

Statewide averages for nitrogen dioxide (NO<sub>2</sub>) show a steady downward trend over the past three decades, primarily due to the installation and use of pollution control devices on motor vehicles, power plants and industrial boilers.

These tables present the statewide averages of NO<sub>2</sub> from 1987 through 2019. The data is represented in two different ways: A statewide average of the annual averages from each monitoring station; and the statewide average of the 98th percentile 1-hour daily maximums. For reference, the annual standard for nitrogen dioxide is 53 ppb and the 1-hour standard is 100 ppb.

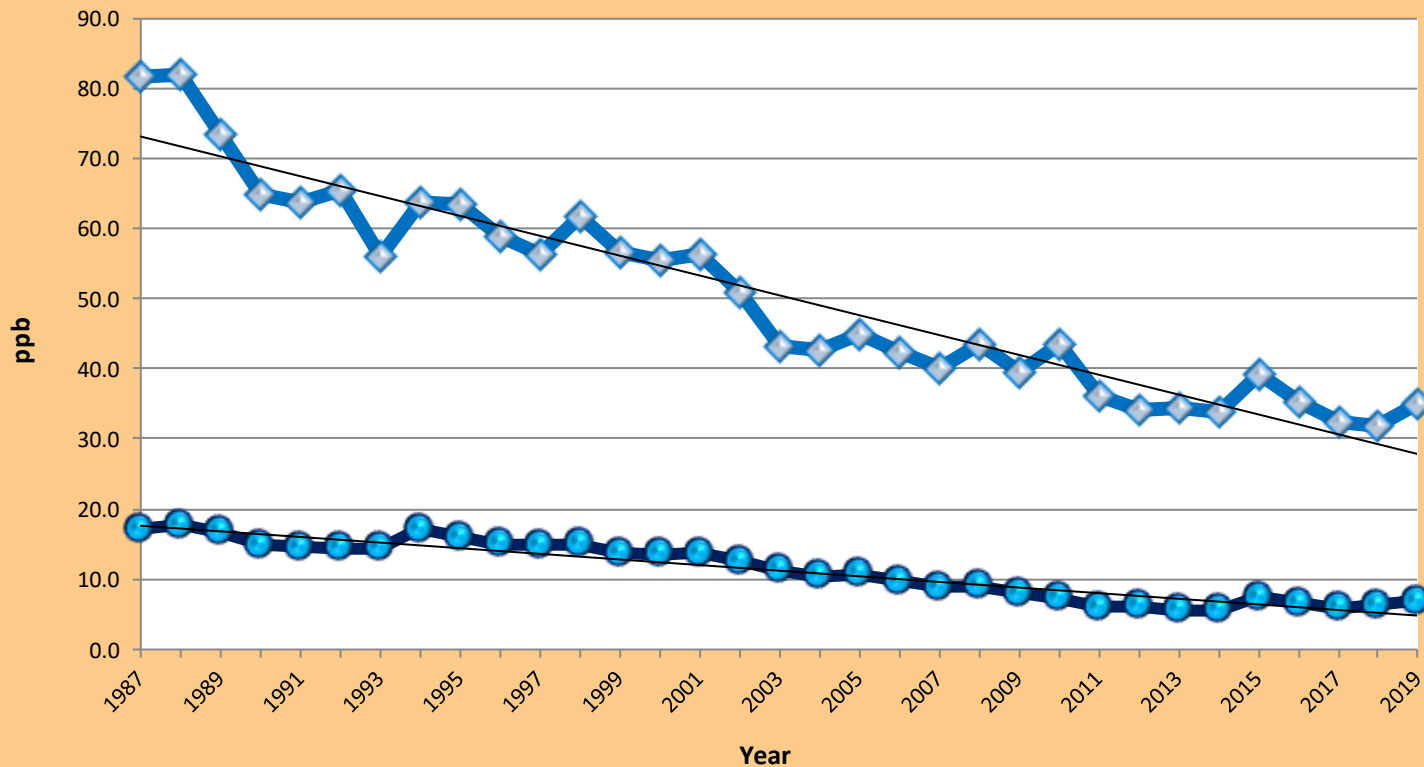
The data from these tables are graphed on the following page, with the downward trend lines clearly visible.

Year	Statewide Average (ppb) Based upon Annual Arithmetic Means	Statewide Average (ppb) Based upon 98th Percentile 1-Hour Daily Maximums
1987	17.09	72.00
1988	17.72	74.38
1989	16.61	74.14
1990	14.76	69.57
1991	14.50	63.83
1992	14.34	64.20
1993	14.40	58.85
1994	17.02	60.42
1995	15.97	63.55
1996	14.90	58.82
1997	14.88	55.64
1998	14.95	62.36
1999	13.68	57.64
2000	13.48	57.27
2001	13.72	54.77
2002	12.51	48.92

Year	Statewide Average (ppb) Based upon Annual Arithmetic Means	Statewide Average (ppb) Based upon 98th Percentile 1-Hour Daily Maximums
2003	11.30	45.33
2004	10.46	42.63
2005	10.72	44.88
2006	9.67	44.44
2010	8.05	45.83
2011	7.04	36.68
2012	6.94	35.97
2013	6.48	35.75
2014	7.48	37.44
2015	7.35	39.17
2016	6.57	35.37
2017	6.32	33.55
2018	6.20	31.89
2019	6.88	35.06

*Disclaimer:* These charts show generalized pollution trends through time. They do not show trends for specific sites, nor do they demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

## Statewide Averages for Nitrogen Dioxide



- Statewide Average: Based upon 98th Percentile 1-Hour Daily Maximums
- Statewide Average: Based upon Annual Arithmetic Means

# Ozone

**Primary & Secondary NAAQS:** 3-year average of the 4th highest daily maximum 8-hr concentration not to exceed 0.070 parts per million.

Ozone is a colorless gas that is not emitted directly into the atmosphere from sources. Instead, ozone forms in the lower atmosphere from a photochemical reaction between volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of sunlight.

In 2019, five sites measured eight-hour ozone concentrations greater than 0.070 ppm; however, the fourth highest daily maximum eight-hour ozone concentration at each of these sites was less than the level of the standard. The 2017-2019 three-year average was below the level of the standard for all Kentucky sites except for Cannons Lane (Jefferson County).

