Kentucky Division for Air Quality

Fiscal Year 2009 Annual Report

Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
www.air.ky.gov

FROM THE DIRECTOR

It is my pleasure to share with you the Kentucky Division for Air Quality's annual report for fiscal year 2009. This report highlights the goals and achievements of the Division for Air Quality and summarizes the current state of Kentucky's air quality, along with recognizing future challenges and areas for further improvement.

Kentucky has made great progress in improving air quality across the commonwealth since the signing of the Clean Air Act by Congress in 1963. Air pollution has decreased significantly, providing safer air quality for the commonwealth's citizens. This is in large part due to curbing emissions from large fossil fuel burning facilities such as power plants and cutting emissions from vehicles. Half the nation's electricity consumption comes from coal-burning power plants. In Kentucky, that percentage jumps to 95%. Further, there are more automobiles on the nation's highways than ever before.

Although our air quality is better than ever, there is always more work to be done. Every five years, the United States Environmental Protection Agency reviews and revises the National Ambient Air Quality Standards as necessary to reflect increased scientific understanding about the impacts of air quality on human health and the environment. Simply put, the standards are often made more stringent. This means counties that currently meet national air quality standards should still strive to reduce air pollution, in order to continue to meet those standards.

Air quality is an economic issue as well as a health concern. Economic development can be seriously curtailed if an area does not meet federal air quality standards. Progressive companies not only want to avoid these areas due to stricter permitting requirements, they also want to locate in an area that is attractive to their employees and customers. Further, efforts of many citizens to conserve energy have a direct relationship to improved air quality. Turning off lights, purchasing ENERGY STAR products, and insulating homes, for example, reduces the amount of energy that needs to be produced by coal-burning power plants.

Air is a fascinating media that literally knows no boundaries. Every Kentuckian has the ability to help keep Kentucky's air clean, and there are many ways to be involved:

Check the Air Quality Index at www.air.ky.gov;
Learn about air quality and the simple ways that you can make a difference;
Start by making one small change that reduces air pollution;
Spread the word about what you are doing;
Organize locally to reduce air pollution;
Report suspected air pollution concerns to your local regional office.

We all have a valuable role to play in protecting our resources for future generations. Remember, it all adds up to cleaner air!

Sincerely,

John S. Lyons, Director

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EXECUTIVE SUMMARY

The mission of the Division for Air Quality (DAQ) is 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.*

The third largest division in the Department for Environmental Protection with 176 staff positions, DAQ oversees a diverse air quality program that encompasses monitoring, regulation development, compliance with federal air quality standards, permitting regulated facilities and environmental education.

"Although our air quality is better than ever, there is always more work to be done. As federal standards become more stringent, more counties than ever will be faced with the possibility of not meeting those standards. Counties will need to look for innovative ways to reduce air pollution locally.

A variety of strategies, both new and old, can both benefit air quality and help develop new green economies. Examples of these strategies include: strengthening of bicycle, pedestrian, and public transit networks; increasing community recycling infrastructure and passing local burn bans; utilizing biofuels; and installing solar panels or geothermal systems."

John S. Lyons,
DAQ Director

Selected achievements and challenges for Fiscal Year 2009

- A broad assessment of air quality over time (1980-2008) for six federally regulated air pollutants shows a trend of reduced air pollution. Air quality continues to improve statewide, due to a combination of regulatory and voluntary programs put in place by local, state, and federal governments (see figure 1).

- The division was unable to complete a 2009 Kentucky Green House Gas (GHG) Assessment due to limited resources. A significant achievement for the commonwealth was that in November, 2008 Kentucky joined the Climate Registry, a national program to help entities establish their carbon emissions. Also in November of 2008, Governor Beshear announced the release of Kentucky's Seven Point Strategy for Energy Independence, which includes several measures that will reduce carbon emissions in the commonwealth.

Air Monitoring

The Technical Services Branch continues to successfully operate a network of 113 ambient air quality monitors and 13 meteorological data towers, report on the Air Quality Index, observe compliance demonstrations at permitted facilities, and collaborate with the United States Environmental Protection Agency (U.S. EPA) and the Program Planning Branch on exceptional event data.

- In FY09, TSB personnel made preparations for the addition of lead samplers to the monitoring network, as well as established sites for the U.S. EPA's special study on air toxics at schools.

Environmental Education
The environmental education program has reached hundreds of students, teachers, and citizens through a combination of presentations, exhibitions, and workshops, along with serving in a number of collaborative groups that work to improve air quality.

- The environmental education program has been able to expand the reach of its single staff member by training and coordinating with 16 regional office staff, who act as environmental education liaisons in their part of the state.

Field Operations
The Field Operation Branch (FOB) continues to respond to the needs of the public and regulated community by investigating complaints and routinely inspecting facilities via the division's network of eight regional offices.

- Within the branch, a comprehensive State Review Framework (SRF) audit was completed by the EPA regarding 2004-2005 compliance activities. The final SRF report statistics determined that FOB compliance activities exceeded the several national averages.

- Eighteen 2008 retirements in FOB negatively impacted the branch in 2009 and the branch will continue to feel that impact for some time to come. Three of eight regional office supervisors and 14 of about 37 (37.8%) environmental (source) inspectors have less than two years of either supervisory or air quality compliance experience. It usually requires at least three years to fully train technical source inspectors to inspect all facility types.

Permit Review
The Permit Review Branch has substantially reduced the long-standing permit back log, dropping the number of applications that went beyond the allotted Regulatory Time Frame from a high of 512 in June 2006, to 26 at the close of fiscal year 2009.

