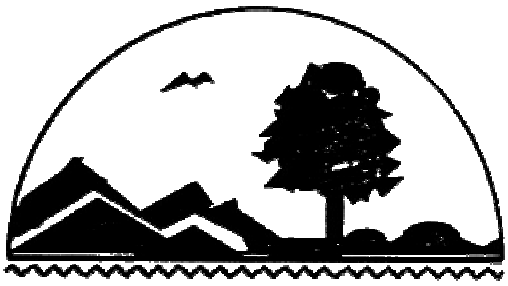
Kentucky

Ambient Air Quality

Annual Report

2001



Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection
Division for Air Quality
803 Schenkel Lane
Frankfort, Kentucky 40601

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FOREWORD

The Kentucky Ambient Air Quality Annual Report is produced by the Technical Services Branch of the state Division for Air Quality. This report presents the results of monitoring that was conducted in the calendar year 2001 to measure the outdoor concentrations of air pollutants in the Commonwealth.

The primary source of data for this report is the Air Quality Surveillance Network operated by the Kentucky Division for Air Quality. The report also contains monitoring data submitted by the Air Pollution Control District of Jefferson County, the U.S. Parks Service and some industries.

Network Design and Operation

The state has operated an air quality monitoring network since July 1967. The 2001 network included 122 monitors in 33 counties.

The monitoring station locations are selected with U.S. Environmental Protection Agency guidance and, in general, are established near high population areas or air pollution sources. Each year the site locations are reviewed to ensure that adequate coverage is being provided.

Many staff hours are devoted to operation of the monitoring network. Division staff routinely visit the sites to calibrate and maintain the monitoring equipment, collect particulate and acid rain samples, and verify and document data from the continuous monitors.

Because it is very important that the air monitoring data is accurate and precise, the Division for Air Quality has an extensive quality assurance program. Staff members audit every air monitor quarterly to ensure that each is operating properly. This audit includes monitors operated by the Air Pollution Control District of Jefferson County and those operated by industrial sources.

Monitoring data is used in several ways. The data is used to demonstrate compliance with and/or progress made toward meeting ambient air quality standards and to identify pollution trends. The data is also used to evaluate public health impacts and the possible need to initiate emergency control procedures.

The public has access to the information through this annual report and, on a daily basis, through the toll-free air quality index message number: 1-800-AIR-IN-KY. This is a 24-hour toll-free report on Kentucky's air quality. During the summer months, the public can also access daily ozone level reports through EPA's AIRNOW website at www.epa.gov/airnow.

Report Organization

This report contains sections on each criteria pollutant with the monitoring data contained in a table arranged alphabetically by county. Air toxics data and acid rain data are contained in separate sections.

The report has been composed and arranged in an attempt to make it "user friendly." Included in the report are: a National Ambient Air Quality Standards table; a table listing monitors by county; maps indicating monitor locations; pollutant trends graphs; and a division directory.

If you have suggestions or questions concerning this report or need additional copies, contact Jerry Sudduth, Technical Services Branch, Division for Air Quality, 803 Schenkel Lane, Frankfort, KY 40601.

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Ambient Air Quality Standards

POLLUTANT	MAXIMUM CONCENTRATION	
	PRIMARY STANDARD	SECONDARY STANDARD
Carbon monoxide		
8 hour average	9 ppm (1)	9 ppm (1)
1 hour average	35 ppm (1)	35 ppm (1)
Sulfur oxides		
24 hour average	0.14 ppm (1)	--
annual average	0.03 ppm	--
3 hour average	--	0.50 ppm (1)
Nitrogen dioxide		
Annual average	0.05 ppm	0.05 ppm
Lead		
Calendar Quarter average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$
Ozone		
1 hour average	0.12 ppm (4)	0.12 ppm (4)
8 hour average	0.08 ppm (5)	0.08 ppm (5)
Particulate Matter (measured as PM_{10})		
24 hour average	150 $\mu g/m^3$ (3)	150 $\mu g/m^3$ (3)
annual average	50 $\mu g/m^3$ (2)	50 $\mu g/m^3$ (2)
Particulate Matter (measured as $PM_{2.5}$)		
24 hour average	65 $\mu g/m^3$ (6)	65 $\mu g/m^3$ (6)
annual average	15 $\mu g/m^3$ (7)	15 $\mu g/m^3$ (7)

The federal Clean Air Act, as amended by the U.S.Congress in 1970, 1977 and 1990, directs the U.S. Environmental Protection Agency (EPA) to establish NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) defining maximum allowable ambient (outdoor) concentrations for criteria pollutants. The term "criteria pollutants" derives from the requirement that EPA must set criteria or standards for each.

There are two standard goal levels for each of the criteria pollutants. The PRIMARY STANDARD is designed to protect the public health. The SECONDARY STANDARD is designed to protect public health and welfare. Welfare covers damage to plants and animals, impairment of visibility and property damage.

Units of measure in chart are micrograms of pollutants per cubic meter of air ($\mu g/m^3$) and parts of pollutants per million (ppm) parts of air.

Footnotes:

(1) This average is not to be exceeded more than once per year.
(2) The standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 $\mu g/m^3$.
(3) The standard is attained when the expected number of days per calendar year with a twenty-four (24) hour average concentration above 150 $\mu g/m^3$ is equal to or less than one (1).
(4) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 $\mu g/m^3$) is equal to or less than one (1).
(5) The standard is attained when the 3 year average of the annual fourth-highest daily maximum 8-hr average ozone concentration is less than or equal to 0.08 ppm.
(6) The standard is attained when the 3 year average of the annual 98th percentile is less than or equal to 65 $\mu g/m^3$.
(7) The standard is attained when the 3 year average of annual means is less than or equal to 15 $\mu g/m^3$.

2001 Kentucky Air Monitoring Network Sites by County

County	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO	O_3	Pb	AcidRn	WS/WD
Bell	1	1			1	1			1
Boone						1			
Boyd	1	3	1	1	1	1			1
Bullitt	1	1		1		1			1
Campbell	1	1	1	1		1			
Carter	1					1		1	1
Christian	1								
Daviess	1	2	1	1	1	1			1
Edmonson[1]						1		1	
Fayette	2	2	1	1	1	2			
Franklin	1								
Graves						1			1
Greenup			1			1			
Hancock			1			1			
Hardin	1	1				1			
Harlan		1							
Henderson	1	1	1	1	1	2			
Jefferson[2]	4	6	3	2	5	3			1
Jessamine						1			1
Kenton	1	1		1	1	1			1
Livingston		1	1			2			1
McCracken	1	2	1	1	1	1			
McLean						1			1
Madison	1	1							
Marshall		1							

2001 Kentucky Air Monitoring Network Sites by County

County	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO	O_3	Pb	AcidRn	WS/WD
Oldham						1			
Perry	1	1				1			
Pike	1	1	1			1			
Pulaski		1				1			
Scott						1			
Simpson						1			1
Warren	1	1		1		1			
Whitley		1							
Total	22	30	13	11	12	32	0	2	12

[1] Operated by the National Park Service.
[2] Operated by the Air Pollution Control District of Jefferson County.

2001 Industrial Air Monitoring Network Sites by County

County	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO	O_3	Pb	Acid Rn	WS/WD
Christian						1			
Henderson			2						
Muhlenburg			1	1		1			1
Scott						1			
Trigg						1			
Webster			1						
Wayne,WV			3	1		1			
Total	0	0	7	2	0	5	0	0	1

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless, poisonous gas that is produced by the incomplete combustion of carbon containing fuels. The primary source of carbon monoxide is the exhaust from motor vehicles which includes highway and non-road vehicles such as construction equipment. Other sources include industrial processes and coal, kerosene and wood burning stoves in homes.

The main health effect of carbon monoxide is its tendency to reduce the oxygen carrying capacity of blood. Carbon monoxide enters the bloodstream in the lungs where it binds chemically with the hemoglobin in red blood cells. Hemoglobin normally carries oxygen to organs and tissues but because CO binds with the hemoglobin over 200 times more readily than oxygen, the amount of oxygen absorbed into the bloodstream is greatly reduced when CO is present. Depending on the level of exposure, CO can cause fatigue and headaches and can impair vision and reflexes. Unconsciousness and even death may occur at high concentrations. The severity of the effects is related to the length of exposure and concentration level of CO.

Carbon monoxide is monitored continuously by analyzers which operate using the non-dispersive infrared photometry method. In this method, ambient air is drawn into a sample cell and a beam of infrared light is passed through it. Carbon monoxide absorbs infrared light and any decrease in the intensity of the beam is due to the presence of CO. The decrease is directly related to the concentration of CO in the ambient air. A detector measures the difference between the sample cell beam and a duplicate beam passing through a reference cell with no CO present. The difference is translated into a measure of the CO present in the ambient air. Data from the analyzer is transmitted by telemetry for entry into an automated data storage system. In 2001 the Division for Air Quality and the Air Pollution Control District of Jefferson County (APCDJC) operated twelve CO monitors in Kentucky.

Primary NAAQS: 8-hour average not to exceed 9 ppm more than once per year.
1-hour average not to exceed 35 ppm more than once per year.

Secondary NAAQS: Same as primary standard.

Neither the one-hour or 8-hour standards were exceeded in 2001. The last exceedance of a standard occurred on January 7, 1998 at Ashland site 21-019-0014 when an 8-hour average of 11.7 ppm was recorded. Prior to the exceedance in Ashland, the most recent exceedance occurred in February 1993 in Louisville where an eight-hour average of 9.5 ppm was recorded at site 21-111-0052. All Kentucky counties are currently in attainment of the standards for carbon monoxide.

Statewide and regional carbon monoxide levels have declined substantially since 1980, primarily due to improved emission controls on motor vehicles (see Figure 1).

A statistical summary of carbon monoxide data collected in 2001 follows on page 8.

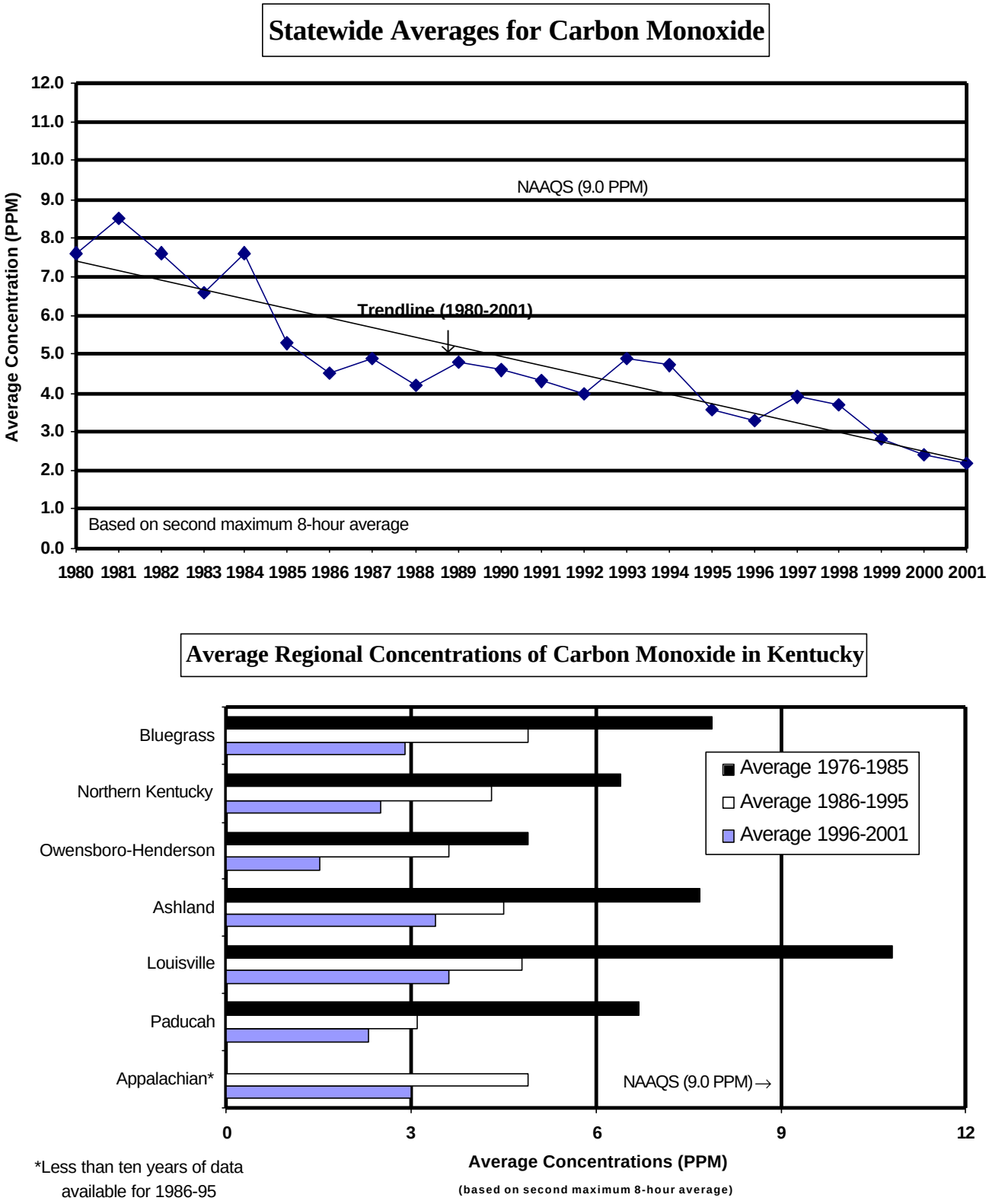


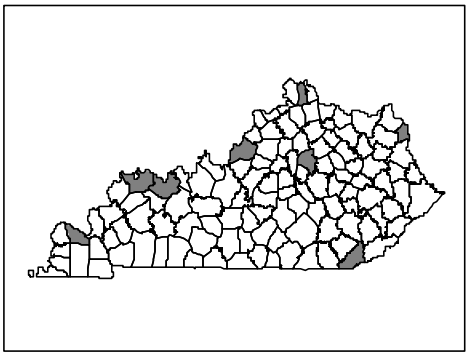
Figure 1. Carbon Monoxide trends

Criteria Pollutant Summary Report - 2001

Pollutant: Carbon Monoxide
Method: Instrumental/Non-Dispersive Infrared Photometry
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 1-Hour Average 35 PPM
8-Hour Average 9 PPM
Secondary NAAQS: Same as Primary Standard



County	Site	AIRS-ID	# Obs	1-Hr Averages			8-Hr Averages		
				1st max	2nd max	Obs> 35.0	1st max	2nd max	Obs > 9.0
Bell	34th and Dorchester Middlesboro	21-013-0002	3612	2.1	2.0	0	1.2	1.2	0
Boyd	2924 Holt Street Ashland	21-019-0017	3274	2.9	2.6	0	2.1	2.0	0
Daviess	US 60 and Pleasant Valley Rd, Owensboro	21-059-0005	3977	2.1	1.7	0	0.9	0.7	0
Fayette	650 Newtown Pike Lexington	21-067-0012	8385	5.2	3.9	0	2.7	2.7	0
Henderson	North Green Street Henderson	21-101-0013	4108	2.3	2.3	0	1.3	1.3	0
Jefferson [1]	424 W. Muhammad Ali Blvd, Louisville	21-111-0045	8345	5.3	4.9	0	3.6	3.1	0
Jefferson [1]	3510 Goldsmith Lane Louisville	21-111-0046	8482	4.7	4.4	0	4.1	3.9	0
Jefferson [1]	7201 Watson Lane Louisville	21-111-0051	8703	4.3	3.6	0	2.4	2.0	0
Jefferson [1]	7800 Preston Hwy Okolona	21-111-0052	7997	5.4	5.1	0	3.8	3.3	0
Jefferson [1]	1735 Bardstown Road Louisville	21-111-1019	8715	5.0	4.7	0	3.6	3.3	0
Kenton	1401 Dixie Highway Covington	21-117-0007	3720	2.4	2.2	0	1.8	1.2	0
McCracken	2901 Powell Street Paducah	21-145-1024	4130	2.8	2.5	0	2.2	1.7	0

[1] Carbon monoxide monitors located in Jefferson County are operated by the Air Pollution Control District of Jefferson County.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. Sulfur dioxide is produced by the combustion of sulfur containing fuels, ore smelting, petroleum processing and the manufacture of sulfuric acid. Nationwide, coal-fired power plants are the largest sources of sulfur dioxide. Other industrial sources include petroleum refineries and paper mills.