*LMAPCD = Louisville Metro Air Pollution Control District*

*NPS = National Park Service*

*CASTNET = EPA-operated monitor*

## 2019 Ozone Results:

### 3-Yr Average of 4th Highest Daily Maximum 8-Hour Concentration

Method: Ultra-Violet Photometry

Data Interval: Hourly

Units: Parts-per-million (ppm)

County/Site Name	ppm
Bell	0.060
Boone	0.063
Boyd	0.062
Bullitt	0.064
Campbell	0.065
Carter	0.059
Christian	0.058
Daviess	0.063
Edmonson (NPS)	0.061
Fayette	0.061
Greenup	0.058
Hancock	0.063
Hardin	0.061
Henderson	0.066
Bates (LMAPCD)	0.065

County/Site Name	ppm
Cannons Lane (LMAPCD)	0.072
Carrithers Middle School (LMAPCD)	0.067
Watson Lane (LMAPCD)	0.066
Jessamine	0.061
Livingston	0.063
McCracken	0.063
Morgan (CASTNET)	0.061
Oldham	0.066
Perry	0.059
Pike	0.057
Pulaski	0.058
Simpson	0.062
Trigg (CASTNET)	0.061
Warren	0.059
Washington (CASTNET)	0.062

## Statewide Averages for Ozone

Statewide averages for ozone (O<sub>3</sub>) have generally declined since 1987. This trend is attributable to emission controls on vehicles and a regional strategy to control NO<sub>x</sub> emissions from large stationary internal combustion engines, large boilers, and turbines used in power plants and other industrial applications.

This table presents the statewide averages of ozone from 1987 through 2019. For reference, the current primary standard for ozone is a 3-year average of the 4th highest daily maximum 8-hr concentration not to exceed 0.070 ppm.

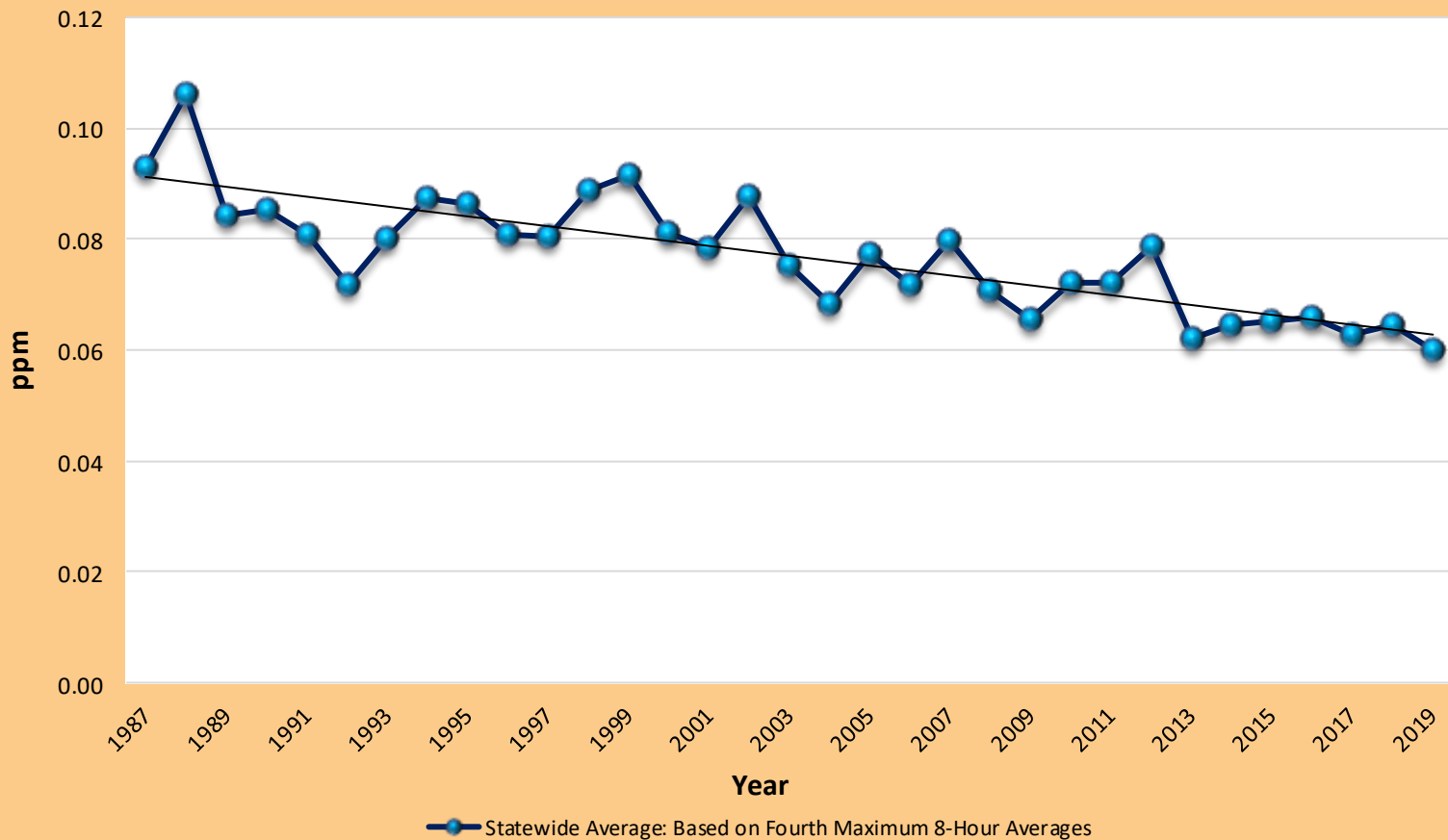
These data are graphed on the following page, with the downward trend line marked.

Year	Statewide Average: Based on Fourth Maximum 8-Hour Averages (ppm)
1987	0.093
1988	0.106
1989	0.084
1990	0.086
1991	0.081
1992	0.072
1993	0.080
1994	0.088
1995	0.086
1996	0.081
1997	0.081
1998	0.089
1999	0.092
2000	0.081
2001	0.078
2002	0.088
2003	0.075
2004	0.068
2005	0.078
2006	0.072

Year	Statewide Average: Based on Fourth Maximum 8-Hour Averages (ppm)
2007	0.080
2008	0.071
2009	0.066
2010	0.072
2011	0.072
2012	0.079
2013	0.062
2014	0.065
2015	0.065
2016	0.066
2017	0.063
2018	0.065
2019	0.060

*Disclaimer:* These charts show generalized pollution trends through time. They do not show trends for specific sites, nor do they demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

## Statewide Averages for Ozone



## Fine Particulate Matter (PM<sub>2.5</sub>)

**Primary NAAQS:** 3-year average of the annual weighted mean not to exceed 12.0 micrograms per meter cubed ( $\mu\text{g}/\text{m}^3$ )

3-year average of the 98th percentile of 24-hour concentrations not to exceed 35  $\mu\text{g}/\text{m}^3$

**Secondary NAAQS:** 3-year average of the annual weighted mean not to exceed 15.0  $\mu\text{g}/\text{m}^3$

3-year average of the 98th percentile of 24-hour concentrations not to exceed 35  $\mu\text{g}/\text{m}^3$

Fine particulate matter (PM<sub>2.5</sub>) is a mixture of solid particles and liquid droplets that are 2.5 microns or smaller in size. Sources include power plants, wood burning, industrial processes, and combustion. Fine particulates are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides and VOCs are transformed through chemical reactions.