- One of the biggest challenges for the Permit Review Branch is to issue permits within the regulatory time frames by state regulations and time frames set by the U.S. EPA with the increasing complexity in regulations and litigations. The Permit Review Branch has maintained the number of permits issued past the regulatory time frame to less than 20%, and will continue striving to reduce that percentage.

Program Planning
The Program Planning and Administration Branch (PPAB) helped several counties to attain Clean Air Act ambient air quality standards, while simultaneously preparing for more stringent standards that may impact the ability of several counties to maintain compliance.

- PPAB submitted a designation recommendation to EPA for the 0.075 ppm ozone standard and is awaiting evaluation from EPA.

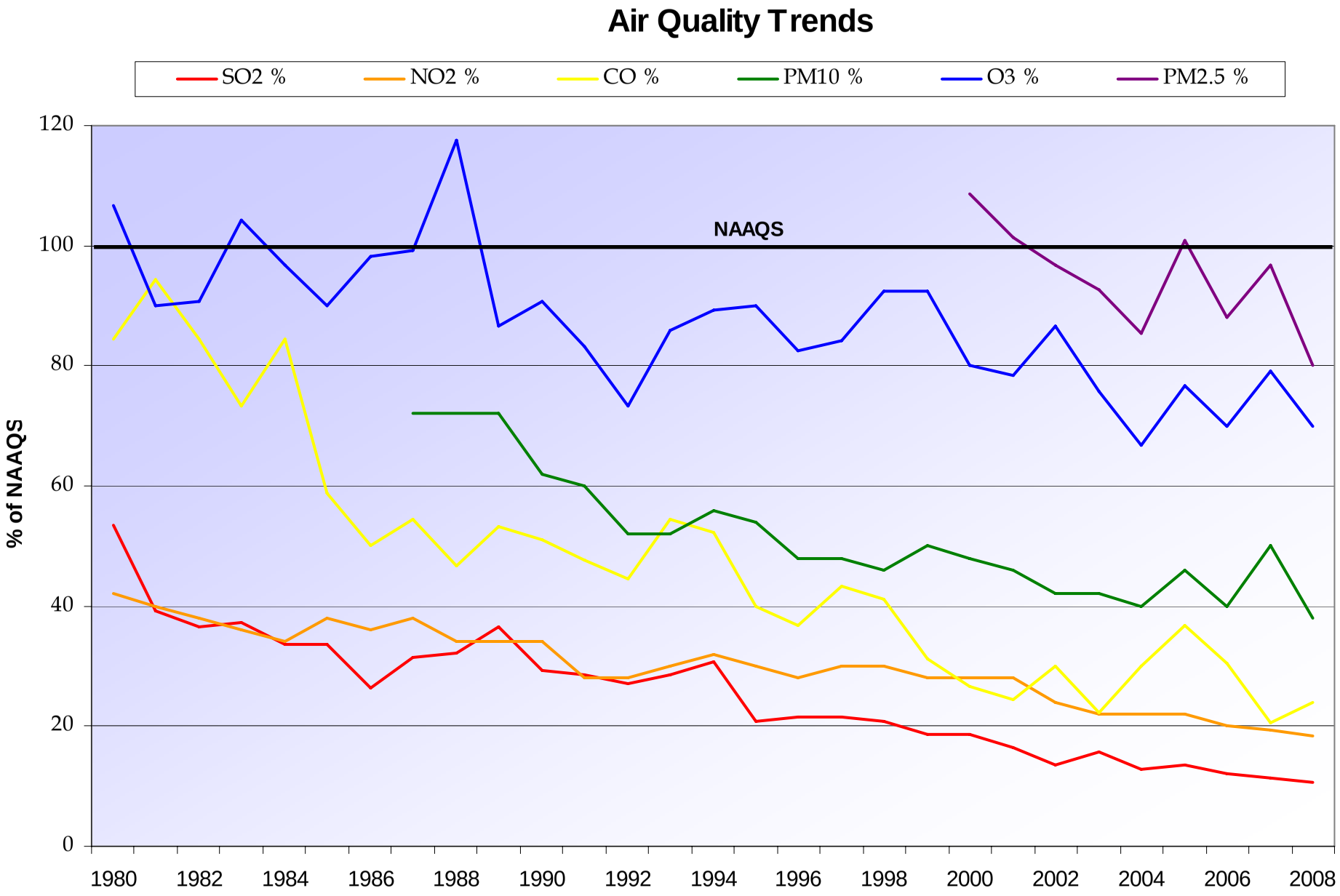

Figure 1: Air Quality Trends from 1980-2008. This chart shows trends in individual pollution levels over time. While individual pollutants may spike certain years, overall the trend is a decline in pollution levels. The pollutants are shown in terms of percentage of the National Ambient Air Quality Standard (NAAQS) because the different pollutants are measured in different scales, which makes direct comparison difficult. For a key of pollution abbreviations, see the Glossary of Abbreviations on page 105.

INTRODUCTION

The Division for Air Quality is one of six divisions in the Department for Environmental Protection, which is housed in the Energy and Environment Cabinet. The cabinet has developed a set of objectives to be implemented by each department from 2006-2009. The objectives and tactics relevant to DAQ are:

Cabinet Objective 1.0: Improve regulatory procedures and implementation. Make Kentucky's regulatory program rational, reasonable and user-friendly.

Cabinet Objective 2.0: Improve the quality of the Kentucky environment and minimize the health impacts to the citizens from environmental risks in the commonwealth.