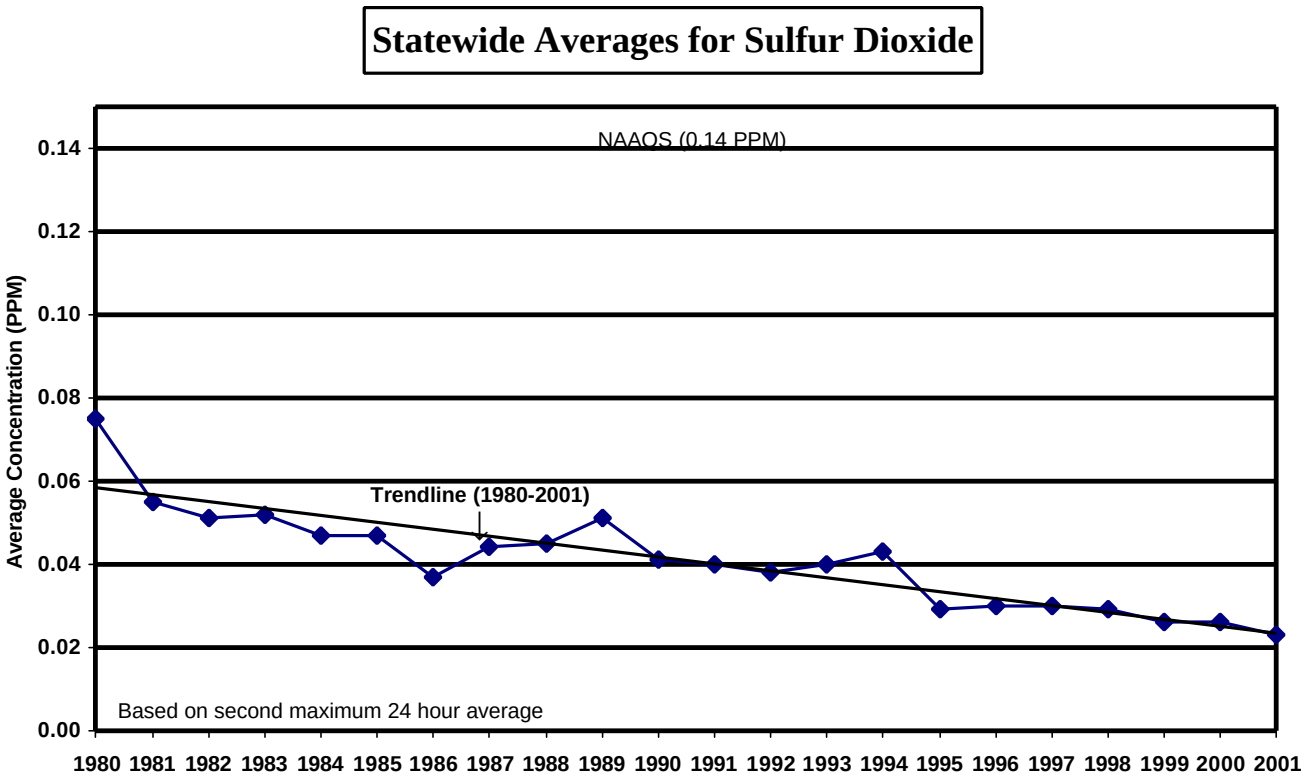
The primary health effect of sulfur dioxide is that it aggravates pre-existing respiratory, cardiovascular and pulmonary diseases. Asthmatics, children and the elderly are especially susceptible to the effects of sulfur dioxide pollution. Sulfur dioxide can also damage the foliage of trees and agricultural crops. It can also combine with moisture in the atmosphere to form sulfuric acid (H_2SO_4) which is a component of acid precipitation that causes acidification of soil and water and the erosion of building surfaces.

Sulfur dioxide is measured continuously by analyzers which use the ultraviolet (UV) fluorescence method. Fluorescent analyzers irradiate an ambient air sample with ultraviolet light. Sulfur dioxide molecules absorb a portion of this energy, then re-emit the energy at a characteristic wavelength of light. The light energy emitted by the sulfur dioxide molecules is proportional to the concentration of sulfur dioxide present in the sample. A photo multiplier cell measures the light emitted and converts it to a parts per million measurement. Data from the analyzer is transmitted by telemetry for entry into an automated data storage system. In 2001 the Division for Air Quality and the Air Pollution Control District of Jefferson County (APCDJC) operated thirteen SO_2 monitors in Kentucky.

Primary NAAQS:	Annual Arithmetic Mean not to exceed 0.03 ppm. 24-hour concentrations not to exceed 0.14 ppm more than once per year.
Secondary NAAQS:	3-hour concentrations not to exceed 0.50 ppm more than once per year.

There were no exceedances of any of the sulfur dioxide standards in 2001. The last exceedance of a sulfur dioxide standard occurred in November 1981 when the monitor at Louisville site 21-111-0032 recorded a 24-hour average of 0.159 ppm. Statewide and regional sulfur dioxide levels have declining trends over the past twenty years due at least in part to successful efforts of power plants to curb SO_2 emissions (see Figure 2).

A statistical summary of sulfur dioxide data collected in 2001 follows on page 11.



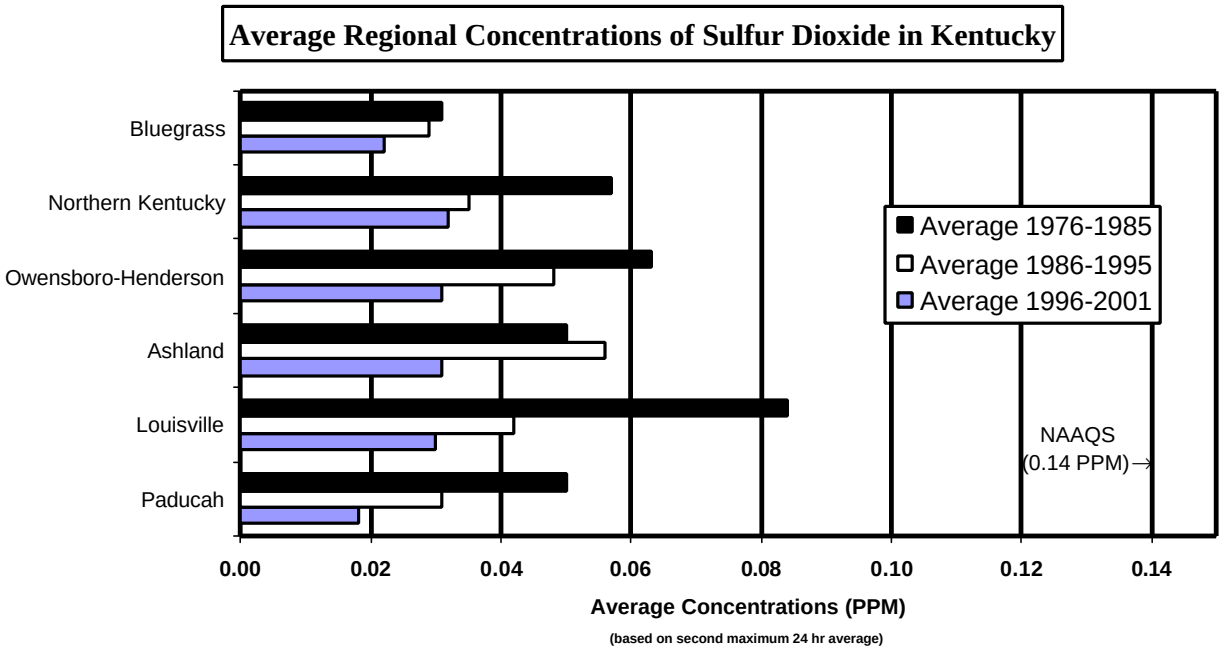
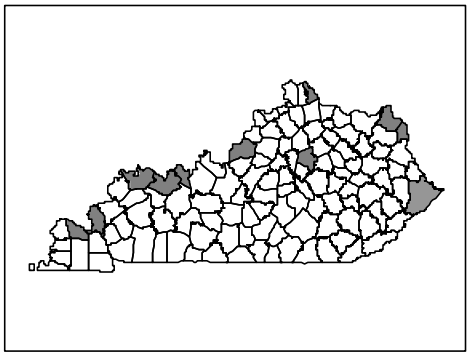


Figure 2. Sulfur Dioxide trends

Criteria Pollutant Summary Report - 2001

Pollutant: Sulfur Dioxide
Method: Instrumental
Ultra-Violet Fluorescence
Data Interval: Hourly
Units: Parts-per-million (PPM)



National Ambient Air Quality Standards (NAAQS)

Primary	NAAQS:	Annual Arithmetic Mean	0.03 PPM
		24-Hour Average	0.14 PPM
Secondary	NAAQS:	3-Hour Average	0.50 PPM

County	Site	AIRS-ID	# Obs	Annual Mean	24-Hr Average			3-Hr Average		
					1st max	2nd max	Obs> .14	1st max	2nd max	Obs> .50
Boyd	32nd and Railroad St Ashland	21-019-0015	8446	.006	.029	.022	0	.076	.059	0
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	7995	.005	.028	.023	0	.073	.071	0
Daviess	US 60 and Pleasant Valley Rd, Owensboro	21-059-0005	8231	.004	.019	.019	0	.063	.051	0
Fayette	650 Newtown Pike Lexington	21-067-0012	8528	.005	.041	.029	0	.061	.059	0
Greenup	Scott & Center Streets Worthington	21-089-0007	8354	.006	.028	.025	0	.069	.051	0
Hancock	2nd & Caroline Avenue Lewisport	21-091-0012	8001	.005	.029	.029	0	.087	.062	0
Henderson	North Green Street Henderson	21-101-0013	8290	.005	.059	.036	0	.062	.061	0
Jefferson[1]	4800 Kaufman Lane Louisville	21-111-0032	8613	.006	.032	.032	0	.116	.115	0
Jefferson[1]	7201 Watson Lane Louisville	21-111-0051	8518	.005	.027	.024	0	.125	.067	0
Jefferson[1]	4201 Algonquin Pkwy Louisville	21-111-1041	7715	.006	.036	.033	0	.115	.101	0
Livingston	763 Bloodworth Road off KY 453	21-139-0004	8273	.003	.016	.016	0	.053	.044	0
McCracken	2901 Powell Street Paducah	21-145-1024	8178	.003	.010	.010	0	.029	.028	0
Pike	101 North Mayo Trail Pikeville	21-195-0002	7889	.002	.007	.006	0	.022	.021	0

[1] Sulfur dioxide monitors located in Jefferson County are operated by the Air Pollution Control District of Jefferson County.

Nitrogen Dioxide

Nitrogen dioxide is a reddish brown gas that is produced during the high temperature combustion of fossil fuels. During combustion, nitrogen and oxygen are combined, or oxidized, to form a family of highly reactive gases called nitrogen oxides (NO_x) which includes nitrogen dioxide (NO_2) and nitrogen oxide (NO). In addition to the nitrogen dioxide produced during combustion, the NO produced may, in the presence of sunlight, undergo a photochemical reaction which will also form NO_2. The rate of reaction is dependent upon the intensity of the sunlight. Major combustion or oxidation sources that produce nitrogen dioxide include motor vehicles, power plants, incinerators, industrial boilers and some chemical processes.

The primary health effect of nitrogen dioxide is as a lung irritant which can cause an increase in respiratory rate, a decrease in lung function and can increase the susceptibility of the respiratory system to infection. Nitrogen dioxide can also be considered detrimental to human health due to its association in the formation of ozone and the resulting health effects caused by that pollutant. Nitrogen dioxide is also a contributor to the formation of acid precipitation which can damage plant and aquatic life and cause the deterioration of stone and masonry-type buildings and statues.

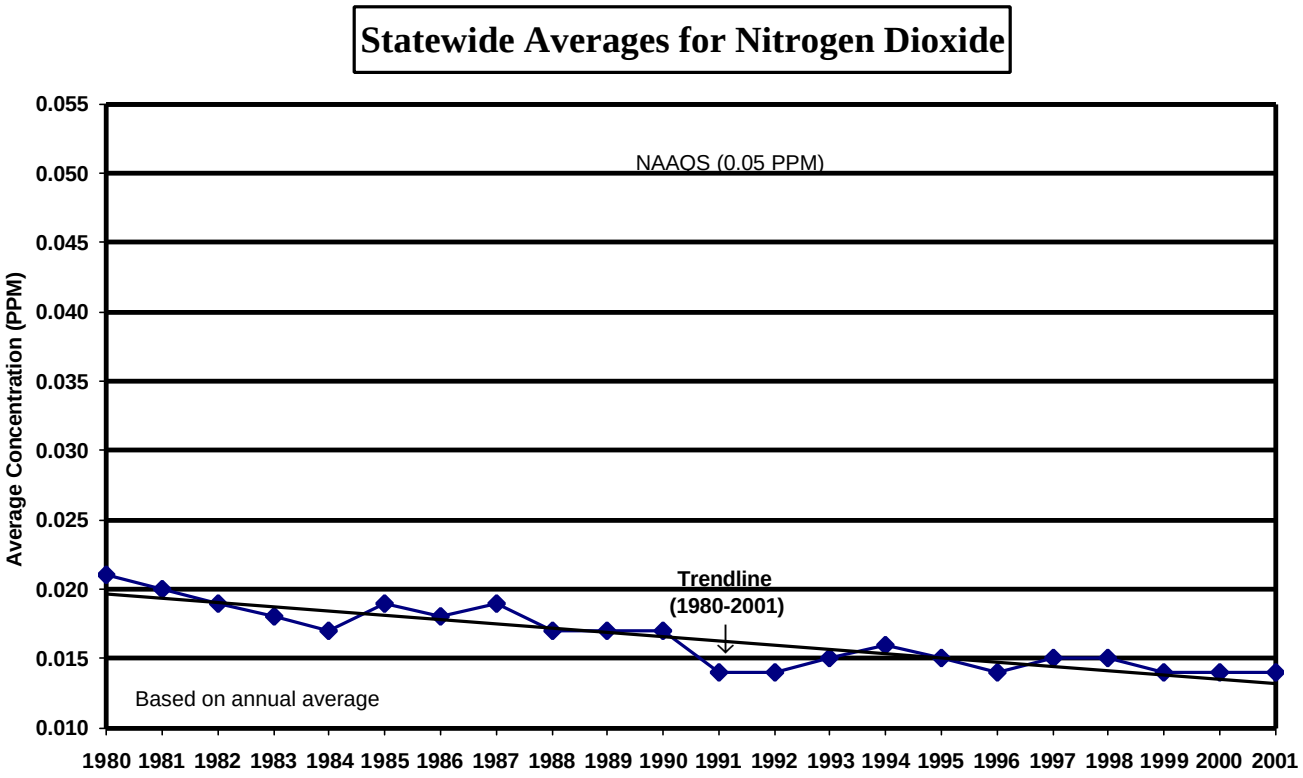
Nitrogen dioxide is monitored continuously by analyzers which utilize the principle of photometric detection of the chemiluminescence (light) resulting from the gas phase reaction of nitric oxide and ozone. When these two gases react, light at a specific wavelength is produced. In operation, sample air is drawn into the analyzer and split into two streams. The first stream is reacted directly with ozone (which is produced by a generator in the analyzer) and the light energy produced is proportional to the NO in the sample. Since NO_2 does not react with ozone, the second stream of air passes through a catalytic converter that converts the NO_2 in the sample to NO. That stream is then reacted with ozone which will provide a total measurement of nitrogen oxides (NO_x) in the sample. The assumption is that the majority of the NO_x value is not NO_2. By subtracting the NO value obtained by the first stream from the NO_x value obtained in the second stream, a NO_2 value is obtained. Data from the analyzer is transmitted by telemetry for entry into an automated data storage system. In 2001 the Division for Air Quality and the Air Pollution Control District of Jefferson County operated eleven nitrogen dioxide monitors in Kentucky.