There were no exceedances of the three-year 24-hour standard nor the three-year annual standard during the 2017 - 2019 averaging period. All Kentucky counties are currently in attainment for the PM<sub>2.5</sub> standards.

### 2019 PM<sub>2.5</sub> Results: 3-Yr Avg. of 24-Hour 98th Percentile

Method: Gravimetric

Data Interval: 24-Hour

Units: Micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

County/Site Name	$\mu\text{g}/\text{m}^3$
Bell	16
Boyd	14
Campbell	16
Carter	13
Christian	18

County/Site Name	$\mu\text{g}/\text{m}^3$
Daviess	17
Fayette	16*
Hardin	16
Henderson	16**
Watson Lane (LMAPCD)	22
Cannons Lane (LMAPCD)	19
Durrett Lane (LMAPCD)	23
Carrithers M.S. (LMAPCD)	20*

County/Site Name	$\mu\text{g}/\text{m}^3$
Algonquin Parkway (LMAPCD)	21*
McCracken	17
Madison	15*
Perry	13
Pike	13
Pulaski	16
Warren	17

LMAPCD = Louisville Metro Air Pollution Control District; \* Incomplete data set; \*\*Henderson site was discontinued in February 2019.

## Statewide Averages for PM<sub>2.5</sub>

This table presents the statewide averages of PM<sub>2.5</sub> from 1999, when monitoring first began for this pollutant, through 2019. The data is presented according to the two primary standards for PM<sub>2.5</sub> :

- The 3-yr average of the annual weighted mean, not to exceed 12.0 µg/m<sup>3</sup>
- 3-year average of the 98th percentile of 24-hour concentrations not to exceed 35 µg/m<sup>3</sup>

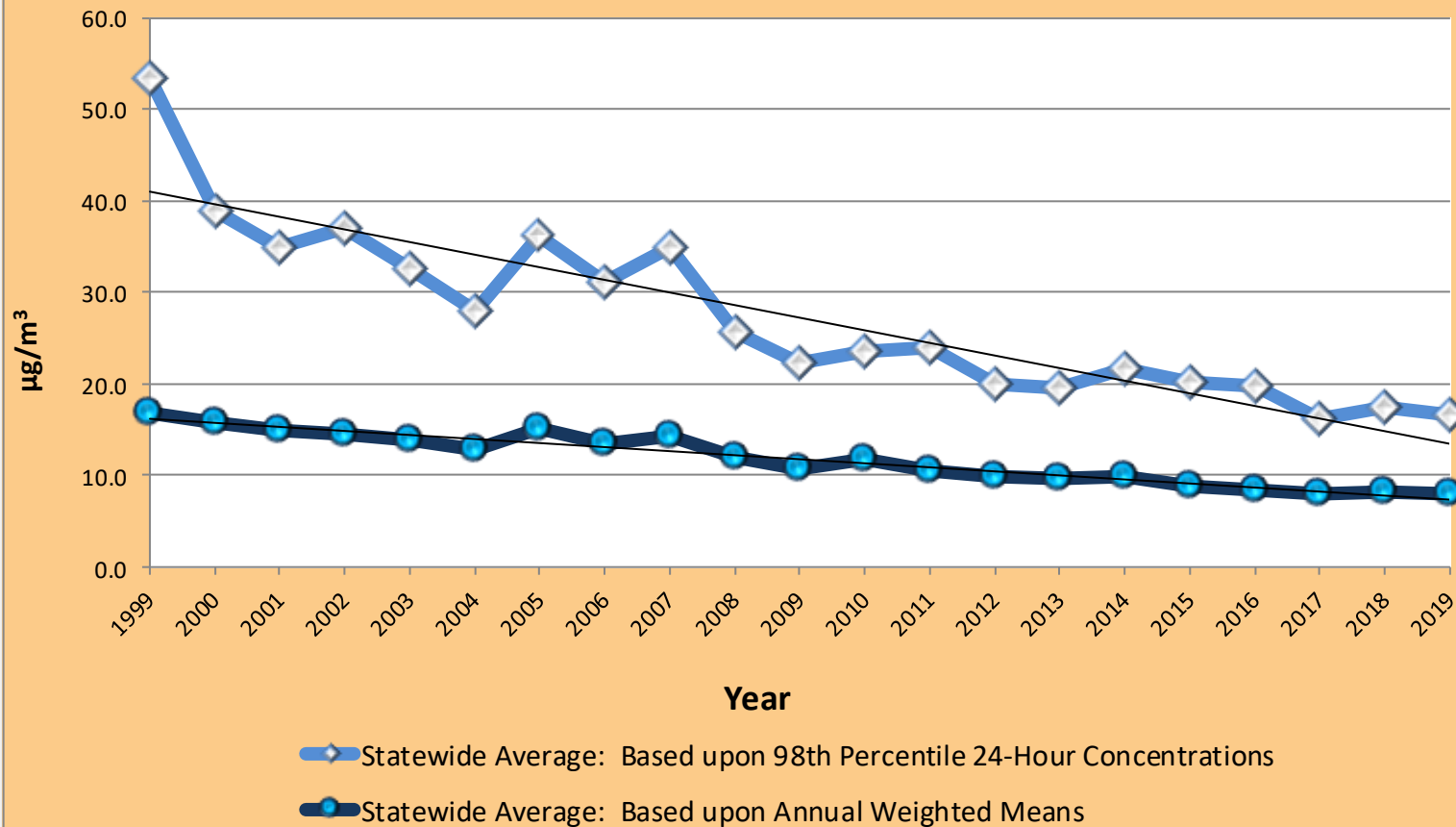
These data are graphed on the following page, with the downward trend lines marked.

Year	Statewide Average: Based upon 98th Per- centile 24-Hour Con- centrations (µg/m <sup>3</sup> )	Statewide Average: Based upon Annual Weighted Means (µg/m <sup>3</sup> )
1999	53.5	16.8
2000	38.8	15.7
2001	34.9	15.0
2002	37.1	14.6
2003	32.6	13.9
2004	27.9	12.8
2005	36.3	15.1
2006	31.0	13.5
2007	34.8	14.3
2008	25.6	12.0
2009	22.4	10.8
2010	23.6	11.7
2011	24.0	10.6

Year	Statewide Average: Based upon 98th Per- centile 24-Hour Con- centrations (µg/m <sup>3</sup> )	Statewide Average: Based upon Annual Weighted Means (µg/m <sup>3</sup> )
2012	20.0	10.0
2013	19.6	9.7
2014	21.7	9.9
2015	20.1	8.9
2016	19.8	8.4
2017	16.3	7.9
2018	17.5	8.2
2019	16.5	7.9

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## Statewide PM<sub>2.5</sub> Averages



## Particulate Matter (PM<sub>10</sub>)

**Primary NAAQS:** Expected number of days with a maximum 24-hour concentration greater than 150 micrograms per meter cubed ( $\mu\text{g}/\text{m}^3$ ) must be less than or equal to one, on average over three years.