DAQ strives to assist Kentucky's citizens and businesses in a satisfactory manner by responding to complaints, requests, and permit actions quickly and thoroughly. In addition to serving individuals and businesses, the division works to ensure that the federal Clean Air Act is met by working with county and city governments to ensure local compliance with (attainment of) the National Ambient Air Quality Standards (NAAQS), which are set by the U.S. EPA. In order to better accomplish the above objectives, the Division for Air Quality has established the following tactics and measures to help us track our progress:

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Tactic 1.1: Continue execution of the permit backlog reduction plan originally implemented on July 15, 2006.

Measures for **Permit Backlogs**:

- The total number of permits pending (page 20).
- The total number of permits pending that exceed regulatory time frames (page 20).
- The percentage of permit reviews completed within regulatory time frames (page 23).
- The percentage of permit reviews completed that exceed regulatory time frames (page 23).

The division has established a number of tactics and measures to meet the cabinet's second objective of protecting and enhancing Kentucky's environment and public health:

Tactic 2.1: Continue implementation of the air toxics program to evaluate and address any risks to public health associated with hazardous air pollutant (HAP) emissions.

Originally operating out of the state health department, the state air pollution control program was the Kentucky Air Pollution Control Commission, in operation as early as the 1940s. Kentucky's environmental cabinet was first formed in the early 1970s, in part due to national legislation which brought the Environmental Protection Agency (and the Clean Air Act) into being. Today, as in its beginning, air pollution control is divided among a hierarchy of state, federal, and local programs.

Federal Programs

The Clean Air Act (CAA) authorizes two permitting programs at the federal level. The New Source Review (NSR) program has been around since 1975 and requires extensive review of applications for major new or modified air contaminant sources prior to issuance of construction permits. Title V of the 1990 CAA authorized for the first time a federally enforceable operating permit program.

Local Authority

KRS 224 recognizes the right of counties to develop their own air pollution control districts, if they wish. Jefferson County (Louisville Metro Air Pollution Control District) has maintained a local air pollution control program since the late 1940's, while activities in the rest of Kentucky counties are covered by DAQ. The Air Pollution Control District may choose to make subtle changes or be more stringent than state and federal regulations, but it must be at least as stringent as the state and federal programs.

Measures to **hazardous air pollutant reductions**:

- The total number of air toxics risk assessments reviewed and/or performed (page 26).
- The total number of hazardous air pollutant related investigations (page 26).
- The total tons of hazardous air pollutants reduced (page 25).

Tactic 2.2: Implement measures contained in the June 2008 annual fine particle attainment demonstration State Implementation Plan (SIP).

Measure for **demonstrating attainment of the annual fine particle standard**:

- The number of counties remaining in nonattainment (page 37).

Tactic 2.3: Continue to work with the U.S. EPA on appropriate designation for areas not meeting the 24-hour fine particle standard, and develop an attainment demonstration SIP for areas ultimately designated by U.S. EPA as not meeting that standard.

Measure for **designation of the 24-hour fine particle standard**:

- The number of counties remaining in nonattainment (page 37).

Tactic 2.4: Continue implementation of federal programs and requirements contained in the 1997 8-hour ozone attainment demonstration SIP, submitted to the U.S. EPA in December 2007.

Measure for **designation of the 1997 8-hour ozone standard**:

- The number of counties remaining in nonattainment (page 36).

Tactic 2.5: Continue implementation of federal programs and requirements contained in the December 2007 Regional Haze SIP.

Measure for **implementation of the Regional Haze State Implementation Plan**:

- Improved visibility at Class I areas, including Mammoth Cave National Park (page 38).

Tactic 2.7: Determine mercury deposition and impacts resulting from emissions of mercury by Kentucky sources.

Measure for **reducing emissions of mercury from stationary sources:**

- Number of streams with fish consumption advisories (page 76).

Tactic 2.8: Develop a Kentucky greenhouse gas emissions assessment.

Measure for **reducing greenhouse gas emissions from various Kentucky sectors:**

- Baseline: 2009 emissions inventory (page 6).

Tactic 2.9: Assure compliance with air quality regulations and standards.

Measures for **compliance with air quality regulations and standards**:

- Number of major stationary source inspections conducted (page 14);
- Number of minor stationary source inspections conducted (page 14);
- Number of asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) and Asbestos Hazard Emergency Response Act (AHERA) inspections conducted (page 18);
- Number of non NESHAP and AHERA complaint investigations conducted (page 18);
- Compliance rate of stationary source inspections (page 15);
- Compliance rate with 401 KAR 63:005—open burning, 63:010—fugitive emissions, and 401 KAR 53:010—odor (pages 16-17); and
- Compliance rate of NESHAP and AHERA related inspections and investigations (page 18).

CLIMATE CHANGE

Although it remains a goal of the division, in 2009 the agency did not complete a 2009 Kentucky Green House Gas (GHG) Assessment due to limited resources. The U.S. EPA published a proposed rule for a GHG reporting program in June, 2009 but the rule has not been made final as of this writing.

Links:

Governor Beshear's Energy Plan—
http://www.energy.ky.gov/energyplan2008

25X25 website—
http://www.25x25.org

Waxman-Markey CRS report for congress—
http://opencrs.com/document/R40643

Proposed Mandatory Greenhouse Gas Reporting Rule—
http://www.epa.gov/climatechange/emissions/ghgrulemaking.html

The Climate Registry—
http://www.theclimateregistry.org

A significant achievement for the commonwealth was that in November, 2008 Kentucky joined the Climate Registry, a national program to help entities establish their carbon emissions. Also in November of 2008, Governor Beshear announced the release of Kentucky's Seven Point Strategy for Energy Independence, which includes several measures that will reduce carbon emissions in the commonwealth.