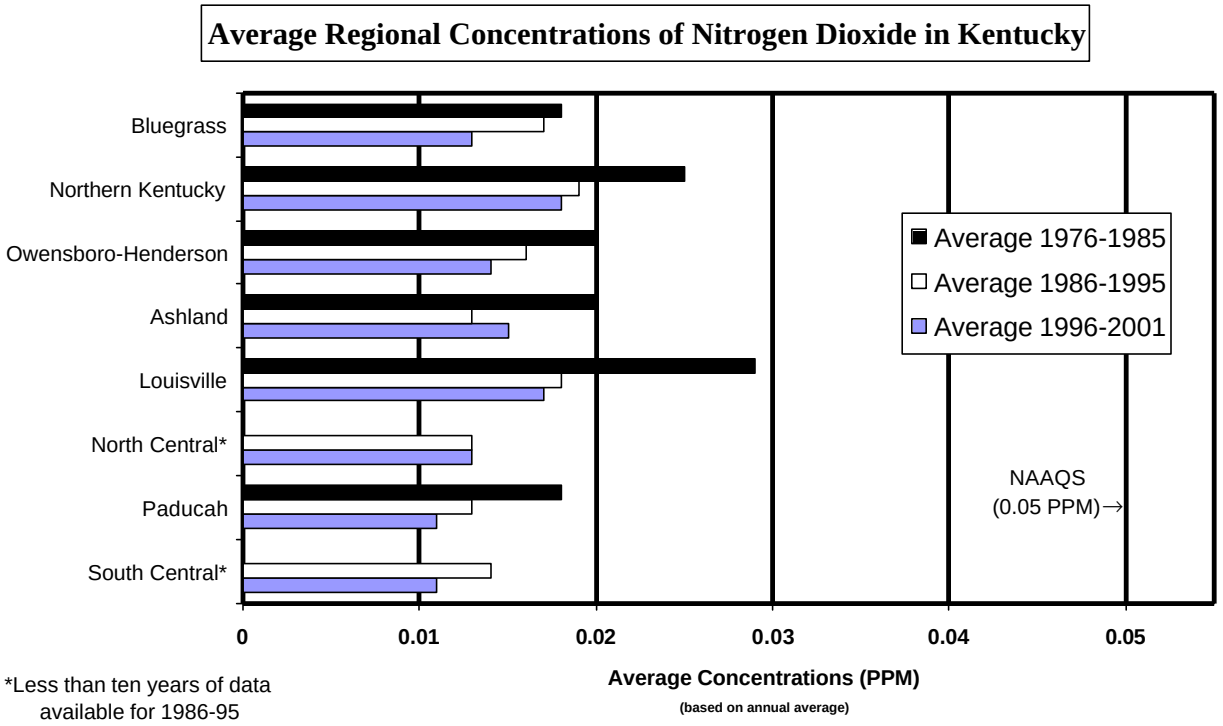
Primary NAAQS: Annual Arithmetic Mean not to exceed 0.05 ppm.

Secondary NAAQS: Same as primary standard.

There were no exceedances of the NO_2 standard in 2001 and there have been no recorded exceedances of the NAAQS since the inception of sampling in 1970. Statewide and regional nitrogen dioxide levels show steady downward trends likely due to the use of pollution control devices on motor vehicles, power plants and industrial boilers (see Figure 3).

A statistical summary of nitrogen dioxide data collected in 2001 follows on page 14.





*Less than ten years of data available for 1986-95

Figure 3. Nitrogen Dioxide trends

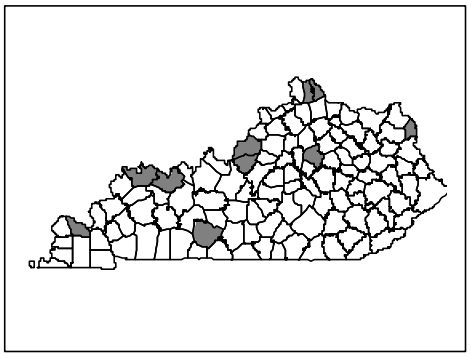
Criteria Pollutant Summary Report - 2001

Pollutant: Nitrogen Dioxide
Method: Instrumental/Gas-Phase Chemiluminescence
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: Annual Arithmetic Mean 0.05 PPM

Secondary NAAQS: Same as Primary Standard



County	Site	AIRS-ID	# Obs	Mean	1-Hr Average	
					1st max	2nd max
Boyd	32nd and Railroad Streets Ashland	21-019-0015	8274	.015	.067	.062
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	7972	.011	.059	.054
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	8324	.015	.107	.091
Daviess	US 60 and Pleasant Valley Road Owensboro	21-059-0005	7806	.010	.052	.051
Fayette	650 Newtown Pike Lexington	21-067-0012	8084	.013	.064	.063
Henderson	North Green Street Henderson	21-101-0013	8262	.016	.078	.074
Jefferson[1]	7201 Watson Lane Louisville	21-111-0051	7493	.013	.075	.060
Jefferson[1]	1918 Mellwood Avenue Louisville	21-111-1021	8697	.023	.077	.073
Kenton	1401 Dixie Highway Covington	21-117-0007	8295	.018	.075	.073
McCracken	2901 Powell Street Paducah	21-145-1024	8322	.011	.062	.057
Warren	Oakland Elementary School Oakland	21-227-0008	8211	.008	.059	.052

[1] Nitrogen dioxide monitors located in Jefferson County are operated by the Air Pollution Control District of Jefferson County.

Ozone

Ozone is a colorless gas which is not emitted directly into the atmosphere from sources but forms in the atmosphere from a photochemical reaction between volatile organic compounds and nitrogen oxides in the presence of sunlight. Sources of volatile organic compounds include motor vehicle exhaust, dry cleaning and paint solvents and evaporation of gasoline from storage and transfer facilities. Sources of nitrogen oxides include emissions from motor vehicles, boilers, incinerators and power plants.

In the upper atmosphere, naturally occurring stratospheric ozone (commonly called the ozone layer), shields the earth's surface from the sun's harmful ultraviolet rays. However, tropospheric or ground level ozone causes irritation of the respiratory system and is particularly harmful to those persons with asthma and circulatory problems. Ozone can also cause damage to crops and increase the deterioration of rubber, paints and fabrics.

Ozone is monitored during the period from March 1 thru October 31 each year when meteorological conditions are most conducive to the formation of ozone. During this period, ozone is monitored continuously by analyzers which operate using the ultraviolet photometry method of analysis. In this method, ambient air is drawn into a sample cell and a beam of ultraviolet light is passed thru it. Ozone absorbs ultraviolet light and a decrease in the intensity of the light indicates the presence of ozone. The intensity of the light is first measured with no ozone present to determine a reference value. An ambient sample is then introduced and the intensity of the resultant light is measured by an ultraviolet detector. The amount of light absorbed by the sample indicates the level of ozone present. Data from the analyzers is transmitted by telemetry for entry into an automated data storage system. In 2001 the Division for Air Quality, the National Park Service at Mammoth Cave and the Air Pollution Control District of Jefferson County (APCDJC) operated thirty-two ozone monitors in Kentucky.

Primary NAAQS:	Maximum one-hour average concentration of 0.12 ppm. Average number of expected exceedences per year not to exceed 1.0 over the last three years. Maximum 8-hour average concentration of 0.08 ppm (based on a three - year average of the annual fourth highest daily maximum 8-hour averages).
Secondary NAAQS:	Same as primary standard.

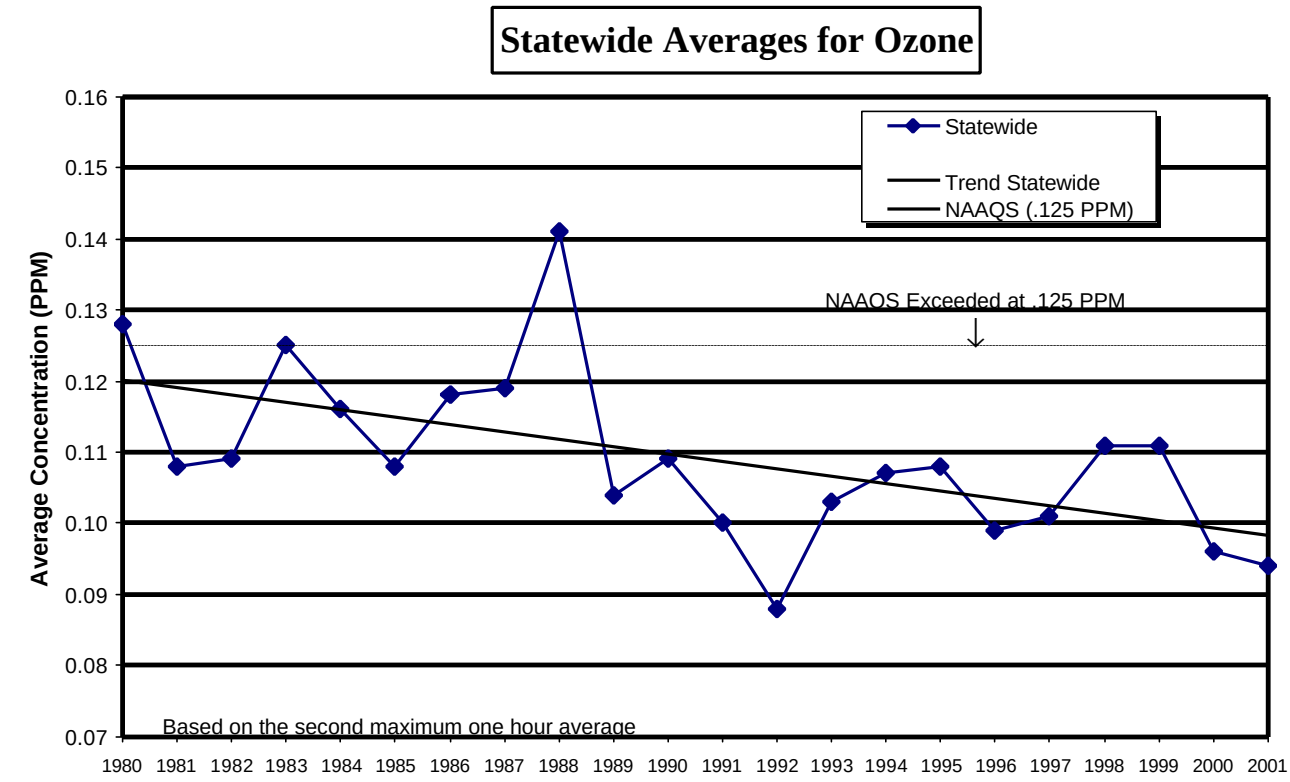
The one-hour ozone standard is written with two decimal places, however actual monitoring data is recorded to three decimal places and must be rounded to two places for comparison to the standard. Therefore the standard is exceeded when a daily one-hour average is greater than or equal to 0.125 ppm. Due to maintenance, repairs and calibration of the analyzers it is impossible to collect 100% of the possible hourly values occurring during the ozone season. Therefore a formula has been developed to estimate the "expected number of exceedances" that would have occurred if 100% of

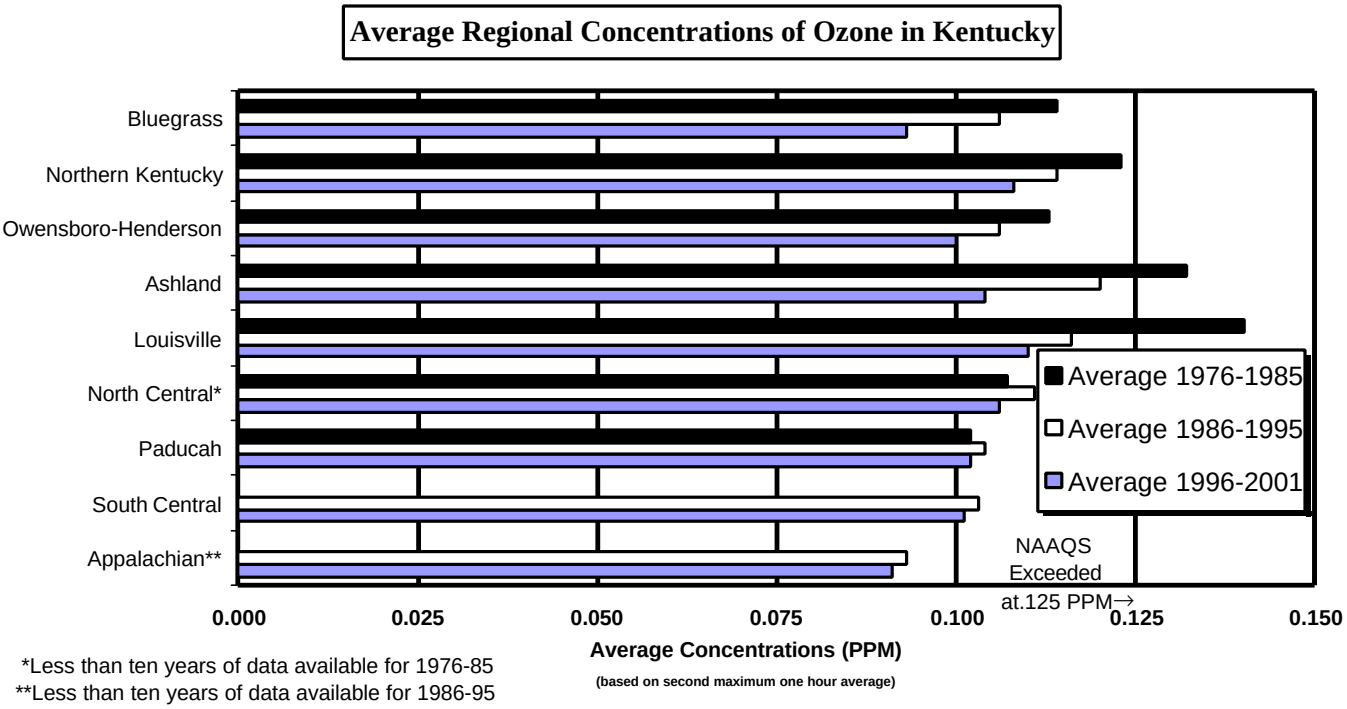
the possible data values had been collected. The expected number of exceedances calculated for each monitor is used to determine attainment of the one hour standard. The standard is attained when the expected number of exceedances for a monitor is less than or equal to 1.0 averaged over the last three calendar years. During the period 1999-2001, no monitor had an average expected number of exceedances greater than 1.0 (see one-hour ozone multi-year expected exceedances on pages 20-21).

There has been a general decline in ozone levels over the past twenty-five years based on one-hour data as seen in Figure 4. This downward trend is the result of emission controls on vehicles, such as catalytic converters, and controls on industrial sources of VOC's and nitrogen oxides. A statistical summary of one-hour ozone data collected in 2001 follows on pages 18-19.

In November 1997 the federal EPA adopted a new eight-hour ozone standard based on scientific and medical research which indicated that extended exposure to lower levels of ozone may be as harmful as short term exposure to elevated levels. The new eight-hour standard is set at 0.08 ppm and is exceeded when an average level of ozone over an eight hour period is 0.085 ppm or greater. The standard is attained if the fourth highest daily 8-hour average for each of the three most recent years are averaged and that average is less than 0.085 ppm. Eight-hour multi-year averages for 1999-2001 can be found on pages 22-23. In 2001 there were 51 exceedances of the 8-hour standard with twenty-three monitors recording at least one 8-hour exceedance. Only preliminary attainment designations have been made based on eight-hour readings.

A statistical summary of eight-hour ozone data collected in 2001 follows on pages 18-19.