**Secondary NAAQS:** Same as Primary Standard

Coarse particulate matter of 10 microns or less in diameter is known as PM<sub>10</sub>. Common sources of PM<sub>10</sub> are prescribed fires, construction activities, agricultural practices, metal recycling, and smokestacks.

There were no exceedances of the annual PM<sub>10</sub> standard in 2019. The last exceedance of the standard occurred on March 22, 2012 at the Ashland site, which is located next to a metals recycler. All Kentucky counties are currently in attainment for the PM<sub>10</sub> standards.

### 2019 PM<sub>10</sub> Results: Maximum 24-Hr Concentrations ( $\mu\text{g}/\text{m}^3$ )

Method: Gravimetric

Data Interval: 24-Hour

Units: Micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

County/Site Name	1st Max	2nd Max	3rd Max	4th Max
Boyd	44	40	37	34
Carter	18	16	16	15
Fayette	31	28	21	21
Henderson*	16	17	16	16
Watson Lane (LMAPCD)	35	32	30	30
Algonquin Parkway (LMAPCD)	40	40	39	39
Livingston	26	24	24	24
McCracken	30	28	26	24

LMAPCD = Louisville Metro Air Pollution Control District

\* Incomplete data set; Henderson site was discontinued in February 2019.

# Statewide Averages for PM<sub>10</sub>

Statewide and regional PM<sub>10</sub> levels show declining trends over the past several decades, with 2019 representing the lowest statewide average concentration measured for PM<sub>10</sub>. This decrease is largely due to the installation of pollution controls on industrial sources for particulate matter.

These tables show the statewide average of the annual maximum 24-hour concentration for PM<sub>10</sub> from 1987 through 2019, measured in  $\mu\text{g}/\text{m}^3$ .

These data are graphed on the following page, with the downward trend line marked.

*Disclaimer:* These charts show generalized pollution trends through time. They do not show trends for specific sites, nor do they demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

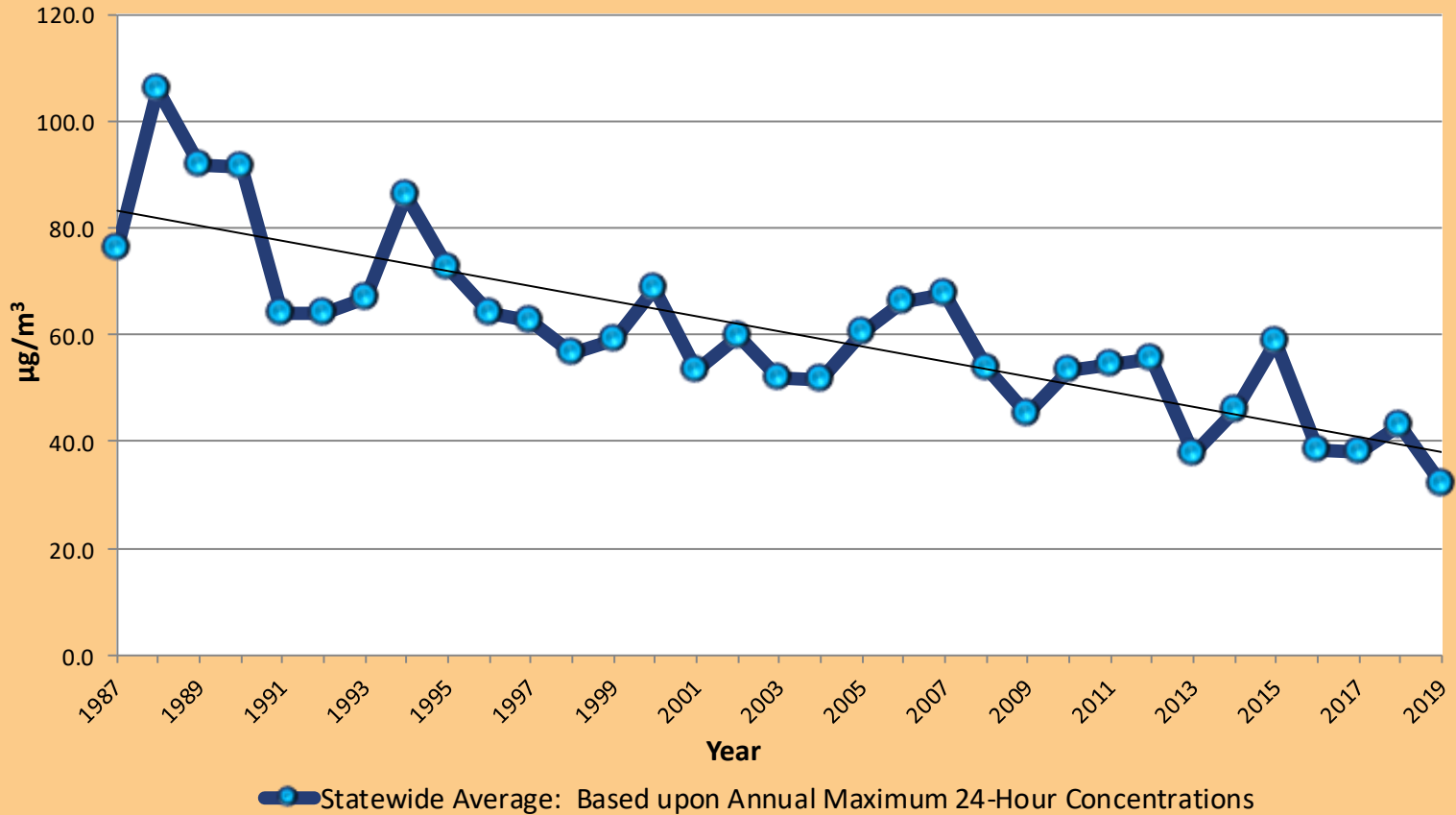
Year	Statewide Avg. Based upon Annual Maximum 24-Hour Concentrations ( $\mu\text{g}/\text{m}^3$ )
1987	76.0
1988	105.9
1989	91.7
1990	91.5
1991	64.1
1992	63.9
1993	66.9
1994	86.1
1995	72.7
1996	63.9
1997	62.4
1998	56.4
1999	59.0
2000	68.6
2001	53.4
2002	59.8
2003	52.0
2004	51.5
2005	60.3
2006	66.2
2007	67.7

Year	Statewide Avg. Based upon Annual Maximum 24-Hour
2008	53.6
2009	45.1
2010	53.3
2011	54.3
2012	55.5
2013	37.7
2014	46.0
2015	58.5
2016	38.5
2017	37.9
2018	42.9
2019	32.0



Air sampling inlets

## Statewide PM<sub>10</sub> Averages



## Sulfur Dioxide (SO<sub>2</sub>)

**Primary NAAQS:** 3-year average of the 99th percentile of the daily maximum 1-hour concentration not to exceed 75 ppb

**Secondary NAAQS:** 3-hour concentrations not to exceed 0.5 ppm (500 ppb) more than once per year

Sulfur dioxide (SO<sub>2</sub>) is a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. SO<sub>2</sub> is produced during the combustion of sulfur-containing fuels, ore smelting, petroleum processing, and the manufacturing of sulfuric acid. Nationwide, coal-fired power plants are the largest sources of SO<sub>2</sub>.