At this time, it is uncertain how the Climate Registry and the GHG Reporting Rule will mesh. In order to minimize duplication of work, Kentucky is waiting for U.S. EPA's rule to be made final before beginning a thorough analysis of carbon emissions. Another complicating factor is the federal House of Representatives passing of the American Clean Energy and Security Act of 2009 (see story at right).

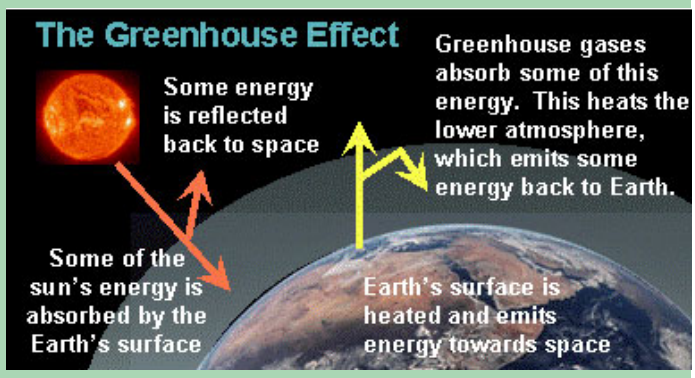
House Approves Cap and Trade Bill

The American Clean Energy and Security Act of 2009 presents new challenges and opportunities for Kentucky's consumers, industries and energy providers.

The American Clean Energy and Security Act (ACESA) of 2009, sponsored by Representatives Markey and Waxman, passed the U.S. House of Representatives on June 26, 2009, by a narrow margin of 219 to 212. The bill requires nationwide greenhouse gas emissions reductions through a cap-and-trade program. While federal climate change bills have been discussed in recent years, the Waxman-Markey bill is the first to pass a chamber.

Key Provisions of the ACESA

The major provision of the Act is the cap-and-trade program for reducing greenhouse gases emissions. Cap-and-trade systems are market-based; this system would establish an absolute cap on the amount of air emissions from regulated sectors and would allow trading of emissions permits, also known as "allowances." It's not a new scheme for emissions reductions, having been used successfully as part of the Clean Air Act's program to reduce acid rain pollution for a number of years.



The Greenhouse Effect explains how the release of certain pollutants from human activities is contributing to the warming of our earth.
Image credit: NOAA

Beginning in 2012, the ACESA establishes annual GHG emissions reductions from large sources such as electric utilities and oil refineries. The ACESA calls for a 17 percent reduction in emissions of greenhouse gases from 2005 levels by 2020 and 83 percent by 2050. The bill also includes provisions to prevent tropical deforestation (a major contributor to GHG emissions).

Eighty-five percent of all pollution allowances are given at no cost for various purposes, including compensating energy-intensive industries, state governments, oil refiners and low-income households. In its current form, the Waxman-Markey bill gives 35 percent of free allowances to the electric utility industry in 2012 and 2013, with 15 percent going to energy-intensive industries that have international competition, and another 10 percent going to states for investments in renewable power sources and energy efficiency.

In addition to addressing greenhouse gas emissions, the bill contains a number of other key provisions, including energy efficiency, renewable energy, and smart grid development. One of the key provisions is a nationwide renewable and efficiency portfolio standard whereby electric utilities would be required to meet 20 percent of their electricity demand through renewable energy sources and energy efficiency by 2020.

Challenges & Opportunities for Kentucky

Kentucky is the third largest coal-producing state, accounting for roughly one-tenth of total U.S. coal production. Kentucky is also a heavily industrialized economy—we are the third largest in automobile manufacturing and rank 6th in the nation in the percent of our state's gross domestic product attributable to manufacturing. This industrial development has in large part occurred due to our relatively low electricity rates, afforded through oversight from the Public Service Commission and coal-fired power generation. In 2006, Kentucky ranked 13th in overall carbon dioxide emissions and 7th in per

capita emissions, nationally. Kentucky's electric power industry emits roughly 93 million metric tons of carbon dioxide.

Kentucky policymakers and government officials have been anticipating federal climate change legislation for a number of years. Most people would agree it has not been a matter of if, but when. In a climate-changed world, it is imperative that Kentucky and other states are able to meet reductions targets in a timely and cost-effective manner. For existing coal-fired electricity generation, for example, necessary equipment to capture carbon dioxide (a major greenhouse gas) emissions and technology to sequester or store those emissions must be in place. These carbon capture and sequestration technologies are not currently available at commercial scale. To further research and development of CCS technologies, the Kentucky Legislature has taken a number of important steps to provide necessary funding resources.

"In Kentucky, a primary challenge that we face is to develop clean, reliable, affordable energy sources that help us to reduce our carbon dioxide emissions, provide economic prosperity, and allow us to continue to use our state's traditional domestic energy resources. As the third largest coal producer and as a state that relies on coal to generate more than 92% of our electricity, Kentuckians have much at stake in a carbon constrained world."

Len Peters
EEC Secretary

Governor Beshear's comprehensive energy plan, Intelligent Energy Choices for Kentucky's Future, is built upon the solid foundation established by the Kentucky General Assembly and establishes a 7-point energy strategy to help Kentucky reduce its carbon dioxide emissions, develop our renewable energy resources, improve overall energy efficiency, reduce our reliance on imported oil and natural gas, and grow our economy.

Energy and Environment Cabinet Secretary Len Peters recognizes the challenges and uncertainties associated with climate change and that greenhouse gas emissions, such as carbon dioxide, contribute to global warming. As he states, "One of our goals in the Cabinet is to reduce emissions of carbon dioxide, and other air pollutants, in order to reduce or mitigate negative environmental and human health consequences. The issues facing our energy future are complex – one single solution will simply not meet our energy needs, and the range of possible solutions will require some trade-offs."