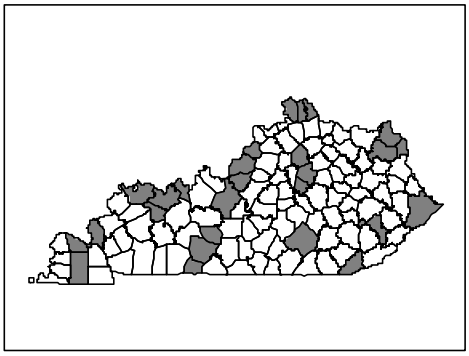


*Less than ten years of data available for 1976-85
**Less than ten years of data available for 1986-95

Figure 4. Ozone trends

Criteria Pollutant Summary Report - 2001

Pollutant: Ozone
Method: Ultra-Violet Photometry
Data Interval: Hourly
Units: Parts-per-million (PPM)



National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 1-Hour (1 per year/3 years) 0.12 PPM
8-hour (3 year avg of 4th max.) 0.08 PPM

Secondary NAAQS: Same as Primary Standard

County	Site	AIRS-ID	# Obs	1-Hr Average			8-Hr Average				
				Obs >0.12	1st max	2nd max	Obs >0.08	1st max	2nd max	3rd max	4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	5808	0	.095	.092	1	.089	.081	.081	.077
Boone	KY 338 & Rabbit Hash Rd, Eastbend	21-015-0003	5835	0	.100	.097	1	.085	.084	.084	.083
Boyd	32nd and Railroad St Ashland	21-019-0015	5847	0	.110	.104	4	.091	.089	.085	.085
Bullitt	2nd & Carpenter St Shepherdsville	21-029-0006	5807	1	.136	.101	2	.100	.089	.083	.082
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	5711	0	.114	.110	6	.100	.095	.091	.088
Carter	Camp Webb Grayson Lake	21-043-0500	5840	0	.103	.098	0	.079	.078	.077	.076
Daviess	US 60 and Pleasant Valley, Owensboro	21-059-0005	5775	0	.108	.086	1	.094	.080	.076	.073
Edmonson[1]	Alfred Cook Road Mammoth Cave	21-061-0501	8680	0	.098	.094	2	.087	.085	.083	.080
Fayette	Iron Works Pike Lexington	21-067-0001	5621	0	.088	.079	0	.076	.070	.067	.066
Fayette	650 Newtown Pike Lexington	21-067-0012	5841	0	.098	.092	1	.091	.084	.084	.078
Graves	Byerly Farm on KY 1949, Symsonia	21-083-0003	5835	0	.097	.087	0	.078	.077	.077	.073
Greenup	Scott & Center St Worthington	21-089-0007	5807	0	.119	.113	6	.092	.090	.089	.088
Hancock	2nd & Caroline Lewisport	21-091-0012	5668	0	.104	.090	1	.093	.082	.082	.077
Hardin	801 North Miles St Elizabethtown	21-093-0006	5784	0	.101	.095	3	.090	.089	.086	.080
Henderson	North Green Street Henderson	21-101-0013	5866	0	.091	.090	0	.077	.073	.072	.072
Henderson	Baskett Fire Dept. Baskett	21-101-0014	5290	0	.091	.086	1	.087	.079	.075	.074
Jefferson[2]	7601 Bardstown Rd Louisville	21-111-0027	5783	0	.100	.097	2	.086	.085	.081	.081
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	5857	0	.111	.103	1	.086	.082	.082	.081
Jefferson[2]	1918 Mellwood Ave Louisville	21-111-1021	5779	0	.097	.094	1	.085	.080	.078	.077

Ozone Summary Report Continued

County	Site	AIRS-ID	# Obs	1-Hr Average			8-Hr Average				
				Obs >0.12	1st max	2nd max	Obs >0.08	1st max	2nd max	3rd max	4th max
Jessamine	DOT Garage US27 Nicholasville	21-113-0001	5848	0	.084	.084	0	.080	.077	.076	.076
Kenton	1401 Dixie Highway Covington	21-117-0007	5839	0	.112	.106	2	.095	.087	.084	.082
Livingston	KYDOT, 811 US60E Smithland	21-139-0003	5803	0	.101	.099	3	.087	.087	.087	.084
Livingston	763 Bloodworth Rd off KY 453	21-139-0004	5563	0	.096	.087	1	.087	.078	.077	.076
McCracken	2901 Powell Street Paducah	21-145-1024	5813	0	.103	.087	1	.088	.079	.079	.077
McLean	3962 KY 815 Guffie	21-149-0001	5690	0	.105	.090	1	.092	.080	.079	.078
Oldham	DOT Garage Buckner	21-185-0004	5825	0	.108	.104	4	.092	.089	.089	.086
Perry	Perry Co Horse Park Hazard	21-193-0003	5806	0	.084	.084	0	.076	.075	.073	.072
Pike	101 North Mayo Trail, Pikeville	21-195-0002	5764	0	.088	.086	0	.081	.080	.078	.075
Pulaski	Clifty Street Somerset	21-199-0003	5840	0	.102	.087	0	.079	.078	.078	.077
Scott	Fire Station on KY32 Sadieville	21-209-0001	5849	0	.075	.075	0	.070	.067	.066	.066
Simpson	DOT Garage on KY 1008, Franklin	21-213-0004	5813	0	.104	.102	4	.092	.091	.087	.085
Warren	Oakland Elementary School, Oakland	21-227-0008	5709	0	.104	.103	2	.094	.091	.081	.081

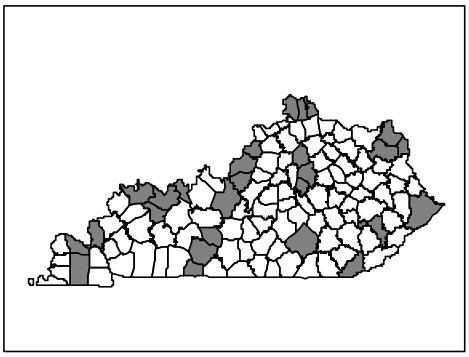
[1] Monitor operated by the National Park Service at Mammoth Cave.
[2] Monitor operated by the Air Pollution Control District of Jefferson County.

Criteria Pollutant Multi-year Summary Report -2001
3 Year Average of One-hour Expected Exceedances

Pollutant: Ozone
Method: Ultra-Violet Photometry
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 1-Hour (1 per year/3 years) 0.12 PPM
8-Hour (3-year avg of 4th max.) 0.08 PPM
Secondary NAAQS: Same as Primary Standard



County	Site	AIRS-ID	1999		2000		2001		3 year expected avg
			Actual	Expect	Actual	Expect	Actual	Expect	
Bell	34th & Dorchester Middlesboro	21-013-0002	0	0	0	0	0	0	0.0
Boone	KY 338 & Rabbit Hash Road, Eastbend	21-015-0003	0	0	0	0	0	0	0.0
Boyd	32nd & Railroad Streets Ashland	21-019-0015	0	0	0	0	0	0	0.0
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	0	0	0	0	1	1.0	0.3
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	*	*	0	0	0	0	*
Carter	Camp Webb Grayson Lake	21-043-0500	0	0	0	0	0	0	0.0
Daviess	US 60 & Pleasant Valley Road, Owensboro	21-059-0005	0	0	0	0	0	0	0.0
Edmonson[1]	Alfred Cook Road Mammoth Cave	21-061-0501	1	1.0	0	0	0	0	0.3
Fayette	Iron Works Pike Lexington	21-067-0001	0	0	0	0	0	0	0.0
Fayette	650 Newtown Pike Lexington	21-067-0012	0	0	0	0	0	0	0.0
Graves	Byerly Farm, KY 1949 Symsonia	21-083-0003	0	0	0	0	0	0	0.0
Greenup	Scott & Center Streets Worthington	21-089-0007	0	0	0	0	0	0	0.0
Hancock	2nd & Caroline Streets Lewisport	21-091-0012	0	0	0	0	0	0	0.0
Hardin	801 North Miles Street Elizabethtown	21-093-0006	*	*	0	0	0	0	*
Henderson	North Green Street Henderson	21-101-0013	0	0	0	0	0	0	0.0
Henderson	Baskett Fire Dept Baskett	21-101-0014	0	0	0	0	0	0	0.0
Jefferson[2]	7601 Bardstown Road Louisville	21-111-0027	0	0	0	0	0	0	0.0
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	0	0	0	0	0	0	0.0
Jefferson[2]	1918 Mellwood Ave Louisville	21-111-1021	0	0	0	0	0	0	0.0

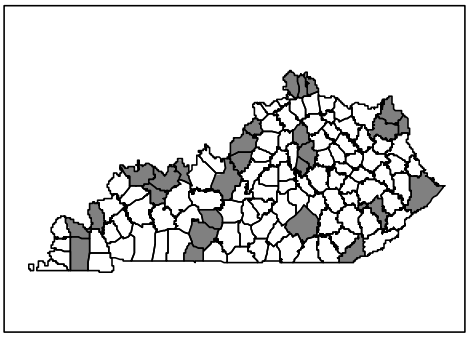
Ozone 3 Year 1-Hour Averages Continued

County	Site	AIRS-ID	1999		2000		2001		3 year expected Avg
			Actual	Expect	Actual	Expect	Actual	Expect	
Jessamine	DOT Garage US 27 Nicholasville	21-113-0001	0	0	0	0	0	0	0.0
Kenton	1401 Dixie Highway Covington	21-117-0007	0	0	0	0	0	0	0.0
Livingston	KYDOT, 811 US 60 East Smithland	21-139-0003	0	0	0	0	0	0	0.0
Livingston	763 Bloodworth Road off KY 453	21-139-0004	0	0	0	0	0	0	0.0
McCracken	2901 Powell Street Paducah	21-145-1024	0	0	0	0	0	0	0.0
McLean	3962 KY 815 Guffie	21-149-0001	0	0	0	0	0	0	0.0
Oldham	DOT Garage, Morgan Rd Buckner	21-185-0004	1	1.2	0	0	0	0	0.4
Perry	Perry County Horse Park Hazard	21-193-0003	*	*	0	0	0	0	*
Pike	101 North Mayo Trail Pikeville	21-195-0002	0	0	0	0	0	0	0.0
Pulaski	Clifty Street Somerset	21-199-0003	0	0	0	0	0	0	0.0
Scott	Fire Station on KY 32 Sadieville	21-209-0001	0	0	0	0	0	0	0.0
Simpson	DOT Garage, KY 1008 Franklin	21-213-0004	0	0	0	0	0	0	0.0
Warren	Oakland Elementary Sch Oakland	21-227-0008	*	*	0	0	0	0	*

[1] Monitor operated by the National Park Service at Mammoth Cave.
[2] Monitor operated by the Air Pollution Control District of Jefferson County.

Criteria Pollutant Multi-year Summary Report - 2001
8-Hour 4th Maximum 3 Year Average

Pollutant: Ozone
Method: Ultra-Violet Photometry
Data Interval: Hourly
Units: Parts-per-million (PPM)



National Ambient Air Quality Standards (NAAQS)

Primary NAAQS:	1-Hour (1 per year/3 year)	0.12 PPM
	8-Hour (3-year avg of 4th max.)	0.08 PPM
Secondary NAAQS:	Same as Primary Standard	

County	Site	AIRS-ID	1999 4th max	2000 4th max	2001 4th max	3 year Avg. 4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	.081	.090	.077	.082
Boone	KY 338 & Rabbit Hash Road Eastbend	21-015-0003	.091	.083	.083	.085
Boyd	32nd & Railroad Streets Ashland	21-019-0015	.094	.079	.085	.086
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	.093	.082	.082	.085
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	*	.093	.088	*
Carter	Camp Webb Grayson Lake	21-043-0500	.093	.080	.076	.083
Daviess	US 60 & Pleasant Valley Rd Owensboro	21-059-0005	.090	.074	.073	.079
Edmonson[1]	Alfred Cook Road Mammoth Cave	21-061-0501	.098	.088	.080	.088
Fayette	Iron Works Pike Lexington	21-067-0001	.087	.062	.066	.071
Fayette	650 Newtown Pike Lexington	21-067-0012	.091	.076	.078	.081
Graves	Byerly Farm on KY 1949 Symsonia	21-083-0003	.098	.080	.073	.083
Greenup	Scott & Center Streets Worthington	21-089-0007	.095	.077	.088	.086
Hancock	2nd & Caroline Streets Lewisport	21-091-0012	.093	.079	.077	.083
Hardin	801 North Miles Street Elizabethtown	21-093-0006	*	.079	.080	*
Henderson	North Green Street Henderson	21-101-0013	.081	.078	.072	.077
Henderson	Baskett Fire Dept Baskett	21-101-0014	.096	.078	.074	.082
Jefferson[2]	7601 Bardstown Road Louisville	21-111-0027	.097	.090	.081	.089
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	.100	.076	.081	.085
Jefferson[2]	1918 Mellwood Avenue Louisville	21-111-1021	.086	.084	.077	.082

Ozone 3 Year 8-Hour Continued

County	Site	AIRS-ID	1999 4th Max	2000 4th Max	2001 4th Max	3 year Avg. 4th max
Jessamine	DOT Garage US 27 Bypass Nicholasville	21-113-0001	.082	.077	.076	.078
Kenton	1401 Dixie Highway Covington	21-117-0007	.091	.087	.082	.086
Livingston	KYDOT, 811 US 60 East Smithland	21-139-0003	.101	.078	.084	.087
Livingston	763 Bloodworth Road off KY 453	21-139-0004	.092	.082	.076	.083
McCracken	2901 Powell Street Paducah	21-145-1024	.093	.084	.077	.084
McLean	3962 KY 815 Guffie	21-149-0001	.103	.079	.078	.086
Oldham	DOT Garage, Morgan Rd Buckner	21-185-0004	.103	.085	.086	.091
Perry	Perry County Horse Park Hazard	21-193-0003	*	.072	.072	*
Pike	101 North Mayo Trail Pikeville	21-195-0002	.081	.078	.075	.078
Pulaski	Clifty Street Somerset	21-199-0003	.095	.087	.077	.086
Scott	Fire Station on KY 32 Sadieville	21-209-0001	.081	.071	.066	.072
Simpson	DOT Garage, KY 1008 Franklin	21-213-0004	.096	.085	.085	.088
Warren	Oakland Elementary School Oakland	21-227-0008	*	.088	.081	*

[1] Monitor operated by the National Park Service at Mammoth Cave.
[2] Monitor operated by the Air Pollution Control District of Jefferson County.

Particulate Matter - (PM_{10} / $PM_{2.5}$)

Particulate matter is a broad classification of non-gaseous pollutants that consists of very fine solid particles and liquid droplets or aerosols. Particulates are produced from many sources, including utility plants, wood burning stoves, leaf burning, vehicle exhaust, incinerators, rock quarries, coal processing, smelting, construction, farming and roadways. Common forms of particulates include fly ash, soot, soil, minerals, fibers, metals, oil aerosols and tire rubber.

The primary health effects of particulates are that they aggravate respiratory and cardiovascular disease and in large amounts increase the death rates of sufferers. The elderly, children, and people with chronic lung disease are especially sensitive to particulate matter. Particulate matter can soil and damage a wide range of man-made items such as building surfaces and may damage vegetation by interfering with plant photosynthesis due to the formation of a film on leaves reducing exposure to sunlight. Particulate pollution can also produce haze which diminishes visibility and the amount of sunlight reaching the earth.

Particulate matter is categorized according to particle diameter due to the health impacts caused by particles of differing sizes. Particles that are greater than fifty microns (50µm) in diameter rapidly settle out of the air due to gravity and pose a limited health risk. Particles that are less than fifty microns in diameter remain suspended in the air for longer periods and are classified as Total Suspended Particulates (TSP). The larger of these particles (between 10 and 50 microns) rarely penetrate deeply into the human respiratory system but are trapped and removed by the body's natural defenses. Early research on the effects of smaller or "fine particulate matter" indicated that particles ten microns in diameter or less posed the greatest risk to human health. Particulate matter ten microns or less in diameter is referred to as PM_{10} and is a subset of fine particles within the TSP category. Particles in the PM_{10} range are small enough to evade the body's natural defense systems and penetrate into the lungs, where tissue is damaged and the immune system is weakened.

Primary NAAQS:	Annual Arithmetic Mean not to exceed 50 $\mu g/m^3$ (based on a three-year avg).
	Maximum 24-hour concentration of 150 $\mu g/m^3$. Average number of expected exceedances per year not to exceed 1.0 over last three years.
Secondary NAAQS:	Same as primary standard.

As a result of the research on fine particulate matter, the U. S. EPA adopted a PM_{10} standard on July 1, 1987 replacing the previous TSP standard. In 2001, the Division for Air Quality and the Air Pollution Control District of Jefferson County operated a combined network of thirty PM_{10} samplers in Kentucky. Twenty-two of those are intermittent type samplers that operate for twenty-four hours every sixth day. These samplers operate by drawing a measured volume of air thru a pre-weighed filter over a 24 hour period. Before reaching the filter the air passes through an impaction chamber where larger particles fall out of the airstream while particles smaller than ten microns pass on to the sample filter where they are collected. After completion of the sample run the filter is removed from the sampler and reweighed to determine the mass of the particulates collected. Sample

results are entered manually into a data storage system. The Division for Air Quality also operates eight continuously operating PM_{10} samplers that provide results daily. These samplers determine sample weights electronically and transmit results by telemetry for entry into an automated data storage system.

There were no exceedances of the PM_{10} standards in 2001. The last PM_{10} exceedance occurred on January 7, 2000 at Louisville site 21-111-0043 where a 24-hour sample of 152 $\mu g/m^3$ was collected. Prior to that, the only previous exceedance of a PM_{10} standard occurred on August 27, 1990 in Ashland where a 24-hour value of 182 $\mu g/m^3$ was collected. All Kentucky counties are currently in attainment with the PM_{10} standards. Statewide and regional PM_{10} levels have shown declining trends as seen in Figure 5.