During 2019, one site recorded 13 exceedances of the daily one-hour standard of 75 ppb. That site, located near Sebree, Kentucky, was established to characterize maximum hourly sulfur dioxide concentrations for specific stationary sources. No other exceedances were recorded in the state.

### 2019 Sulfur Dioxide Results: 3-Year Average of Annual Daily Maximum 1-Hr Averages (ppb)

Method: Instrumental, Ultra-Violet Fluorescence

Data Interval: Hourly

County	2017	2018	2019	3 Yr Avg
Boyd	7	8	4	6
Campbell	16	9	8	11
Daviess	17	17	34	23
Edmonson (NPS)	3	5	2	3
Fayette	4	5	4	4
Greenup	7	11	9	9
Henderson (Baskett)*	10	13	12	12
Henderson (Sebree)	94	102	99	98
Watson Lane (LMAPCD)	14	16	15	15
Cannons Lane (LMAPCD)	7	8	10	8
Algonquin Parkway (LMAPCD)	11	12	6	9
Jessamine	3	3	4	3
McCracken	12	10	13	12

Units: Parts-per-billion (ppb)

LMAPCD = Louisville Metro Air Pollution Control District; NPS = National Park Service;

\* Incomplete data set; Henderson site was discontinued in February 2019.

## Statewide Averages for Sulfur Dioxide

The dramatic decline of sulfur dioxide levels is one of Kentucky's biggest air quality success stories. Emission controls on coal-fired power plants, as well as the trading allowances in the federal Acid Rain Program, have directly contributed to the decline in ambient SO<sub>2</sub> concentrations across the region.

These tables show the statewide average for SO<sub>2</sub> from 1985 through 2019, measured in parts-per-billion (ppb). For reference, the primary standard for SO<sub>2</sub> is the 3-year average of the 99th percentile of the daily maximum 1-hour concentration, not to exceed 75 ppb.

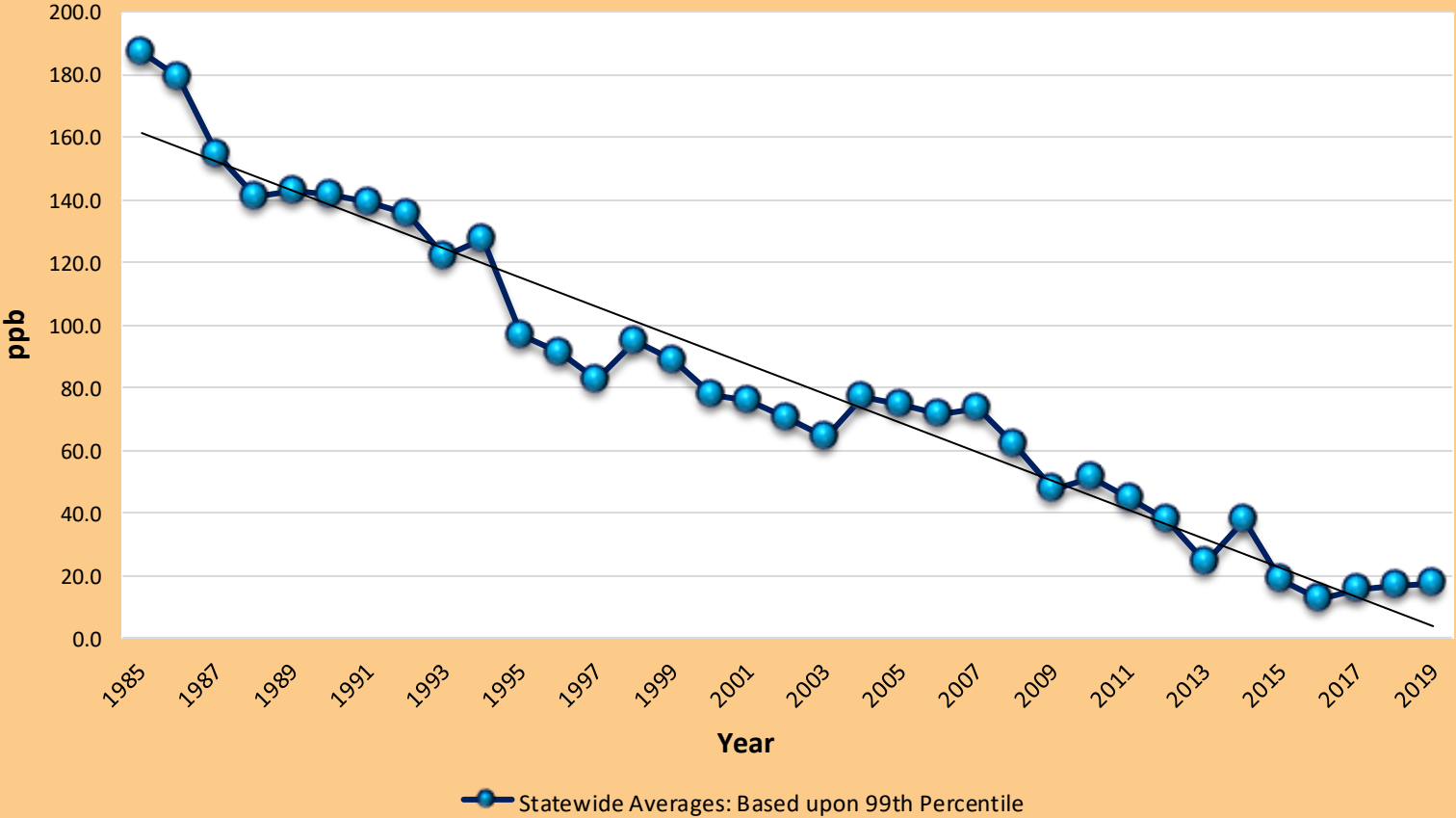
These data are graphed on the following page, with the downward trend line marked.