Greater energy efficiency and conservation are the fastest, most affordable ways to reduce carbon emissions. Ironically, despite our low electricity rates, Kentuckians generally use about the same percent of their income for electricity as Americans with higher per kilowatt costs. Perhaps this is because Kentucky's consumption of electricity per capita is among the highest in the United States. In other words, our low electricity cost per kilowatt has, to some degree, allowed us to be wasteful of this vital resource.

Under a business as usual scenario, Kentucky's energy use is projected to grow by slightly more than 40 percent between now and 2025. With a concerted effort to improve energy efficiency in our homes, schools, office buildings, industries, and transportation system, 60 percent of our new energy requirements could be satisfied with energy efficiency measures rather than new sources of energy production.

Division of Carbon Management Assistant Director, Talina Mathews, notes that it is difficult to predict the exact cost impacts to Kentucky under a carbon dioxide cap and trade scheme. However, we do know, she says, that "costs will increase under any type of climate legislation or any legislation that

imposes mandates on generating electricity from renewable energy sources. Even efforts to improve and reinforce the nation's aging electric transmission infrastructure will impose costs – whether in terms of smart grid technology or expanding the grid to support development of renewable projects in remote areas of the country."

Kentucky's comprehensive energy plan has several parallels to the Waxman-Markey bill. The plan incorporates recommendations to improve energy efficiency; provides a framework from which we can begin to increase our use of renewable resources, including biomass; recommends initiation of an aggressive carbon capture and sequestration program; and seeks to diversify the state's energy portfolio. Developing Kentucky's biomass resources offers great potential to enhance the state's agricultural economy while reducing overall carbon dioxide emissions.

The first three Strategies of the energy plan encompass what is proposed as a Renewable and Efficiency Portfolio Standard for the commonwealth, in which 25 percent of Kentucky's energy needs in 2025 will be met by energy efficiency, conservation, and alternative and renewable resources. As is noted in the plan, leading with these strategies enables us to implement actions to reduce energy use and carbon dioxide emissions in a timely and cost-effective manner. The Waxman-Markey bill also contains a renewable energy standard – originally mirroring the 25 percent by 2025 described above, but scaled down in the current version to 12-15 percent by 2020.

Kentucky has great potential for renewable energy sources on a distributed generation basis. Distributed generation means that energy is generated from several small sources, rather than a large centralized source. Today, renewable energy accounts for only about three percent of the state's entire energy portfolio – including use of biodiesel and ethanol. A conservative estimate from Kentucky's Department for Energy Development and Independence is that we can triple our current use of renewable energy sources between now and 2025 for energy generation, simply by relying on our domestic renewable energy resources. Further, Kentucky can increase its biomass resources tenfold, without negatively impacting food crop production.

Electricity generation emissions are not the only target of the carbon dioxide emissions problem being tackled by the Waxman-Markey bill. Fully 40% of the carbon dioxide emissions in the United States are from the transportation sector. Increased fuel economy standards passed by President Obama on May 20, 2009 require all automakers to increase fleet fuel efficiency by 5 percent per year starting in 2012, which will help reduce those emissions. Provisions of the Waxman-Markey bill would require states to stabilize transportation-related GHG emissions in a year designated by each state independently (2010 is recommended), and to reduce emissions in the years following. These requirements could help establish better infrastructure for alternative modes of transportation in Kentucky, such as more sidewalks and bike lanes, or alternative fuels, such as biodiesel.

"Any policies that are put in place to reduce carbon dioxide emissions will simultaneously reduce emissions of currently regulated pollutants, such as particulate matter, and reducing these pollutants in Kentucky will benefit the health of every man, woman, and child in the commonwealth."

John S. Lyons
DAQ Director

Waxman-Markey's cap-and-trade provisions are just one legislative or regulatory approach for reducing carbon dioxide emissions. Multiple strategies, such as a direct carbon tax, or mandatory reduction of emissions on an industry-by-industry basis, could also be explored. The latter strategy would act similarly to the current structure of the Clean Air Act, under which emissions of particulate matter, sulfur dioxide, and nitrogen oxide have been significantly reduced.

The next step for the Act is a vote in the Senate, although it is important to note that in the Senate, the debate may be taking place on a companion bill, rather than this particular one.

This article was originally written for the Fall, 2009 edition of Land, Air, and Water, a publication of the Energy and Environment Cabinet.

ENVIRONMENTAL EDUCATION

The goal of environmental education (EE) is to give individuals the tools and information needed to think critically and independently about the world around them. Environmental education focuses on the interactions between society and the environment. Air quality is a fitting arena for such a focus, because so much of what people do in their daily lives impacts air quality. The division's environmental education program emphasizes experiential education, with the philosophy that the best way for students to learn is to become actively engaged in whatever it is that they seek to learn.