A statistical summary of PM_{10} data collected during 2001 follows on pages 27-28.

$PM_{2.5}$

Medical and scientific research on the health effects of particulate matter continued after the adoption of the PM_{10} standard. As a result of further research it was determined that very fine particles in the 2.5 micron size range have the most adverse effects on human health. In response to these new findings the EPA adopted a $PM_{2.5}$ standard which became effective September 16, 1997.

$PM_{2.5}$ is monitored by intermittent type samplers that collect samples over a 24-hour run cycle. While most samplers operate every third day some operate every sixth day and some every day. Samplers operate by drawing a measured volume of air through a pre-weighed filter over a 24 hour sample period. Sample air passes through an impaction chamber where larger particles fall out of the air stream while particles smaller than 2.5 microns pass on to the sample filter where they are collected. After completion of the sample run the filter is collected and reweighed to determine the mass of the particulate collected. Sample results are entered into a data storage system. In 2001, the Division for Air Quality and the Air Pollution Control District of Jefferson County operated a network of twenty-two samplers.

Primary NAAQS:	Annual Arithmetic Mean not to exceed 15 $\mu g/m^3$ (based on a three-year avg).
	24-hour concentration not to exceed 65 $\mu g/m^3$. (based on a three-year average of the annual 98^{th} percentiles).
Secondary NAAQS:	Same as primary standard.

There were no exceedances of the 24-hour standard in 2001, but seven samplers exceeded the annual standard. This was the third year of $PM_{2.5}$ sampling, however no attainment designations have been determined at this time.

A statistical summary of 2001 $PM_{2.5}$ data appears on page 29-30.

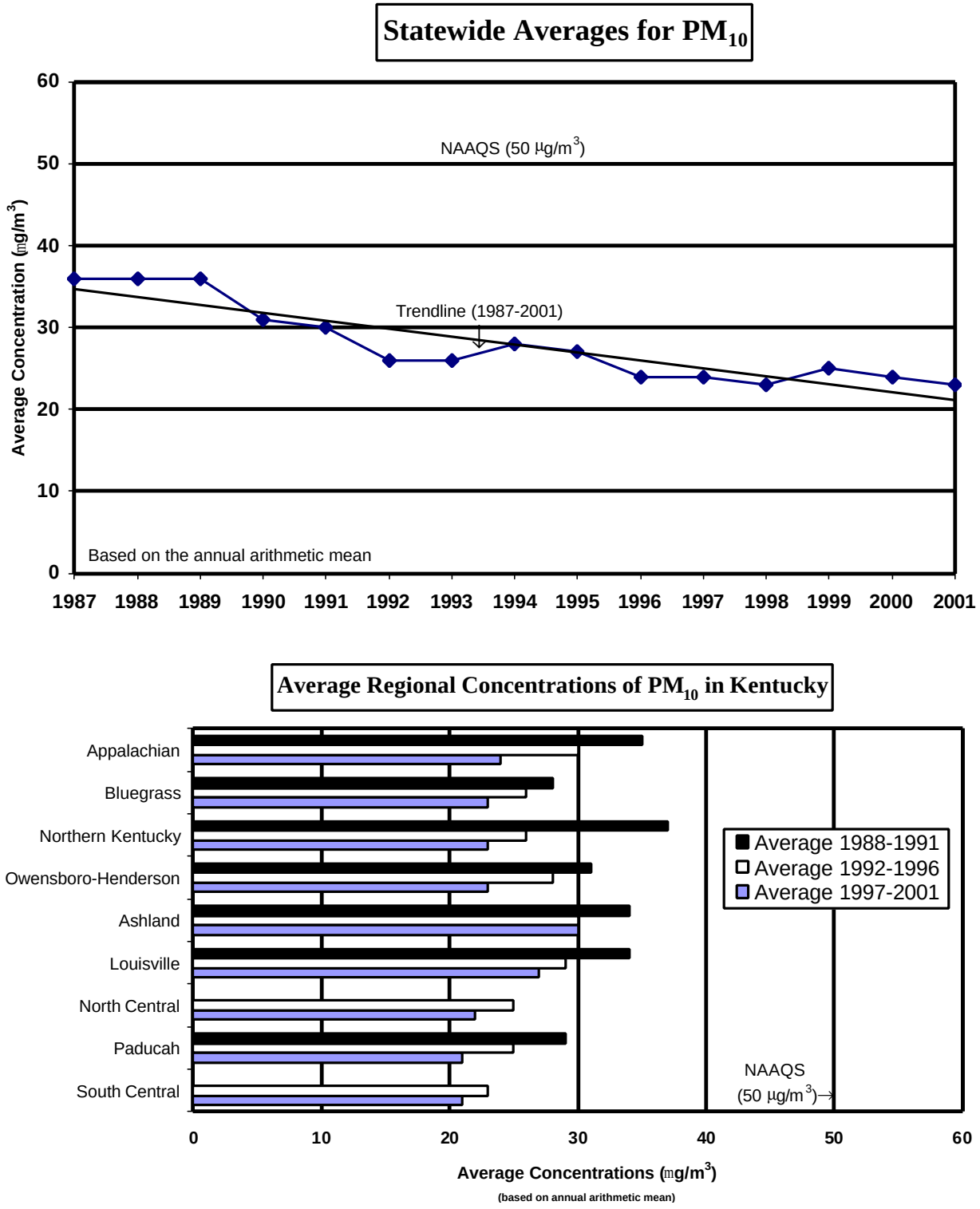


Figure 5. PM_{10} trends

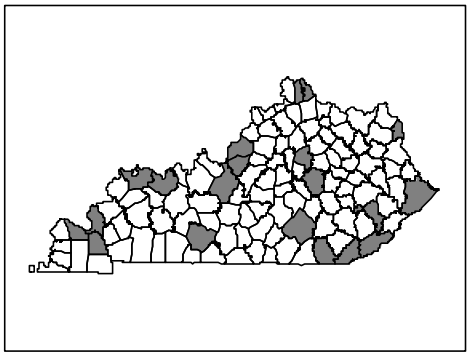
Criteria Pollutant Summary Report - 2001

Pollutant: Particulate Matter PM_{10}
Method: Gravimetric
Data Interval: 24-Hour
Units: Micro-grams per cubic meter ($\mu g/m^3$)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: Annual Arith Mean (3yr avg) $50 \mu g/m^3$
24-hour average $150 \mu g/m^3$

Secondary NAAQS: Same as Primary Standard



County	Site	AIRS-ID	# Obs	Mean	24-hour Average				
					Obs >150	1st max	2nd max	3rd max	4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	58	23	0	50	43	42	40
Boyd	122 22nd Street Ashland	21-019-0002	55	30	0	58	54	53	52
Boyd[1]	32nd and Railroad St Ashland	21-019-0015	217	31	0	80	69	68	66
Boyd[1]	2924 Holt Street Ashland	21-019-0017	120	21	0	57	53	40	40
Boyd	2802 Louisa Street Catlettsburg	21-019-2001	58	24	0	46	46	46	45
Bullitt	2nd & Carpenter Street Shepherdsville	21-029-0006	56	22	0	49	42	41	36
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	48	20	0	50	41	40	37
Daviess	US 60 and Pleasant Valley, Owensboro	21-059-0005	350	21	0	54	52	52	49
Daviess	KY Wesleyan College Owensboro	21-059-0014	57	20	0	55	41	37	37
Fayette	650 Newtown Pike Lexington	21-067-0012	331	21	0	62	56	55	50
Fayette	533 S Limestone Lexington	21-067-0014	57	23	0	57	48	38	36
Hardin	801 N Miles Street Elizabethtown	21-093-0006	58	19	0	44	43	41	34
Harlan	110 First Street Harlan	21-095-0003	60	25	0	52	48	43	42
Henderson	North Green Street Henderson	21-101-0013	349	22	0	56	54	49	48
Jefferson[2]	1032 Beecher Avenue Louisville	21-111-0044	50	27	0	68	59	54	47
Jefferson[2]	850 Barret Avenue Louisville	21-111-0048	61	27	0	57	54	50	47
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	61	28	0	65	62	61	59
Jefferson[2]	2425 Portland Avenue Louisville	21-111-1009	59	27	0	59	53	51	46
Jefferson[2]	4201 Algonquin Pky Louisville	21-111-1041	53	34	0	86	71	62	62
Jefferson[2]	7709 Preston Hwy Okolona	21-111-3001	60	27	0	51	47	47	44

PM_{10} Summary Report Continued

County	Site	AIRS-ID	# Obs	Mean	24-hour Average				
					Obs >150	1st max	2nd max	3rd max	4th max
Kenton	1401 Dixie Highway Covington	21-117-0007	334	20	0	62	61	60	59
Livingston	763 Bloodworth Rd, off KY 453	21-139-0004	57	18	0	40	40	37	32
McCracken	342 Lone Oak Road Paducah	21-145-1004	57	19	0	40	36	34	31
McCracken	2901 Powell Street Paducah	21-145-1024	355	20	0	59	58	52	48
Madison	Mayfield School Richmond	21-151-0003	55	19	0	42	40	34	34
Marshall	24 Main Street Calvert City	21-157-0010	60	21	0	53	40	35	33
Perry	Perry Co. Horse Park Hazard	21-193-0003	57	22	0	41	40	39	39
Pike	101 North Mayo Trail Pikeville	21-195-0002	322	21	0	55	51	49	46
Pulaski	Clifty Street Somerset	21-199-0003	59	20	0	45	43	40	36
Warren	Oakland Ele. School Oakland	21-227-0008	340	18	0	48	45	44	44
Whitley	1990 S Snyder Corbin	21-235-0002	59	22	0	44	44	40	39

[1] The continuous PM_{10} sampler at site 21-019-0015 was relocated to site 21-019-0017 in August 2001.
[2] PM_{10} samplers located in Jefferson County are operated by the Air Pollution Control District of Jefferson County.

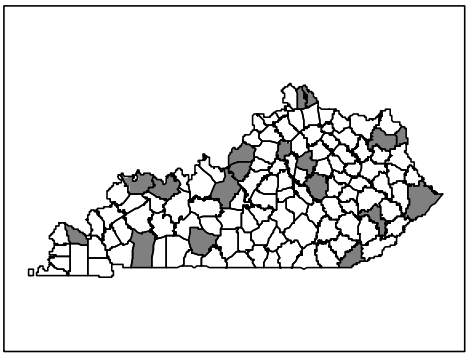
Criteria Pollutant Summary Report - 2001

Pollutant: Particulate Matter $PM_{2.5}$
Method: Gravimetric
Data Interval: 24-Hour
Units: Micro-grams per cubic meter ($\mu g/m^3$)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: Annual Arithmetic Mean (3yr avg) 15$\mu g/m^3$
24-hour (3yr avg of 98th percentile) 65$\mu g/m^3$

Secondary NAAQS: Same as Primary Standard



County	Site	AIRS-ID	# Obs	Mean	24-Hour Average				
					Obs >65	1st max	2nd max	3rd max	4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	54	15.1	0	36.8	30.2	28.2	26.6
Boyd	2924 Holt Street Ashland	21-019-0017	114	15.3	0	54.4	38.5	37.7	37.0
Bullitt	2nd & Carpenter St Shepherdsville	21-029-0006	114	15.6	0	41.6	38.3	32.8	31.5
Campbell	700 Alexandria Pike Fort Thomas	21-037-0003	99	13.4	0	35.8	35.3	31.3	30.5
Carter	Camp Webb Grayson Lake	21-043-0500	116	12.4	0	47.3	30.5	28.9	28.8
Christian	10800 Pilot Rock Rd Hopkinsville	21-047-0006	111	13.5	0	33.4	27.6	27.2	26.5
Daviess	KY Wesleyan College Owensboro	21-059-0014	113	15.2	0	44.2	41.2	31.5	30.4
Fayette	650 Newtown Pike Lexington	21-067-0012	119	15.7	0	48.6	39.1	35.8	34.3
Fayette	533 S Limestone Lexington	21-067-0014	112	16.2	0	49.0	38.1	32.6	31.5
Franklin	803 Schenkel Lane Frankfort	21-073-0006	105	13.9	0	53.1	50.6	35.6	30.1
Hardin	801 N Miles Street Elizabethtown	21-093-0006	115	14.6	0	37.7	36.3	30.7	29.6
Henderson	Bend Gate School Henderson	21-101-0006	107	14.2	0	38.0	36.6	30.0	28.8
Jefferson[1]	1032 Beecher Ave Louisville	21-111-0044	347	17.7	0	53.2	46.5	46.1	44.9
Jefferson[1]	850 Barret Avenue Louisville	21-111-0048	109	16.9	0	55.9	43.7	42.6	40.2
Jefferson[1]	7201 Watson Lane Louisville	21-111-0051	54	15.6	0	37.9	37.6	32.4	29.7
Jefferson[1]	4201 Algonquin Pkwy Louisville	21-111-1041	330	18.7	0	60.8	49.9	49.9	47.9
Kenton	1401 Dixie Highway Covington	21-117-0007	112	15.3	0	51.5	44.6	40.2	39.3
McCracken	342 Lone Oak Road Paducah	21-145-1004	106	14.1	0	34.1	33.0	28.1	27.2
Madison	Mayfield School Richmond	21-151-0003	105	13.9	0	50.6	30.5	29.9	28.6

$PM_{2.5}$ Summary Report Continued

County	Site	AIRS-ID	# Obs	Mean	24-hour Average				
					Obs >65	1st max	2nd max	3rd max	4th max
Perry	Perry Co Horse Park Hazard	21-193-0003	55	14.3	0	36.5	28.0	28.0	26.6
Pike	101 North Mayo Trail Pikeville	21-195-0002	108	14.5	0	44.5	34.1	31.9	30.5
Warren	Kereiakes Park Bowling Green	21-227-0007	118	14.8	0	37.0	33.5	31.5	30.1

[1] $PM_{2.5}$ samplers located in Jefferson County are operated by the Air Pollution Control District of Jefferson County

Industrial Data

Various industries within the Commonwealth of Kentucky operate air monitoring networks and subsequently report the data from these networks to the Division for Air Quality. Monitoring activity designed to measure the background levels of selected pollutants prior to construction of a proposed source or the expansion of an existing source is termed PSD (Prevention of Significant Deterioration of air quality) monitoring. This type of network is normally set up to operate for approximately one year. Monitoring designed to measure the impact of new or expanded sources on the air quality of an area is termed post-construction monitoring. A third type of monitoring is termed compliance monitoring and is usually set up around existing sources to demonstrate compliance with permit conditions and ambient air standards.

Regardless of the type of monitoring undertaken by these industrial networks, all must meet the following requirements.

- The Division must receive and approve a copy of the monitoring plan for each network prior to commencement of monitoring.
- A member of the Technical Services Branch of the Division for Air Quality must inspect the monitoring site(s) before monitoring begins to ensure that applicable siting criteria are met.
- Operators of networks with CO, SO_2, and NO_2 monitors must use gaseous standards that are traceable to National Institute of Standards and Technology (NIST) gaseous Standard Reference Materials (SRM) to generate test concentrations.
- Test concentrations of O_3 must be obtained in accordance with the UV photometric calibration procedure specified in 40 CFR Part 50, Appendix D, or by means of a certified ozone transfer standard.
- Flow measurements must be made with a flow measuring device that is referenced to an authoritative volume or other standard.
- All samplers and monitors used for monitoring criteria pollutants must be approved as EPA reference or equivalent methods.
- All monitors are audited once each calendar quarter by a member of the Division's Quality Assurance Section.
- Air monitoring reports from these networks are due at the Division for Air Quality no later than 90 days after the end of each calendar quarter. These air monitoring reports are to consist of the raw data from each network (usually on a 3.5" diskette), a missing data report (explaining any gaps in the data), monitor calibrations, results from the biweekly precision checks carried out on each automated analyzer, audit reports, and copies of sections of the strip charts (only when requested).

The data from each network is reviewed for completeness and accuracy and to determine if there are any exceedances of any primary or secondary pollutant standards. A letter of receipt is sent to the operator of each network when their data has been received and reviewed. If corrections are deemed necessary, the network operator is notified so the corrections can be made and the data resubmitted.