Year	Statewide Averages: Based upon 99th Percentile (ppb)
1985	187.6
1986	179.4
1987	154.9
1988	141.3
1989	143.3
1990	141.5
1991	139.6
1992	135.8
1993	122.3
1994	127.7
1995	96.8
1996	91.3
1997	82.7
1998	94.8
1999	88.7
2000	77.9
2001	76.1
2002	70.4
2003	64.4
2004	77.3
2005	74.6
2006	71.7

Year	Statewide Averages: Based upon 99th Percentile (ppb)
2007	73.6
2008	61.7
2009	47.9
2010	51.2
2011	44.4
2012	38.0
2013	24.2
2014	37.6
2015	18.7
2016	12.6
2017	15.8
2018	16.8
2019	17.3

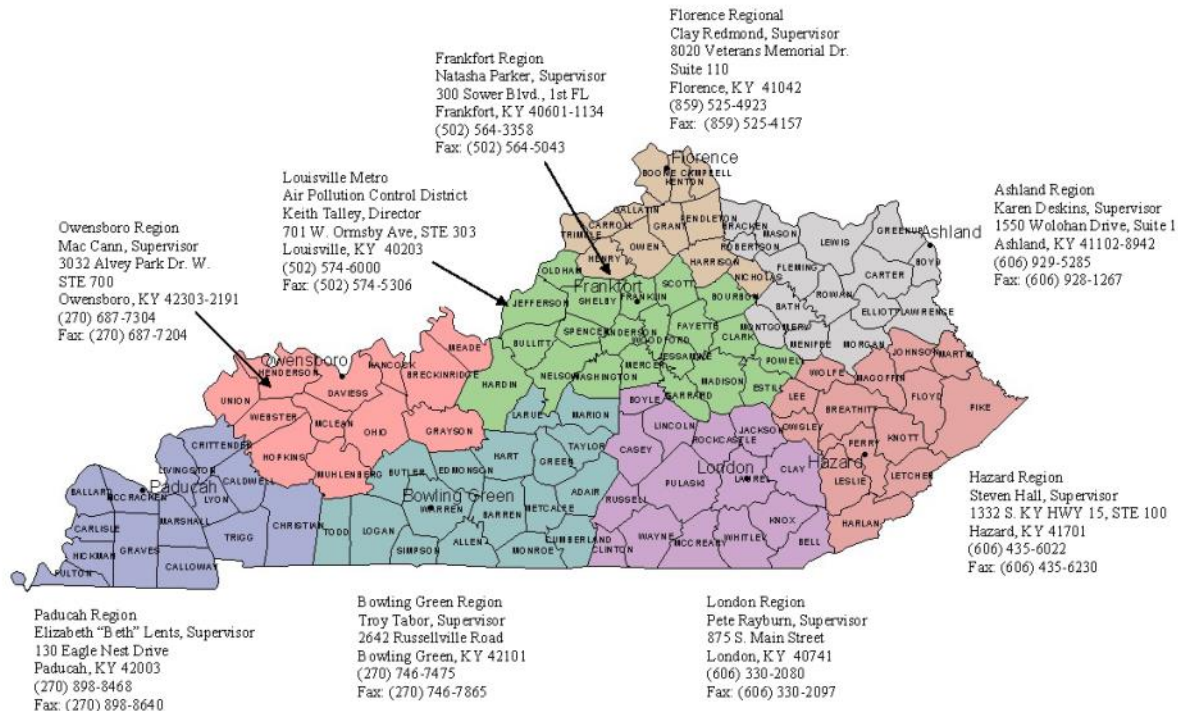
*Disclaimer:* These charts show generalized pollution trends through time. They do not show trends for specific sites, nor do they demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

# Statewide Averages for SO<sub>2</sub>



# Division for Air Quality Regional Office Boundaries

**Environmental Emergency, 24-hour; (502) 564-2380 or (800) 928-2380**



Revised: 01/03/2019

Visit the [Regional Field Offices web page](#) for a complete listing of field office locations and counties served.

# Field Operations Branch Training Programs

The division's Field Operations Branch created two specific branches of educational programming in early 2019.

The Field Inspector Required Education (FIRE) and the Inspector Core Education (ICE) training curriculums were designed to establish training that provides a comprehensive overview of the required knowledge and skills needed to conduct compliance inspections/field investigations under KY Statutes and Agency Administrative Regulations. The training programs consist of training courses that integrate legal, technical, and administrative subjects along with communication skills.

The ICE courses focus on Kentucky-specific regulations and branch standard operating procedures (SOPs). This allows the instructors to not only dive into individual regulatory language and interpretation, but also demonstrate practical applications of the regulations. Kentucky-specific SOPs are also covered to instruct new inspectors, and refresh experienced inspectors, on the correct operating procedures of the Field Operations Branch.

FIRE courses cover topics that are not specific to Kentucky. The courses range from federal regulation interpretation and application to varying sources encountered in Kentucky as well as specific emission monitoring and control devices that inspectors may encounter. All classes are open to discussions and sharing of examples, which enrich the student experience and help in retention of course material.

In all, there were 25 training programs developed and conducted from April 2019 – July 2020. The average session lasted for two hours for a total of 50 hours. Total class attendance numbered 462 over the 25 courses. This totals 1,024 hours of individual training hours.

Training courses continue to be developed and will be offered regularly in order to ensure that our field inspectors have the knowledge base to fairly and professionally apply state and federal regulations to determine compliance and serve the citizens of the Commonwealth and our industrial base.

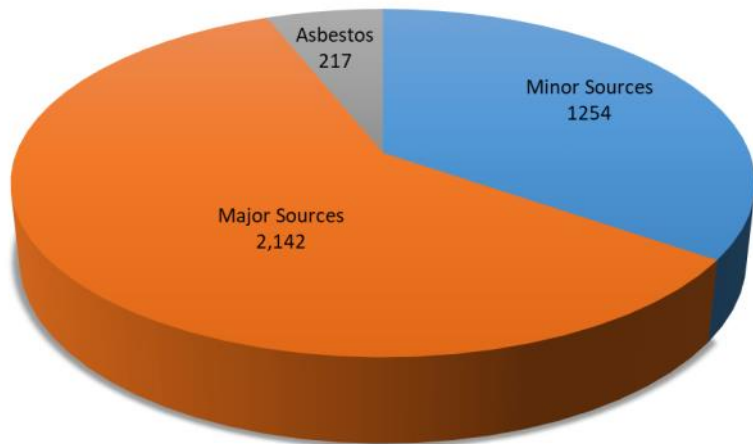


# Inspections

In calendar year 2019, Field Operations Branch staff completed **3,613** compliance inspections of various types at mostly permitted sources (major Title V, minor); **87 percent of inspected sources were found to be compliant.**

- Inspection activities for major and minor facilities include annual certification reviews, full compliance evaluation and partial compliance evaluations.
- Asbestos inspection activities include AHERA and NESHAP inspections.
- Inspection activities include excess emissions reviews, performance test reviews, semi-annual monitoring reviews, engineering inspections, follow-ups, infrared camera inspections, performance test observations and record reviews for all permitted facilities.

**2019 Source Inspection Activity**



## Field Operations & Covid-19

During the latter part of the fiscal year, COVID-19 dramatically changed the way Field Operations staff did their jobs.

- Facility inspections and investigations were conducted while making visual observations from off-site locations, or onsite when social distancing could be achieved and entry into a building could be avoided.
- Facility on-site records reviews were halted and limited to electronic reviews only.
- Indoor inspections of essential businesses were temporarily halted.
- All staff were required to perform a health self-assessment prior to performing inspections or entering regional offices.
- All in-person meetings were moved to electronic meeting platforms.