The DAQ EE program includes:

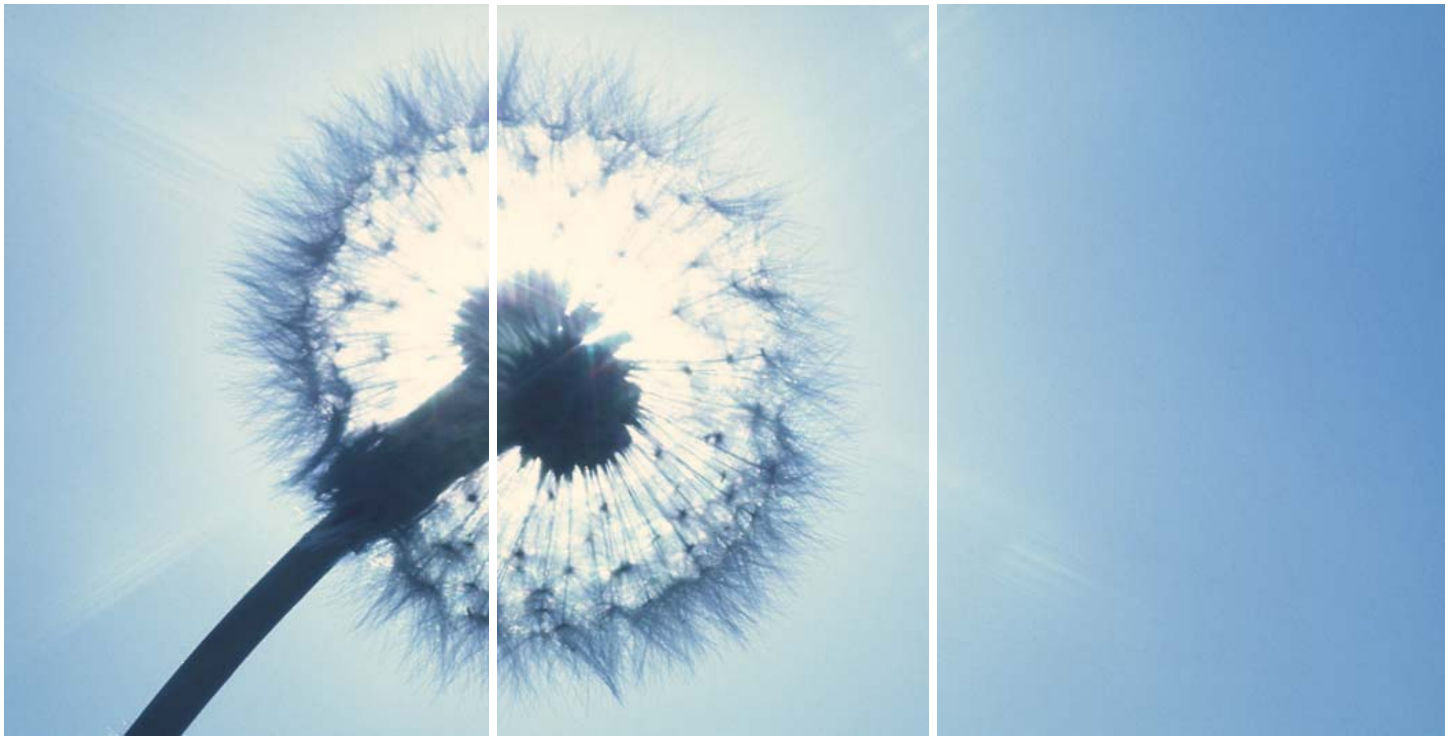
- Teacher training;
- Classroom programs;
- Public events and festivals;
- Fire fighter education;
- School bus driver trainings (idle reduction);
- Community groups, forums, and conferences;
- Media outreach

Air Quality EE program topic areas include:

- Open burning and waste reduction;
- Clean school buses (idle reduction and retrofit technology;
- Fuel economy and alternative fuels;
- Energy conservation and alternative energy sources;
- Alternative modes of transit: walking, biking, vanpooling, etc.;
- Climate change (global warming)

The division's EE program has expanded, thanks to the support of the Field Operations Branch. Two staff in each field office are now trained to assist with local programs as requested, greatly expanding the reach of central office staff. DAQ curriculum is correlated to state and national learning standards, and formulated primarily for grades 4-8.

This year, EE staff presented at the following meetings: National Air Quality Conference: Communicating Air Quality; Governor's Conference on the Environment; Kentucky Association of County Officials (Going Green series); Kentucky Clean Fuels Coalition Quarterly Meeting; and the Kentucky Association for Environmental Education Annual Conference. The division also participated in several teacher workshops, field days, and community festivals.



Southeast Diesel Collaborative

The Southeast Diesel Collaborative (SEDC) is a regional organization that brings together partners from federal, state and local government, non-governmental organizations and business to reduce emissions from diesel engines. A number of sectors, including on-road vehicles, agriculture, construction, ports and rail are represented in the SEDC.

A wide variety of strategies are utilized by SEDC partners, including idle reduction, alternative fuels, and engine retrofits, replacements and repowers. Federal funds, authorized by the Diesel Emissions Reduction Act, help SEDC partners to employ the above strategies in the sectors involved. DAQ staff maintain an active presence in the Southeast Diesel Collaborative, attending annual meetings, and this year, a grant writing workshop designed to help entities apply for federal funds.

DAQ has helped multiple entities compose competitive grant applications—in FY '09 DAQ partnered with the Kentucky Clean Fuels Coalition and UPS to prepare a grant proposal that included gate electrification—eliminating the need for diesel powered equipment at 13 airline gates—and also replaced 92 diesel engines with gasoline engines. The project was awarded $474,000 and will significantly reduce particulate matter and toxic air pollution in Louisville.

Clean School Bus

One sector of the Southeast Diesel Collaborative is on-road fleets, and DAQ has chosen to emphasize the greening of school bus fleets—which can directly impact student health and absenteeism. This fiscal year, Bell County, Boone County, Fayette County, Franklin County, Jefferson County, and Paducah Independent school districts were awarded a total of $196,880 in funds to retrofit school buses with pollution reduction equipment and purchase filter cleaning devices.