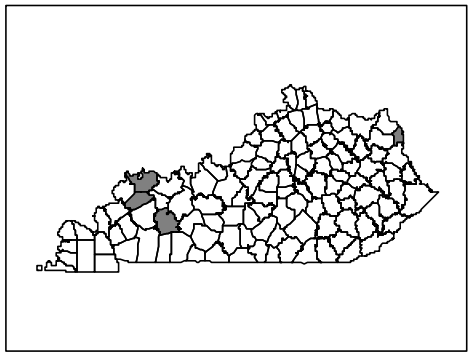
A statistical summary of industrial data collected in 2001 follows on pages 32-34.

Industrial - Criteria Pollutant Summary Report - 2001
Sites Operated by Industry

Pollutant: Sulfur Dioxide
Method: Ultra-Violet Fluorescence
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS:	Annual Arithmetic Mean	0.03 PPM
	24-Hour Average	0.14 PPM
Secondary NAAQS:	3-Hour Average	0.50 PPM



County	Site	Facility-ID	# Obs	Annual Mean	24-Hr Average			3-Hr Average		
					1st max	2nd max	Obs >.14	1st max	2nd max	Obs >.50
Henderson	US 41 & KY 2096 Sebree	Western KY Electric	8208	.002	.022	.020	0	.121	.106	0
Henderson	KY 2097 Sebree	Western KY Electric	8088	.005	.064	.053	0	.151	.131	0
Webster	Bell Gibson Road	Western KY Electric	8206	.009	.149	.132	1	.336	.311	0
Muhlenberg	Airport Road Greenville	TVA	5868	.003	.023	.020	0	.133	.093	0
Wayne, WV	Spring Brook Dr Kenova, WV	Ashland-Marathon	8646	.010	.040	.039	0	.105	.088	0
Wayne, WV	Route 52 Neal, WV	Ashland-Marathon	8662	.010	.047	.033	0	.088	.085	0
Wayne, WV	Big Sandy Road Neal, WV	Ashland-Marathon	8657	.009	.037	.030	0	.085	.081	0

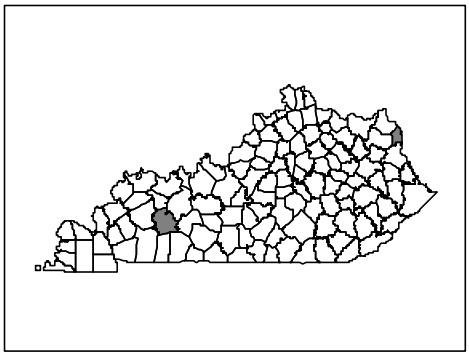
Industrial - Criteria Pollutant Summary Report - 2001
Sites Operated by Industry

Pollutant: Nitrogen Dioxide
Method: Instrumental/Chemiluminescence
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: Annual Arithmetic Mean 0.05 PPM

Secondary NAAQS: Same as Primary Standard



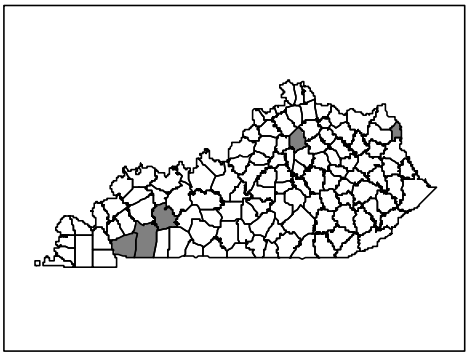
County	Site	Facility-ID	# Obs	Annual Mean	1-Hr Average	
					1st max	2nd max
Muhlenberg	Airport Road Greenville	TVA	5609	.006	.047	.047
Wayne, WV	Spring Brook Drive, Kenova, WV	Ashland-Marathon	8618	.015	.084	.081

Industrial - Criteria Pollutant Summary Report - 2001
Sites Operated by Industry

Pollutant: Ozone
Method: Ultra-Violet Photometry
Data Interval: Hourly
Units: Parts-per-million (PPM)

National Ambient Air Quality Standards (NAAQS)

Primary NAAQS: 1-Hour (1 per year/3 years) 0.12 PPM
8-Hour (3 year avg of 4th max.) 0.08 PPM
Secondary NAAQS: Same as Primary Standard



County	Site	Facility-ID	# Obs	1-Hr Average			8-hour Average				
				Obs >0.12	1st max	2nd max	Obs >0.08	1st max	2nd max	3rd max	4th max
Christian	10800 Pilot Rock Rd Hopkinsville	TVA	5849	0	.096	.096	1	.089	.082	.082	.082
Muhlenberg	Airport Road Greenville	TVA	5800	0	.108	.099	2	.099	.086	.084	.083
Scott	4673 Muddy Ford Rd Oxford	Toyota	5603	0	.090	.089	0	.084	.083	.083	.080
Trigg	Mulberry Flat Road Land Between Lakes	TVA	5654	0	.084	.080	0	.075	.073	.072	.072
Wayne, WV	Spring Brook Drive Kenova, WV	Ashland-Marathon	8694	0	.110	.107	4	.093	.091	.089	.085

Acid Rain

Acid rain includes precipitation in the form of snow, sleet, hail, rain or fog that has a low pH level resulting from emissions of pollutants into the atmosphere, especially sulfur dioxide and nitrogen oxides. Acidified rainwater contains combinations of sulfuric and nitric acids that form when water vapor and sulfur dioxide and nitrogen oxides react. Major sources of sulfur dioxide include power plants, paper and wood pulp processing plants and facilities with coal fired boilers. Nitrogen oxides are produced primarily from the combustion of fossil fuels in the engines of cars, trucks and other vehicles and from power plant emissions.

Aquatic life appears to be most sensitive to the effects of acid rain. Small changes in the pH levels of lakes and streams may prevent some fish species and other aquatic life forms from reproducing. Many insects cannot survive in acidic waters and therefore birds and mammals that depend on insects for food may suffer abnormally high mortality rates. Acid rain can also alter soil chemistry and nutrient availability, in turn weakening trees and shrubs and causing them to be more vulnerable to insects, diseases and fungus infestations. Acid rain may also damage agricultural crops and has been blamed for deterioration of monuments and building surfaces.

Acid rain monitoring stations operate on a weekly sampling schedule. Cumulative precipitation events occurring during a seven day period are collected in one container to represent a one-week sample. An automatic wet/dry precipitation collector is used to collect the sample. The sampler consists of two collection containers. The “wet” container is fitted with a clean plastic sample bag for collection of precipitation. The “dry” container, designed for dry particulate collection is not presently utilized for sample collection. The sampler employs a moisture sensor which activates an electrically driven movable container lid that covers the wet container during dry periods and then moves to cover the dry container when precipitation occurs. At the end of each weekly sampling period, the wet container is removed and replaced with a new, clean container for the next sampling period. After the sample is removed, field measurements of pH and conductivity are made and recorded. The remaining sample is then shipped to Frankfort where laboratory analysis is conducted to determine levels for pH, conductivity, sulfates, nitrates, phosphates, ammonia and metal ions. The Division for Air Quality currently operates two acid rain sites, one at Mammoth Cave National Park and one at Grayson Lake State Park.

Annual pH averages for both sites have shown modest upward trends since 1985 meaning that rainfall is gradually becoming less acidic (see Figure 6). This improvement is due at least in part to successful efforts of power plants to curb sulfur dioxide and nitrogen dioxide emissions.

A statistical summary of acid rain data collected in 2001 follows on pages 37-38.

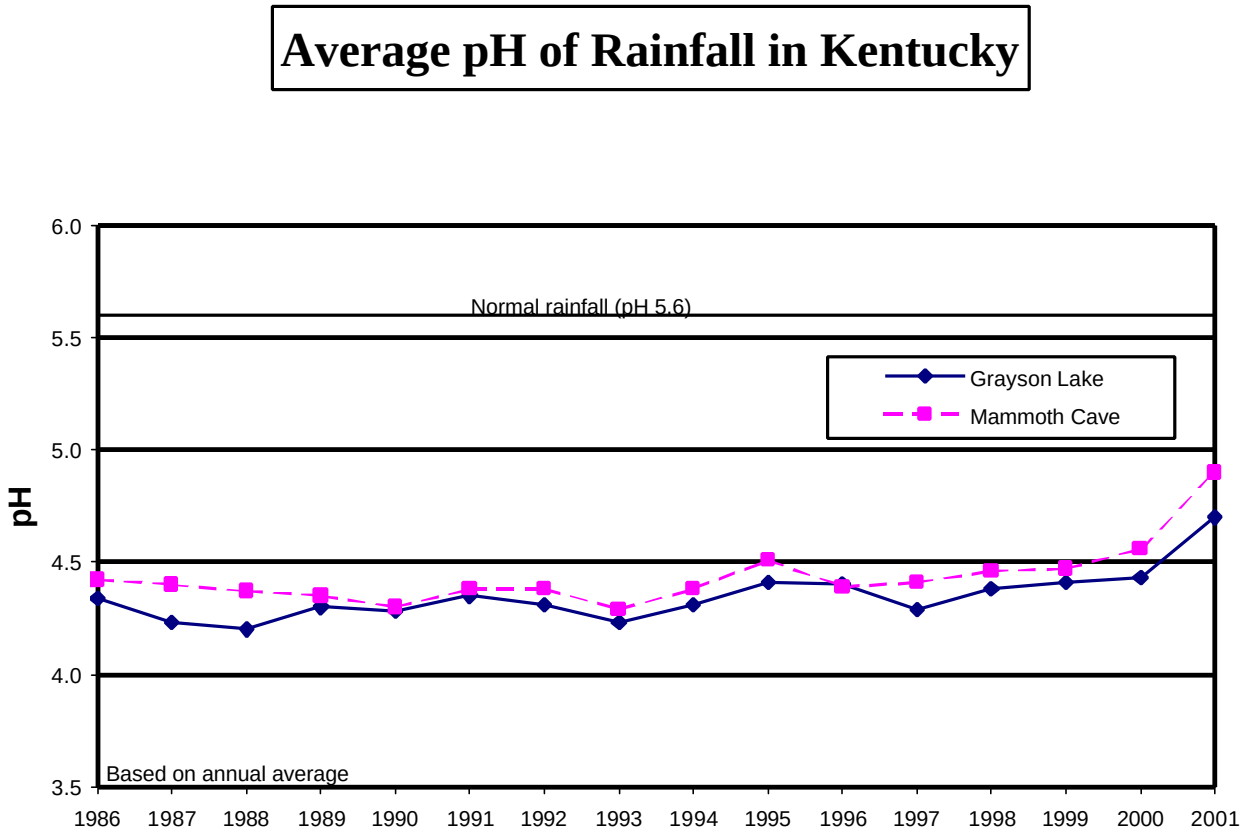


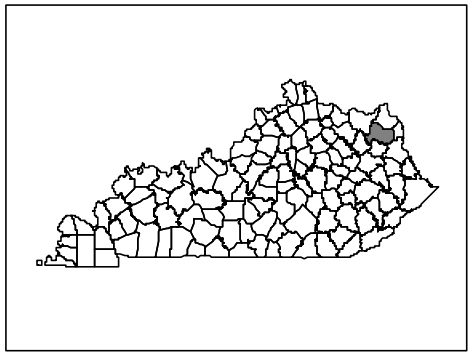
Figure 6. pH trends

Acid Rain Pollutants Summary Report - 2001

Agency: Kentucky Division for Air Quality

Site ID: 21-043-0500
County: Carter
Location: Grayson Lake
Camp Webb

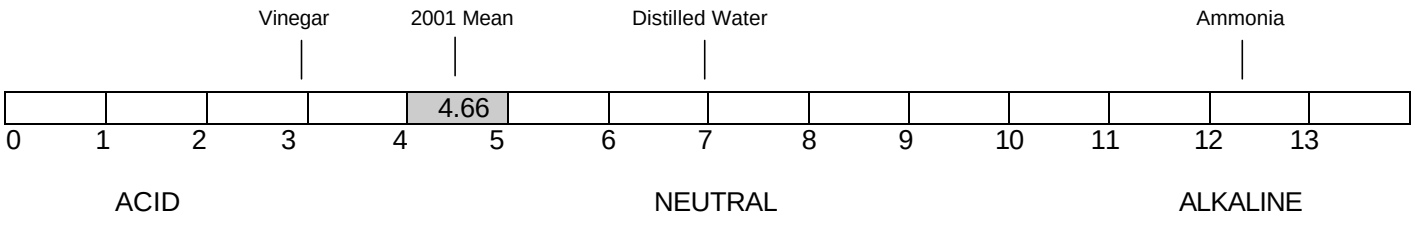
Method: Wet/Dry Collector
Laboratory Analytical



Parameter	Units	# Obs	Arithmetic Mean	1st Max	2nd Max	3rd Max	4th Max
Acidity	Mg/L	45	3.3	8.6	7.5	6.1	5.5
Ammonia	Mg/L	41	0.4	2.6	1.0	0.9	0.7
Calcium	Mg/L	13	0.7	2.5	1.0	0.9	0.7
Chloride	Mg/L	46	0.2	0.7	0.7	0.6	0.5
Conductivity	µmho	43	18.7	64.9	35.1	34.2	33.8
Magnesium	Mg/L	9	0.2	0.4	0.4	0.1	0.1
Nitrate	Mg/L	46	1.8	9.0	4.6	4.6	4.0
Potassium	Mg/L	11	0.1	0.2	0.2	0.1	0.1
Sodium	Mg/L	6	0.5	1.5	0.4	0.4	0.3
Sulfate	Mg/L	46	2.1	9.2	7.4	6.6	3.7

pH is measured on a scale ranging from zero to fourteen where neutral substances such as distilled water are around seven on the scale. The more acidic substances such as vinegar would be on the lower end of the scale while alkaline substances such as ammonia would be on the upper end of the scale. The chart below indicates where the pH measurements for 2001 at Grayson Lake fall on this scale.

pH Scale

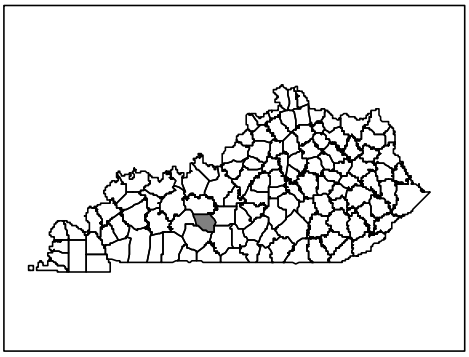


Acid Rain Pollutants Summary Report - 2001

Agency: National Parks Service and Kentucky Division for Air Quality

Site Id: 21-061-0501
County: Edmonson
Location: Mammoth Cave National Park
Alfred Cook Road

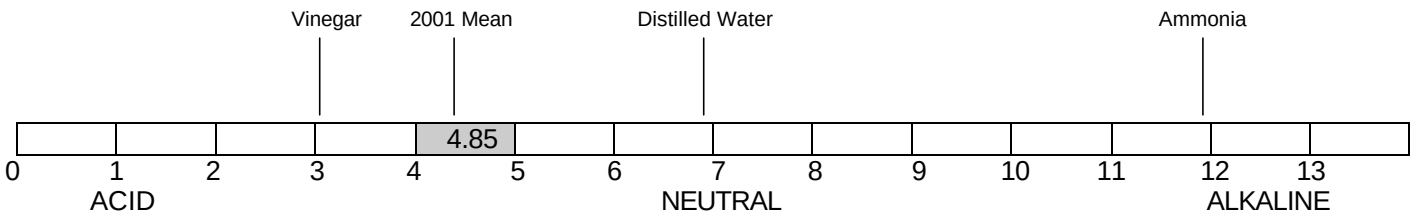
Method: Wet/Dry Collector
Laboratory Analytical



Parameter	Units	# Obs.	Arithmetic Mean	1st Max	2nd Max	3rd Max	4th Max
Acidity	Mg/L	41	3.2	8.5	6.8	5.3	5.0
Ammonia	Mg/L	40	0.3	1.8	1.0	0.6	0.5
Calcium	Mg/L	8	0.5	0.6	0.6	0.5	0.5
Chloride	Mg/L	43	0.5	4.3	1.2	1.1	1.0
Conductivity	µmho	39	16.1	48.3	30.3	30.1	25.4
Magnesium	Mg/L	32	0.2	0.9	0.6	0.6	0.3
Nitrate	Mg/L	43	2.0	11.4	7.7	6.9	5.1
Potassium	Mg/L	12	0.1	0.4	0.2	0.2	0.1
Sodium	Mg/L	3	1.1	1.7	1.0	0.6	-
Sulfate	Mg/L	43	2.2	9.8	6.1	5.8	4.6

pH is measured on a scale ranging from zero to fourteen where neutral substances such as distilled water are around seven on the scale. The more acidic substances such as vinegar would be on the lower end of the scale while alkaline substances such as ammonia would be on the upper end of the scale. The chart below indicates where the pH measurements for 2001 at Mammoth Cave fall on this scale.

pH Scale



Air Toxics

In addition to the six criteria pollutants for which National Ambient Air Quality Standards have been adopted, the Division for Air Quality in recent years has conducted sampling to assess the health risks associated with a wide variety of substances classified as toxic air pollutants. Air toxics include substances known or suspected to cause neurological, immunological, reproductive and respiratory disorders, as well as known or suspected human carcinogens. The air toxics monitoring program is a cooperative effort between the Kentucky Division for Air Quality and the Kentucky Division of Environmental Services, which provides the analytical support.