Air monitoring stations continued operation without interruption. However, only one person was permitted inside the station at a time and all staff were restricted to one person per vehicle.

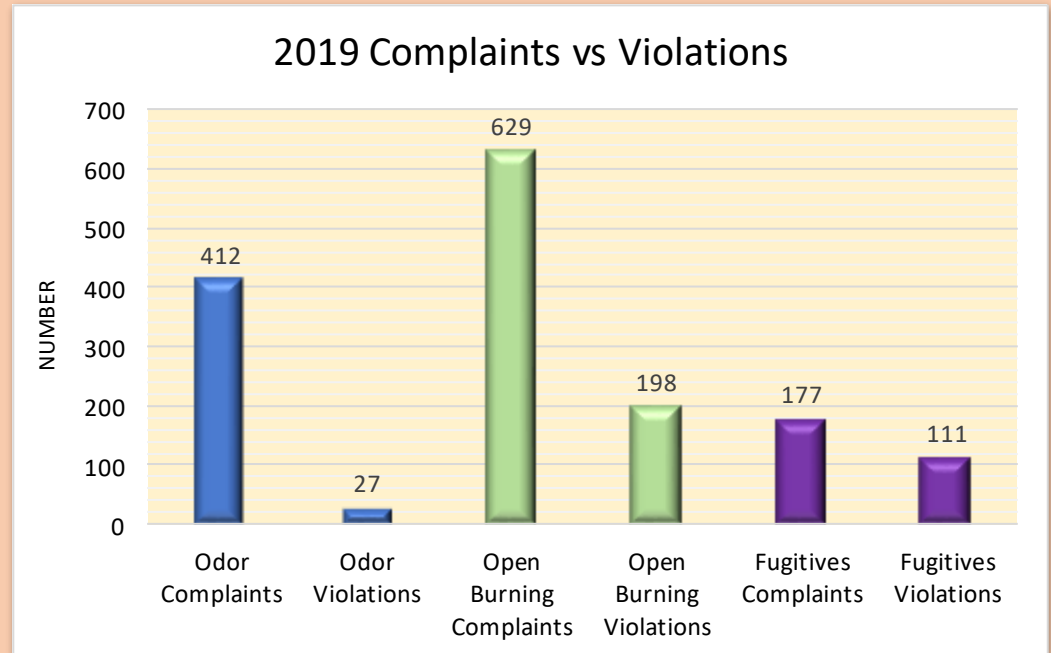


# Air Pollution Complaints

During 2019, the division received a total of **1,218 complaints**. The majority of complaints were about open burning, odors, and fugitive emissions. The breakdown of complaints vs. violations follows:

- 177 complaints were about fugitive emissions, 111 of which resulted in notices of violation (63 percent)
- 412 complaints were about odor, of which 27 resulted in notices of violation (7 percent)
- 629 complaints were about open burning, of which 198 resulted in notices of violation (31 percent)

In general, an air quality complaint represents a single incident about which one or more calls have been received. For example, a single incident of tire burning may generate several citizen calls to DAQ. Those calls are counted collectively as a single complaint, since they refer to a single incident.



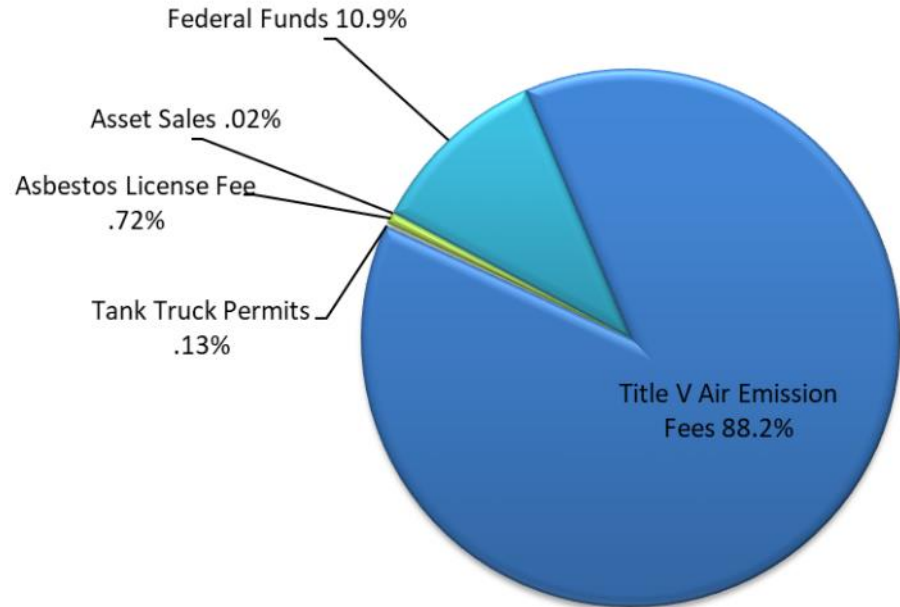
## Program Funding

The division operates primarily on Title V (pronounced “Title Five”) emissions fees and federal grant funds. Funding under the Title V program mandated by the Clean Air Act is through air pollutant emission fees assessed to permitted air pollution sources in the state that meet specific criteria.

State statute authorizes the division to charge fees sufficient to cover the cost of implementing and carrying out the requirements of the Title V program.

88 percent of the division’s funding comes from emissions fees under the Title V program. Another 10.9 percent comes from federal grant funds. The remaining funding comes from asbestos license application fees, tank truck permits, and proceeds from asset sales.

## FY 2020 Funding



## Emissions Inventory

The Emissions Inventory Section surveys nearly 1,200 plants per year to determine actual air pollutant emissions for the previous calendar year. Title V fees are generated based on actual emissions in a calendar year. Sources are surveyed annually and charged a per ton fee for emissions.

The table on this page shows data for the 2018 calendar year. At the time of publication of this report, data for the 2019 calendar year was still being verified. It takes approximately nine months to verify and complete the inventory for the previous year.



Pollutant	Tons Emitted in 2018
Carbon monoxide	63,782
Nitrogen dioxide	62,156
Particulate matter 2.5	6,275
Particulate matter 10	12,306
Sulfur dioxide	60,848
Volatile organic compounds (as an ozone precursor)	47,338

## Program Planning & COVID-19

The division's Program Planning & Administration Branch (PPAB) continued to produce timely and accurate work products while adapting to the remote working environment. Switching from in-person to online work kept staff safe, saved time and even saved paper as staff collaborated on drafts and final products through digital online platforms.

# Kentucky Greenhouse Gas Emissions

Because some gases have a higher warming potential than others, emissions of greenhouse gases are typically expressed in "carbon dioxide equivalent" (CO<sub>2</sub>e) in order to allow their impacts to be directly compared. EPA's Greenhouse Reporting Rule requires reporting of greenhouse gases from sources that emit 25,000 metric tonnes or more of CO<sub>2</sub>e per year in the U.S.