Students at Clark Elementary School read "The Magic School Bus Gets Cleaned Up" as part of the educational program for grant-funded school districts.
Photo Credit: Mitzi Golightly, Paducah Independent School District

The division actively partners with school districts to help them implement idle reduction policies, saving schools money and reducing student and driver exposure to harmful diesel emissions. DAQ includes Clean School Bus activities as a component of its environmental education initiatives in schools.

This year, Governor Beshear announced that through the American Recovery and Reinvestment Act, an additional $1.4 million would be granted to school districts for the greening of their school bus fleets. The funds will retrofit buses in 23 school districts across the state and benefit an estimated 220,000 students.

Kentucky Association for Environmental Education

DAQ is an active member of the Kentucky Association for Environmental Education (KAEE), sponsoring the organization's annual conference and maintaining a presence on www.EEinKentucky.org, a one-stop shop for environmental education in the state. This year, DAQ Environmental Education Specialist Elizabeth Robb Schmitz served as president of the KAEE board of Directors.

FIELD OPERATIONS

The Field Operations Branch is one of the largest branches of the division and is currently staffed by 75 employees that include supervisors, administrative staff, air source inspectors, asbestos inspectors, field support staff, and air monitoring specialists. Located in eight regional offices, the primary duties of these staff are to:

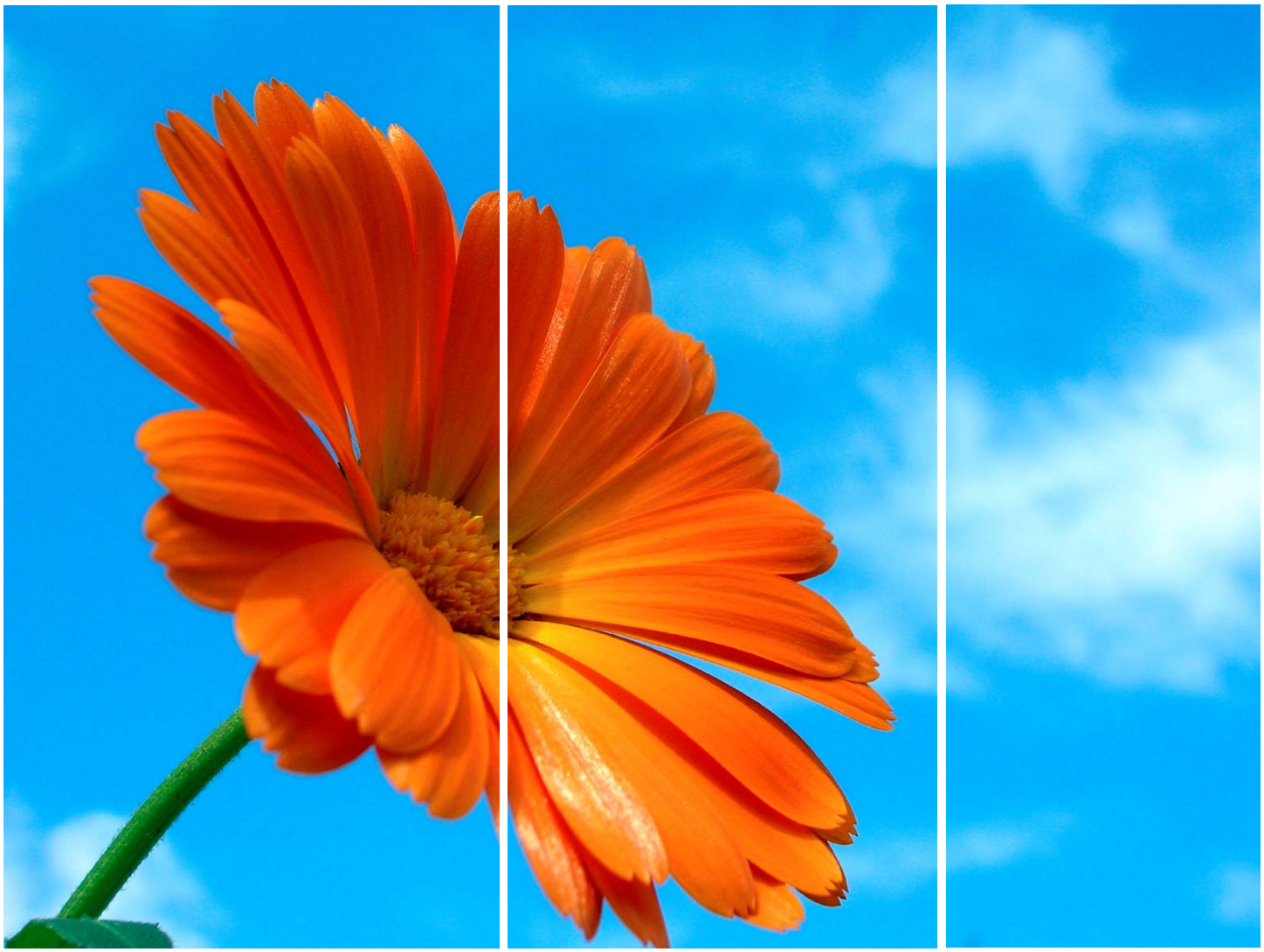
1) Complete unscheduled inspections to ensure that permitted facilities and non-permitted entities maintain compliance with federal and/or state air quality regulations and asbestos regulations;

2) Operate and maintain 113 air monitoring units located at 34 stations scattered throughout the state to determine ambient air quality and verify that pollutant concentrations remain within U.S. EPA established limits; and

3) Investigate, within five business days, numerous unscheduled air quality complaints received from the general public and other sources.