In 2001 the Division for Air Quality conducted an air toxics study in seven Kentucky metropolitan areas monitoring for volatile organic compounds (VOC). Monitoring for volatile organics is accomplished by collecting whole air 24-hour composite samples in non-reactive stainless steel SUMMA® canisters. Samples are then analyzed in the laboratory with a gas chromatograph/mass spectrometer. Current methodology targets the following compounds with a detection limit of 2.0 $\mu g/m^3$. Other compounds can be detected by this methodology and are reported if found.

1,1,1,2-Tetrachloroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,1-Dichloropropene
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,2-Dibromo-3-chloropropane
1,2-Dibromomethane (EDB)
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,2-Xylene
1,3,5-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,4-Dichlorobenzene
1-Chlorohexane
2,2-Dichloropropane
2-Butanone (MEK)
2-Chlorotoluene
2-Hexanone (MBK)
3-Chlorotoluene
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
Dibromomethane
Dichlorodifluoromethane
Ethylbenzene
Hexachlorobutadiene
Isopropyl toluene (Cymene)
Isopropylbenzene (Cumene)
Naphthalene
Styrene
Tetrachloroethene
Toluene
Trichloroethene
Trichlorofluoromethane
Vinyl acetate
Vinyl chloride
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
n-Butylbenzene
n-Propylbenzene

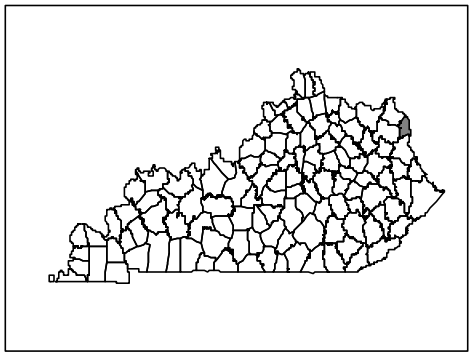
4-Chlorotoluene	sec-Butylbenzene
4-Methyl-2-pentanone (MIBK)	tert-Butylbenzene
Benzene	trans-1,3-Dichloropropene
Bromobenzene	trans-1,3-Dichloroethene
Bromochloromethane	1,3-Xylene
Bromodichloromethane	1,4-Xylene

Volatile organic compounds sample results for are summarized on pages 41-47. Although analysis was conducted for all of the above listed compounds for each sample, only those compounds that were above the detection limit are included in these reports.

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-019-0015
County: Boyd
Location: Ashland

Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$

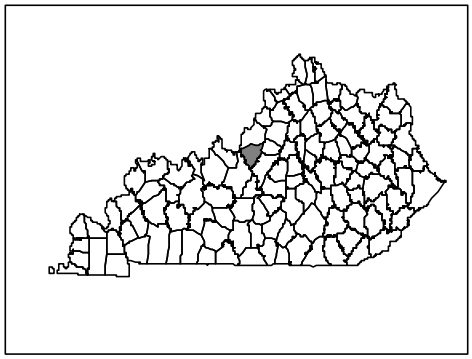


Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,1-Dichloroethene	42	1	1.38	-	-	-	-
1,2-Dichloroethane	42	1	7.57	-	-	-	-
1,2-Xylene	42	14	3.9	2.72	2.02	1.78	1.17
1,2,4-Trimethylbenzene	42	10	3.09	1.55	1.25	1.22	1.19
1,3-Butadiene	42	2	0.57	0.56	-	-	0.565
1,3-Xylene & 1,4-Xylene	42	25	7.5	7.25	5.77	3.54	2.28
Benzene	42	42	37.2	21.6	13.2	13.0	3.19
Bromomethane	42	19	3.36	3.36	2.93	2.87	2.21
Carbon disulfide	42	3	5.32	2.78	1.18	-	2.78
Carbon tetrachloride	42	3	0.69	0.56	0.55	-	0.56
Chlorobenzene	42	3	3.28	2.82	2.66	-	2.82
Chloroethane	42	6	1.52	1.36	1.31	1.17	1.24
Chloromethane	42	27	6.33	6.08	6.07	6.04	4.53
Dichlorodifluoromethane	42	41	14.1	11.9	11.6	11.4	7.56
Dichloromethane	42	4	54.9	1.45	0.99	0.57	1.22
Ethylbenzene	42	13	3.57	2.44	2.25	1.84	1.78
Isopropylbenzene	42	8	12.6	10.5	3.08	2.57	1.91
Naphthalene	42	9	10.1	7.54	5.32	3.52	2.59
Styrene	42	15	3.56	3.06	1.7	1.45	1.17
Toluene	42	42	17.1	11.7	10.6	9.0	3.42
Trichlorofluoromethane	42	35	3.97	3.58	3.57	3.38	2.01

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-029-0006
County: Bullitt
Location: Shepherdsville

Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$

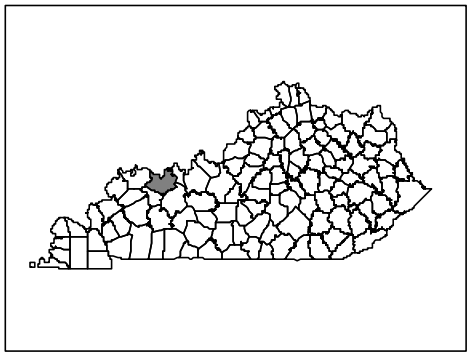


Parameter	# of samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,1,1,2-Tetrachloroethane	42	1	1.18	-	-	-	-
1,2,4-Trimethylbenzene	42	2	1.91	1.32	-	-	1.62
1,2-Xylene	42	5	3.09	1.91	1.12	0.95	1.12
1,3-Xylene & 1,4-Xylene	42	13	6.14	5.52	2.96	2.26	1.65
Benzene	42	32	4.38	3.37	3.1	2.94	1.76
Bromomethane	42	13	3.52	3.06	2.75	2.57	2.39
Chloroethane	42	3	2.02	1.1	0.75	-	1.1
Chloromethane	42	24	7.02	6.23	6.19	5.59	4.58
Dichlorodifluoromethane	42	40	11.9	11.5	11.4	11.1	7.38
Dichloromethane	42	3	67.1	58.4	8.48	-	58.4
Ethylbenzene	42	2	1.5	1.45	-	-	1.48
Isopropyl toluene	42	1	1.03	-	-	-	-
Naphthalene	42	1	1.51	-	-	-	-
Styrene	42	4	2.81	1.97	1.28	1.23	1.63
Toluene	42	34	24.7	11.1	8.41	5.75	2.85
Trichlorofluoromethane	42	29	3.65	3.59	3.4	3.25	1.65
Vinyl chloride	42	1	2.42	-	-	-	-

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-059-0005
County: Daviess
Location: Owensboro

Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$

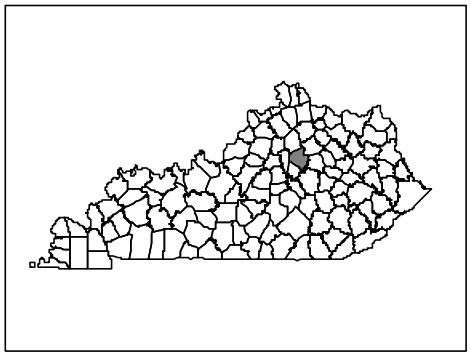


Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,1,1,2-Tetrachloroethane	30	1	0.57	-	-	-	-
1,1-Dichloroethene	30	1	2.11	-	-	-	-
1,2,4-Trimethylbenzene	30	9	3.88	1.64	1.38	1.27	1.21
1,2-Xylene	30	10	4.6	2.14	2.02	1.87	1.58
1,3,5-Trimethylbenzene	30	6	1.33	1.3	1.16	0.98	1.07
1,3-Butadiene	30	3	2.54	1.24	0.61	-	1.24
1,3-Xylene & 1,4-Xylene	30	17	15.0	9.81	8.98	4.67	3.39
Benzene	30	26	13.1	7.75	6.92	5.99	3.14
Bromomethane	30	13	2.8	2.72	2.56	2.56	2.07
Carbon disulfide	30	1	1.29	-	-	-	-
Carbon tetrachloride	30	6	0.82	0.77	0.64	0.6	0.62
Chloroethane	30	2	1.05	0.89	-	-	0.97
Chloromethane	30	19	6.59	6.03	5.26	5.25	3.97
Dichlorodifluoromethane	30	29	11.0	10.5	10.3	9.2	7.18
Dichloromethane	30	3	24.8	4.76	0.51	-	4.76
Ethylbenzene	30	8	3.6	2.25	2.11	1.29	1.26
Isopropylbenzene	30	1	2.8	-	-	-	-
Styrene	30	3	1.52	1.39	1.24	-	1.39
Toluene	30	26	23.5	20.6	20.6	12.7	5.63
Trichlorofluoromethane	30	25	3.46	3.43	3.29	2.97	1.45

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-067-0012
County: Fayette
Location: Lexington

Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$

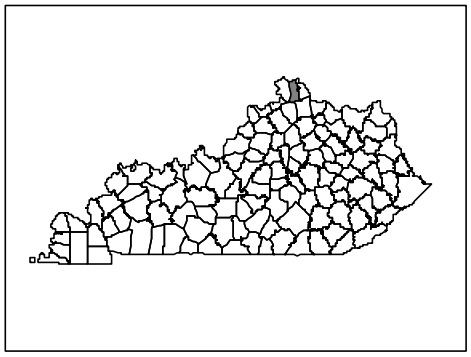


Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,2,4-Trimethylbenzene	37	2	2.1	1.36	-	-	1.65
1,2-Dichloroethane	37	1	1.77	-	-	-	-
1,2-Xylene	37	7	2.1	1.71	1.68	1.5	1.5
1,3,5-Trimethylbenzene	37	1	0.55	-	-	-	-
1,3-Butadiene	37	2	0.76	0.7	-	-	0.73
1,3-Xylene & 1,4-Xylene	37	15	6.19	5.5	5.08	3.53	1.88
Benzene	37	26	6.7	3.84	3.84	3.71	1.86
Bromomethane	37	16	2.81	2.72	2.66	2.6	2.28
Carbon tetrachloride	37	3	0.84	0.65	0.5	-	0.65
Chloroethane	37	2	0.76	0.74	-	-	0.75
Chloromethane	37	27	6.9	6.17	6.04	5.84	4.27
Dichlorodifluoromethane	37	36	12.8	10.6	10.5	10.5	6.95
Dichloromethane	37	2	4.03	2.0	-	-	3.02
Etylbenzene	37	3	1.69	1.56	1.5	-	1.56
Hexachlorobutadiene	37	1	0.68	-	-	-	-
Isopropyl toluene	37	1	1.86	-	-	-	-
Styrene	37	3	2.54	1.6	1.13	-	1.6
Tetrachloroethene	37	6	1.43	1.06	1.01	1.01	1.01
Toluene	37	32	19.5	9.74	8.96	7.38	2.98
Trichlorofluoromethane	37	26	3.74	3.6	3.2	3.17	1.56

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-117-0007
County: Kenton
Location: Covington

Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$

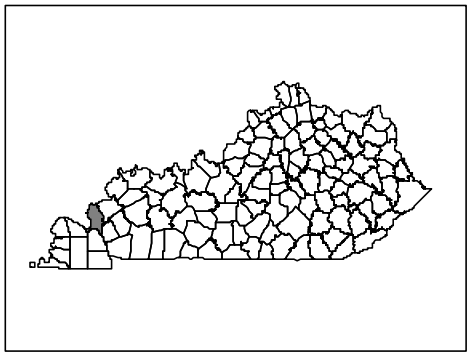


Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,2,3-Trichlorobenzene	24	1	2.3	-	-	-	-
1,2,4-Trimethylbenzene	24	1	0.8	-	-	-	-
1,2,4-Trichlorobenzene	24	1	0.81	-	-	-	-
1,2-Xylene	24	1	1.15	-	-	-	-
1,3-Xylene & 1,4-Xylene	24	5	3.18	2.83	2.66	2.54	2.66
1-Chlorohexane	24	1	8.56	-	-	-	-
Benzene	24	23	10.3	9.12	7.61	6.67	4.28
Bromomethane	24	14	5.15	4.9	2.34	2.27	2.14
tert-Butylbenzene	24	1	1.46	-	-	-	-
Carbon tetrachloride	24	4	0.79	0.68	0.6	0.52	0.64
Chlorobenzene	24	20	3.64	3.6	3.54	3.53	3.16
Chloroethane	24	1	1.72	-	-	-	-
Chloromethane	24	20	10.7	7.94	6.54	5.92	4.31
Dichlorodifluoromethane	24	24	11.9	8.65	8.15	7.86	6.8
Dichloromethane	24	2	3.32	2.35	-	-	2.84
Isopropyl-toluene	24	12	4.84	4.67	4.4	1.86	1.06
Naphthalene	24	2	2.0	1.57	-	-	1.79
Styrene	24	8	2.96	2.22	1.54	1.24	1.20
Toluene	24	23	8.13	6.17	5.6	5.51	2.89
Trichloroethene	24	1	1.21	-	-	-	-
Trichlorofluoromethane	24	23	3.71	2.54	2.12	2.02	1.38

Air Toxics Monitoring Summary Report - 2001

Agency: Kentucky Division for Air Quality
Site ID: 21-139-0004
County: Livingston
Location: 763 Bloodworth Road

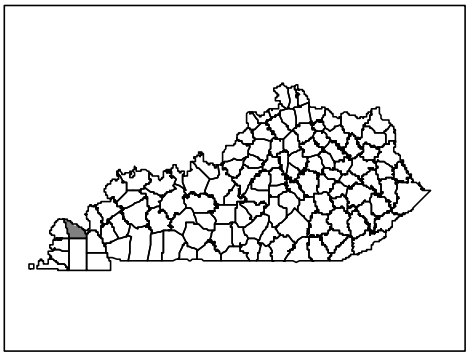
Group: Volatile Organic Compounds
Method: EPA Method TO14
Collection: Summa Passivated Canisters
Analysis: GC/MS Full-Scan Mode
Units: $\mu g/m^3$



Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,2,3-Trichlorobenzene	36	2	7.62	2.76	-	-	5.19
1,2,4-Trichlorobenzene	36	1	7.16	-	-	-	-
1,2,4-Trimethylbenzene	36	1	1.64	-	-	-	-
1,2 Dichloroethane	36	13	13.8	9.0	8.23	7.66	5.73
1,3-Butadiene	36	2	0.8	0.7	-	-	0.75
1,3-Xylene & 1,4-Xylene	36	2	2.01	0.8	-	-	1.4
Benzene	36	27	7.67	4.26	4.09	3.8	1.55
Bromomethane	36	22	4.04	3.18	2.75	2.58	2.19
tert-Butylbenzene	36	1	2.59	-	-	-	-
Carbon disulfide	36	2	1.73	1.55	-	-	1.64
Carbon tetrachloride	36	6	2.82	1.4	0.8	0.71	0.75
Chloroethane	36	11	1.86	1.2	1.18	1.15	1.06
Chloromethane	36	27	7.81	7.74	6.83	5.79	4.88
Dichlorodifluoromethane	36	36	13.1	12.6	11.8	11.3	7.3
Dichloromethane	36	1	0.53	-	-	-	-
Etylbenzene	36	1	0.95	-	-	-	-
Hexachlorobutadiene	36	1	23.1	-	-	-	-
Naphthalene	36	2	9.53	9.04	-	-	9.29
Styrene	36	3	2.66	2.3	1.38	-	2.3
Tetrachloroethene	36	1	1.95	-	-	-	-
Toluene	36	25	4.14	2.03	1.94	1.94	0.94
Trichlorofluoromethane	36	26	3.94	3.46	3.13	2.01	1.42
Vinyl chloride	36	13	7.5	6.76	6.12	3.13	2.33