Although the division is not required to report greenhouse gas emissions on behalf of facilities, the Emissions Inventory Section collects this data when available.

Greenhouse Gas	2014 Actual Emissions (tons)	2015 Actual Emissions (tons)	2016 Actual Emissions (tons)	2017 Actual Emissions (tons)	2018 Actual Emissions (tons)
Carbon dioxide	100,438,102	92,176,908	86,531,345	73,655,105	76,999,573
Methane	100,197	88,373	89,313	88,675	89,808
Nitrous oxide	3,810	3,519	3,891	3,190	3,369
CO <sub>2</sub> e (metric tonnes)	94,096,177	86,712,303	81,703,900	69,838,096	72,943,967
CO <sub>2</sub> e (tons)	103,723,251	95,583,925	90,063,137	76,983,327	80,406,960

## Regulation Development

From July 2019 through June 2020, the Regulatory Development Section finalized amendments to four administrative regulations. These administrative regulations updated designation statuses in the Commonwealth, public notice requirements, compliance mechanisms for fugitive emissions, and application forms for asbestos certification.

## State Implementation Plan

During FY20, the Energy and Environment Cabinet (EEC) submitted four final revisions to [Kentucky's SIP](#):

- July 5, 2019 - Withdrawal letter submitted to EPA requesting removal of 401 KAR 51:010, Section 9, Attainment Status Designations for Sulfur Dioxide (SO<sub>2</sub>) from Kentucky's SIP.
- October 4, 2019 – 2010 SO<sub>2</sub> Data Requirements Rule Annual Report submitted to EPA.
- December 5, 2019 – 2010 SO<sub>2</sub> Redesignation Request for the portion of Jefferson County surrounding LG&E Mill Creek submitted to EPA. Proposed rule published in the Federal Register on May 15, 2020.
- December 9, 2019 – SIP Revision submitted adopting 401 KAR 51:010, Attainment Status Designation into KY SIP.

## Clean Diesel Grant

The Kentucky Clean Diesel Grant Program provides financial support for projects that protect human health and improve air quality by reducing harmful emissions from diesel school buses. The Division for Air Quality administers this program with funding provided through the federal Diesel Emissions Reduction Act (DERA).

During FY 2020, a total of **\$321,010** **was awarded** to the division through DERA. Out of nine school districts that applied, seven were selected to receive funding through the Kentucky Clean Diesel Grant Program. The seven school districts will replace a total of twelve older-model, diesel school buses with either new diesel, propane, or biodiesel buses. The new buses will emit 98 percent less particulate matter and 90 percent less nitrogen oxide pollution than the older buses they replaced.

# Air Permitting

The Permit Review Branch issues air permits for industrial and commercial sources that release pollutants into the air. Air permits include information on which pollutants are being released, how much may be released, and what kinds of steps the source's owner or operator is required to take to reduce the pollution. Permits also include plans to measure and report air pollution emitted.

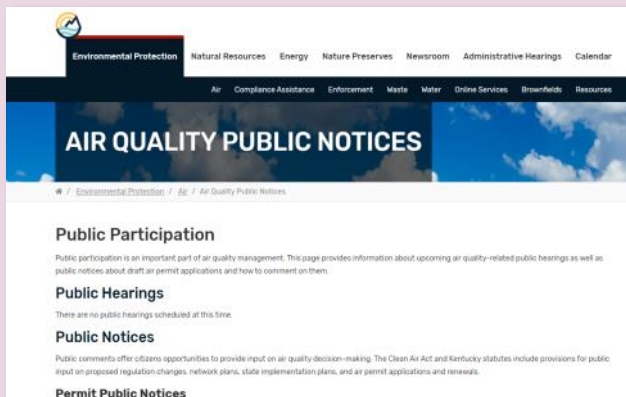
During FY20, the Permit Review Branch issued 393 permits. 18 of these were considered major economic development projects completed in partnership with the Cabinet for Economic Development. At the close of FY20, the branch had 199

pending applications in-house.

Division scientists performed reviews of modeling or refined modeling for five PSD pollutant analyses and 28 air toxic assessments during the fiscal year. These reviews included performing near-field modeling analyses or the thorough review and comment of reported modeling analyses.

## FY 2020 Permitting Actions

Type of Permit Action	Number
Major Permit Applications	92
Cond'l. Major Permit Applications	96
Minor Permit Applications	205
Registrations	415
Administrative Amendments	194



## Public Notices Revamped

In the spring of 2020, the Division for Air Quality changed the method of posting air permit public notices. Previously, public notices were required to be posted in local newspapers and libraries. Changes to the regulation 401 KAR 52:100 went into effect June 2, 2020, allowing the division to use its website as the primary means of notification for air permit public notices.

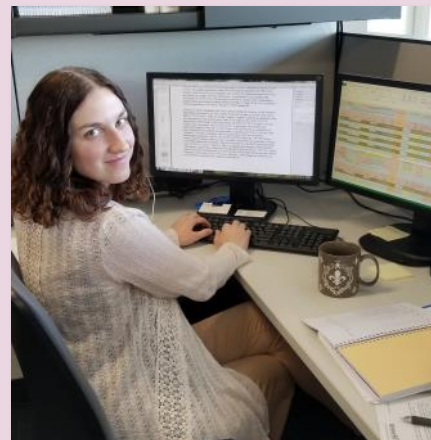
The [Public Notices webpage](#) was redesigned to accommodate supporting documentation for each permit public notice, making it easier for citizens to access all information in one place electronically. From time to time, the cabinet may continue to provide additional notice to the public through

other methods including newspapers, newsletters, and press releases.

## Permit Review & COVID-19

Prior to COVID-19, a normal day for air quality permit writers would be filled with internal meetings and meeting face-to-face with facility personnel. The pandemic required all of that to change. Through video calls and screen sharing, staff have been able to continue their work while maintaining safety by telecommuting. Weekly staff meetings utilize software allowing staff to share and edit documents in real time. Every employee can access documents and/or each other at anytime from anywhere to collaborate.

While working from home, the Permit Review Branch has been able to successfully maintain the level permits outside of regulatory timeframe and issue some highly technical permits.



# Outreach

The Division for Air Quality promotes environmental stewardship and public participation through environmental education programs, resources, and community partnerships.

During the first half of FY20, environmental education programs reached **1,227 people in 8 counties**.

During the second half of FY20, COVID-19 necessitated the cancellation of more than a dozen outreach programs and events. Online resources were developed to fill the void and provide resources to teachers who were also teaching remotely. These included:

- A story map developed for upper elementary students called ["How Clean is Our Air?"](#)
- A [lesson plan](#) & [student activity](#) about air pollution and Kentucky's air monitoring network
- Air Quality Awareness Week quizzes and social media posts