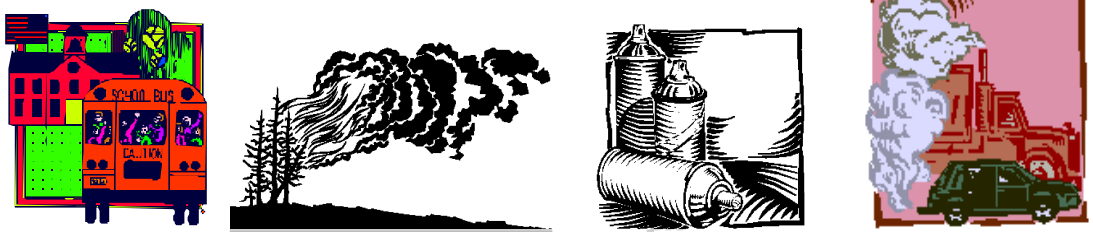
Air Toxics Monitoring Summary Report - 2001

Agency:	Kentucky Division for Air Quality
Site ID:	21-145-1024
County:	McCracken
Location:	Paducah
Group:	Volatile Organic Compounds
Method:	EPA Method TO14
Collection:	SUMMA Passivated Canisters
Analysis:	GC/MS Full-Scan Mode
Units:	$\mu g/m^3$



Parameter	# of Samples	# of times detected	1st max	2nd max	3rd max	4th max	Median Value
1,2,4-Trimethylbenzene	45	19	5.46	3.58	3.5	3.38	2.57
1,2-Dichloroethane	45	1	0.57	-	-	-	-
1,2-Xylene	45	19	3.19	3.04	2.84	2.74	2.06
1,3,5-Trimethylbenzene	45	8	2.14	1.56	1.5	1.48	1.37
1,3-Butadiene	45	1	0.93	-	-	-	-
1,3-Xylene & 1,4-Xylene	45	28	7.81	7.0	6.98	5.78	3.48
1-Chlorohexane	45	1	13.1	-	-	-	-
Benzene	45	38	5.33	4.19	4.11	3.1	1.87
Bromomethane	45	18	3.33	2.72	2.58	2.51	2.17
tert-Butylbenzene	45	1	1.39	-	-	-	-
Carbon tetrachloride	45	2	0.64	0.61	-	-	0.625
Chloromethane	45	32	8.8	6.19	6.02	5.88	4.58
Dichlorodifluoromethane	45	44	12.5	12.2	12.1	11.8	7.23
Dichloromethane	45	5	3.52	1.54	1.4	1.34	1.4
Ethylbenzene	45	13	2.05	1.83	1.65	1.61	1.28
Hexachlorobutadiene	45	1	3.85	-	-	-	-
Naphthalene	45	2	5.57	2.7	-	-	4.14
Styrene	45	7	2.0	1.88	1.47	1.34	1.34
Toluene	45	43	12.2	11.3	11.1	8.33	3.56
Trichlorofluoromethane	45	34	3.47	3.3	3.28	3.16	1.48
Vinyl chloride	45	1	0.54	-	-	-	-

Kentucky
Division for Air Quality



DIRECTORY

Natural Resources and Environmental
Protection Cabinet

Kentucky Natural Resources & Environmental Protection Cabinet
Department for Environmental Protection

Division for Air Quality

803 Schenkel Lane
Frankfort, KY 4060l-1403
Telephone: (502) 573-3382
Fax: (502) 573-3787
Web site: http://www.nr.state.ky.us/nrepc/dep/daq/daqhome.html

The Natural Resources and Environmental Protection Cabinet is the state agency responsible for the protection and preservation of Kentucky's land, air and water resources. The Cabinet is divided into three departments: Natural Resources; Surface Mining Reclamation and Enforcement; and Environmental Protection.

The **Division for Air Quality (DAQ)** is in the Cabinet's Department for Environmental Protection. The division is the state agency primarily responsible for enforcing the state and federal air quality standards in the Commonwealth of Kentucky with the goal of protecting public health and welfare.

To achieve that goal, the division operates a multi-faceted program with staff performing separate but interrelated tasks. The Division for Air Quality is organized as follows:

Director's Office
Enforcement Branch
Field Operations Branch (Regional Air Quality Offices)
Permit Review Branch
Special Programs Branch (formerly Asbestos Abatement)
Technical Services Branch (includes air monitoring and emissions inventory)
Program Planning & Administration Branch

Included in this directory are contacts, telephone numbers and information about each branch's responsibilities.

The Division for Air Quality operates a toll-free air quality index message number: **1-800-AIR-IN-KY**. This report on Kentucky's air quality gives the pollutant index number, the pollutant responsible for the index number, and whether the air quality is in the good, moderate, or unhealthy category in Lexington, Northern Kentucky, Owensboro, Henderson, Ashland, Paducah, Bowling Green, Pikeville and Louisville areas.

Director's Office

John Lyons, Director
E-Mail: john.lyons@mail.state.ky.us
Diana J. Andrews, Assistant Director;
E-Mail: diana.andrews@mail.state.ky.us

Telephone: (502) 573-3382 Fax: :(502) 573-3787

Mission Statement

The Division for Air Quality's mission is to protect public health and the environment by achieving and maintaining acceptable air quality through maintenance of a comprehensive air monitoring network; effective partnering with air pollution sources and the public to control air pollution; timely dissemination of accurate and useful information; judicious use of program resources; and operation of a reasonable, effective compliance assurance program.

PUBLIC EDUCATION/INFORMATION AND OUTREACH

The primary focus of the division's education and information activities is "*Clean Air for Kentucky.*" This program features a hot air balloon and an Air Quality Resource Guide which provides educational materials for teachers, camp leaders and other educators. This Guide has been developed to supplement textbook information on air pollution. The material can be adapted for use with K-12 grades. The guide contains resource materials, fact sheets, the air pollutant gremlins, classroom activities, games, quizzes, experiments, puzzles, coloring sheets and other helpful information about air quality.

The division's Clean Air for Kentucky educational exhibit includes handout materials and is available upon request for conferences, workshops, convention and other special events. Speakers are also available.

To receive an Air Quality Resource Guide; schedule the exhibit and/or a speaker for your conference, camp or other event; schedule a teacher workshop or in-service day; or receive information on a Clean Air for Kentucky hot air balloon visit (there is a cost) to an environmental event, contact: Lillie Cox through e-mail: lillie.cox@mail.state.ky.us or by regular mail at this address: Division for Air Quality, 803 Schenkel Lane, Frankfort, Kentucky 40601-1403; telephone: (502) 573-3382 or (800)-928-0047 (in Kentucky). Visit our web site: http://www.nr.state.ky.us/nrepc/dep/daq/daqhome.html

Data Management

Gerald Dunn, Resource Management Analyst
E-Mail: gerald.dunn@mail.state.ky.us
Tonya Manley, Systems Support Technician
E-Mail: tonya.manley@mail.state.ky.us

Responsibilities

- Installs and maintains complex equipment and software
- Coordinate data management activities for the Division for Air Quality
- Assist the division's employee training coordinator with developing training opportunities.
- Acts as a network administrator as necessary

Enforcement Branch

Pat Johnston, Manager
E-Mail: pat.johnston@mail.state.ky.us

Branch Responsibilities

- Negotiate enforcement agreements to resolve violations of Division for Air Quality regulations.
- Conduct administrative conferences between violating facilities and division officials.
- Negotiate terms of settlement agreements and/or agreed orders.
- Refer cases to the Cabinet's Office of Legal Services when agreement cannot be reached at the division level.

Field Operations Branch

Don Newell, Manager
E-mail: donald.newell@mail.state.ky.us
Robbin Edwards, Complaints Coordinator
E-mail: robbin.edwards@mail.state.ky.us

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

Branch Responsibilities

- Inspect air emission sources.
- Operate air quality monitors.
- Certify gasoline tank trucks.
- Enforce state and federal air quality regulations.
- Initiate enforcement action against violators of air quality regulations.
- Receive and investigate air quality complaints.
- Maintain and update department computer records concerning citizen complaints, release reporting and emergency response.
- Provide technical assistance and training to the regulated community and the general public.
- Inspect asbestos removals and school's asbestos-management practices.

Air Quality Regional Offices

Ashland Regional Office
Kathleen Buban, Supervisor E-Mail: kathleen.buban@mail.state.ky.us
(P.O. Box 1507), 3700 13th Street, Ashland KY 41105-1507
Telephone: (606) 920-2067 Fax: (606) 920-2069
Bath, Boyd, Bracken, Carter, Elliott, Fleming, Greenup, Lawrence, Lewis, Mason, Menifee, Montgomery, Morgan, Robertson and **Rowan**

Bowling Green Regional Office
Bill Blacketer, Supervisor E-Mail: bill.blacketer@mail.state.ky.us
1508 Westen Avenue, Bowling Green KY 42104-3356
Telephone: (270) 746-7475 Fax: (270) 746-7865
Adair, Allen, Barren, Butler, Cumberland, Edmonson, Green, Hart, Larue, Logan, Marion, Metcalfe, Monroe, Simpson, Taylor, Todd and **Warren**

Florence Regional Office
Clay Redmond, Supervisor E-Mail: clay.redmond@mail.state.ky.us
8020 Veterans Memorial Drive, Suite 110, Florence KY 41042-7570
Telephone: (859) 292-6411 Fax: (859) 292-6657
Boone, Campbell, Carroll, Gallatin, Grant, Harrison, Henry, Kenton, Nicholas, Owen, Pendleton and **Trimble**

Frankfort Regional Office
Mark Ritter, Supervisor E-Mail: mark.ritter@mail.state.ky.us
643 Teton Trail, Suite B, Frankfort KY 40601-1758
Telephone: (502) 564-3358 Fax: (502) 564-5043
Anderson, Bourbon, Bullitt, Clark, Estill, Fayette, Franklin, Garrard, Hardin, Jessamine, Madison, Mercer, Nelson, Oldham, Powell, Scott, Shelby, Spencer, Washington and **Woodford**

Hazard Regional Office
Jack Hurt, Supervisor E-Mail: jack.hurt@mail.state.ky.us
233 Birch Street, Suite 2, Hazard KY 41701-2179
Telephone: (606) 435-6022 Fax: (606) 435-6025
Breathitt, Floyd, Harlan, Johnson, Knott, Lee, Leslie, Letcher, Magoffin, Martin, Owsley, Perry, Pike and **Wolfe**

London Regional Office
Mike Hannon, Supervisor E-Mail: mike.hannon@mail.state.ky.us
875 S. Main Street, London KY 40741-9008
Telephone: (606) 878-0157 Fax: (606) 877-9091
Bell, Boyle, Casey, Clay, Clinton, Jackson, Knox, Laurel, Lincoln, McCreary, Pulaski, Rockcastle, Russell, Wayne and **Whitley**

Owensboro Regional Office
Pat Barker, Supervisor E-Mail: pat.barker@mail.state.ky.us
3032 Alvey Park Drive, W., Suite 700, Owensboro KY 42303-2191
Telephone: (270) 687-7304 Fax: (270) 687-7204
Breckenridge, Daviess, Grayson, Hancock, Henderson, Hopkins, Meade, McLean, Muhlenberg, Ohio, Union and **Webster**

Paducah Regional Office
Bill Clark, Supervisor E-Mail: billj.clark@mail.state.ky.us
4500 Clarks River Road, Paducah KY 42003-0823
Telephone: (270) 898-8468 Fax: (270) 898-8640
Ballard, Caldwell, Calloway, Carlisle, Christian, Crittenden, Fulton, Graves, Hickman, Livingston, Lyon, McCracken, Marshall and **Trigg**

Permit Review Branch

Edd Frazier, acting Manager
E-Mail: edd.frazier@mail.state.ky.us

Section Supervisors

Chemical Section, Sreeni Kesaraju
Combustion Section, Koorosh Farhoudi
Minerals Section, John Castanis
Surface Coating Section, Rick Shewekah
Metallurgy Section, April Webb
Permit Support Section, Allan Elliott

Branch Responsibilities

- Review registration forms to determine whether proposed new sources or existing source modifications require permits or permit revisions.
- Provide guidance during reapplication meetings with new sources.
- Review permit applications to determine whether air contaminant sources proposing to construct or operate in Kentucky are able to do so in compliance with state and federal air quality laws.
- Respond to public inquiries concerning permits and other environmental issues.
- Recommend issuance or denial of permits.
- Serve as technical consultant to other branches of the Division for Air Quality relative to regulation development, compliance demonstration tests, and enforcement actions.
- Monitor facility operations during demonstrations of compliance conducted by air contaminant sources.
- Make necessary modifications to permits in response to changes in environmental laws.
- Make confidentiality determinations.
- Operate and maintain the division file room, map room and library.
- Review and comment on environmental impact statements, A-95 applications, U.S. Army Corps of Engineers and Coast Guard public notices, pollution control tax exemption certification applications and wastewater facility plans.

Special Programs Branch

Parker H. Moore, Manager
E-mail: parker.moore@mail.state.ky.us

***Branch Responsibilities*:**

- Administer regulations pertaining to asbestos management, vehicle emission testing in Northern Kentucky, and risk management for facilities with hazardous chemicals.
- Certify asbestos abatement professionals.
- Review asbestos management plans for all school buildings in Kentucky.
- Review facilities' risk management plans for hazardous chemicals.
- Oversee vehicle missions testing contractor performance; coordinate with repair industry.
- Provide information to the public regarding asbestos management, Northern Kentucky's vehicle emissions testing program, and hazardous chemicals risk management programs.
- Participate in enforcement proceedings to resolve violations involving asbestos, vehicle emissions testing, and chemical risk management.

Vehicle Testing Program

Hours of Operation

Monday, Wednesday	**8 AM-7 PM**
Tuesday, Thursday, Friday	**8 AM-5 PM**
Saturday	**8 AM-1 PM**
Sunday and Holidays	**Closed**

Barry Adkins
2029 Rolling Hills Dr.
Covington, KY 41017
Phone: (606) 426-3364
Fax: (606) 426-3360

Mia Schmitt
1426 Gloria Terrell Dr.
Wilder, KY 41071
Phone: (606) 442-3370
Fax: (606) 442-8333

Chris Juilfs
5760 Constitution Drive
Florence, KY 41042
Phone: (606) 746-6771
Fax: (606) 746-6771

Technical Services Branch

Larry Garrison, Manager
E-Mail: larry.garrison@mail.state.ky.us

Section Supervisors

Technical Support Section, Roger Cook
Quality Assurance Section, William Sudduth
Source Sampling Section, Gerald Slucher
Emissions Inventory Section, Andrea Wilson

Branch Responsibilities

- Plan and support the operation of the air monitoring network.
- Maintain statewide computerized air monitoring data acquisition network; maintain state and federal ambient air quality data bases.
- Observe and evaluate tests performed on air pollution sources to determine compliance with air emission standards.
- Conduct quality assurance programs for ambient and in-stack continuous emission monitoring (CEM) systems.
- Maintain state and federal computerized data base systems of air pollution sources and emissions inventory.
- Prepare and issue air quality reports.
- Prepare and issue emissions inventory reports.
- Prepare and issue the daily air quality index.

Program Planning & Administration Branch

Lona Brewer, Manager
E-Mail: lona.brewer@mail.state.ky.us

Section Supervisors

Evaluation Section, John Gowins
Regulation Development Section, Millie Ellis
Administration Section, Nina Hockensmith

Branch Responsibilities

- Prepare the state implementation plan (SIP) to achieve and maintain national and state air quality standards.
- Draft and process air pollution control regulations.
- Monitor progress toward achieving the division's objectives.
- Measure trends in the reduction of emissions and improvement in air quality.
- Prepare and monitor the division's air quality management plan.
- Examine and evaluate division programs and recommend necessary improvements.
- Prepare and monitor federal grants and division budgets.
- Perform administrative functions for the division such as inventory, personnel actions, purchases and training records.
- Act as Liaison between this agency and the Air Pollution Control District of Jefferson County.
- Represent division on voluntary ozone reduction programs.
- Act as a clearinghouse for information about indoor air quality issues and federal refrigerant programs.
- Coordinate with the Business and Environmental Assistance Program at the University of Kentucky.