"From August 2008 to May 2009, FOB managed to fill numerous inspector position vacancies throughout the state that resulted from early retirement packages offered by the state along with staff turnover. Extensive, ongoing technical training has begun for all the new employees, but it will take several years for those staff to become fully trained."

Kevin Flowers,
FOB Branch Manager



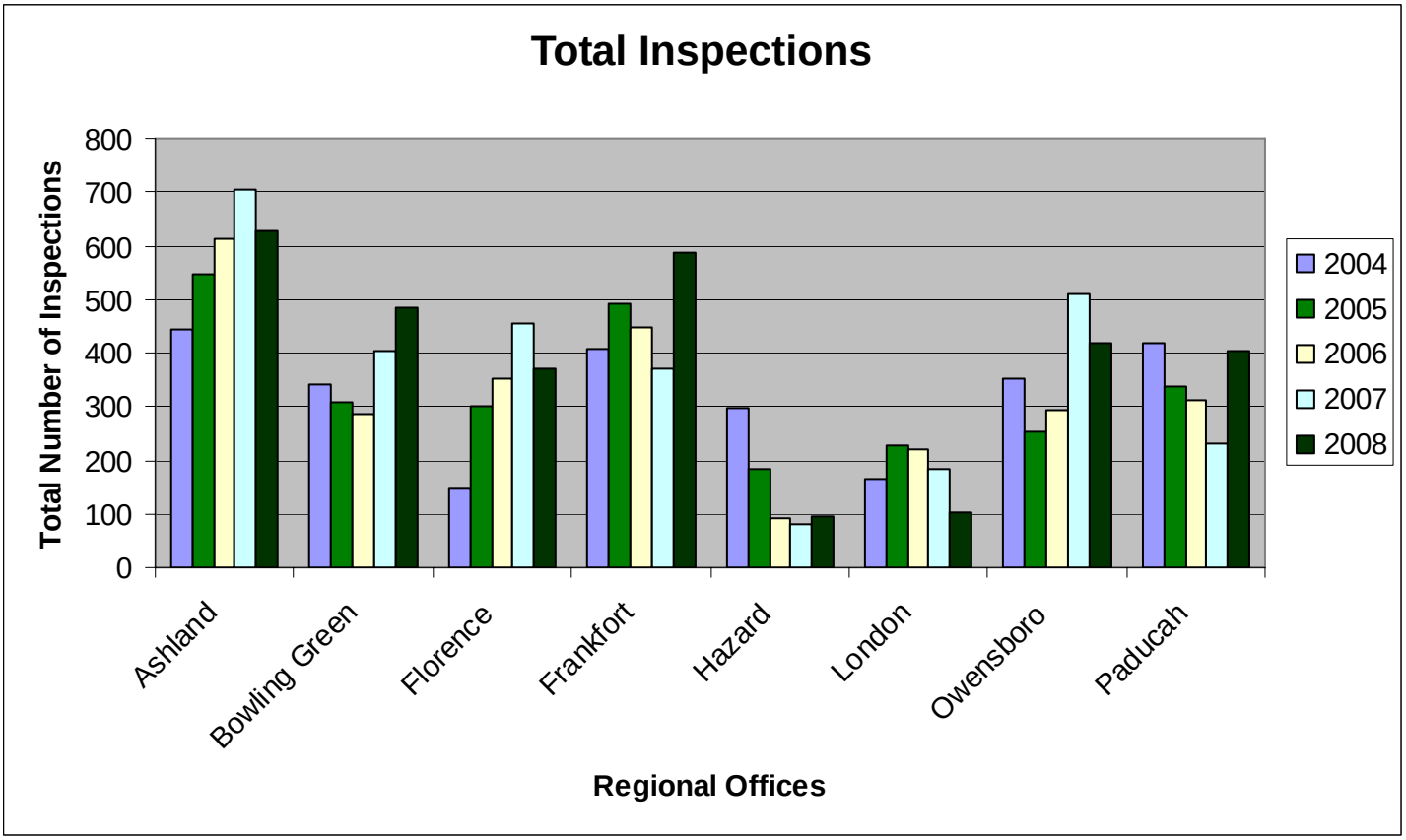


Figure 2: Total inspections conducted by DAQ regional offices.

Inspections

One of the primary duties of the Field Operations Branch (FOB) is to inspect sources of air pollution for compliance with air quality regulations and if applicable, permit conditions. The measures for the success of this program are:

- Number of major stationary source inspections conducted (Figure 3);
- Number of minor stationary source inspections conducted (Figure 4);
- Number of asbestos inspections conducted (Figure 10);
- Compliance rate of stationary source inspections (Figure 5);
- Compliance rate with 401 KAR 63:005—open burning (Figure 7);
- Compliance rate with 63:010—fugitive emissions (Figure 8); and
- Compliance rate with 401 KAR 53:010—odor (Figure 9).

In calendar year 2008, FOB staff completed 3105 compliance inspections of various types at either non-permitted or permitted sources (major Title V, minor). Types of inspections included full compliance evaluations, partial compliance evaluations, records reviews, compliance demonstrations (stack tests), asbestos, follow-up inspections of documented violations, and self-initiated inspections of suspected violators.

The regional offices with more inspections for major facilities (Figure 3) are located in areas of the state with a higher number of major permitted facilities, which include power plants, manufacturing facilities and chemical processing plants. The regional offices with more inspections for minor sources are located in areas of the state with a larger population base, leading to more minor pollution sources, such as auto body/paint shops and dry cleaners (see Figure 4).

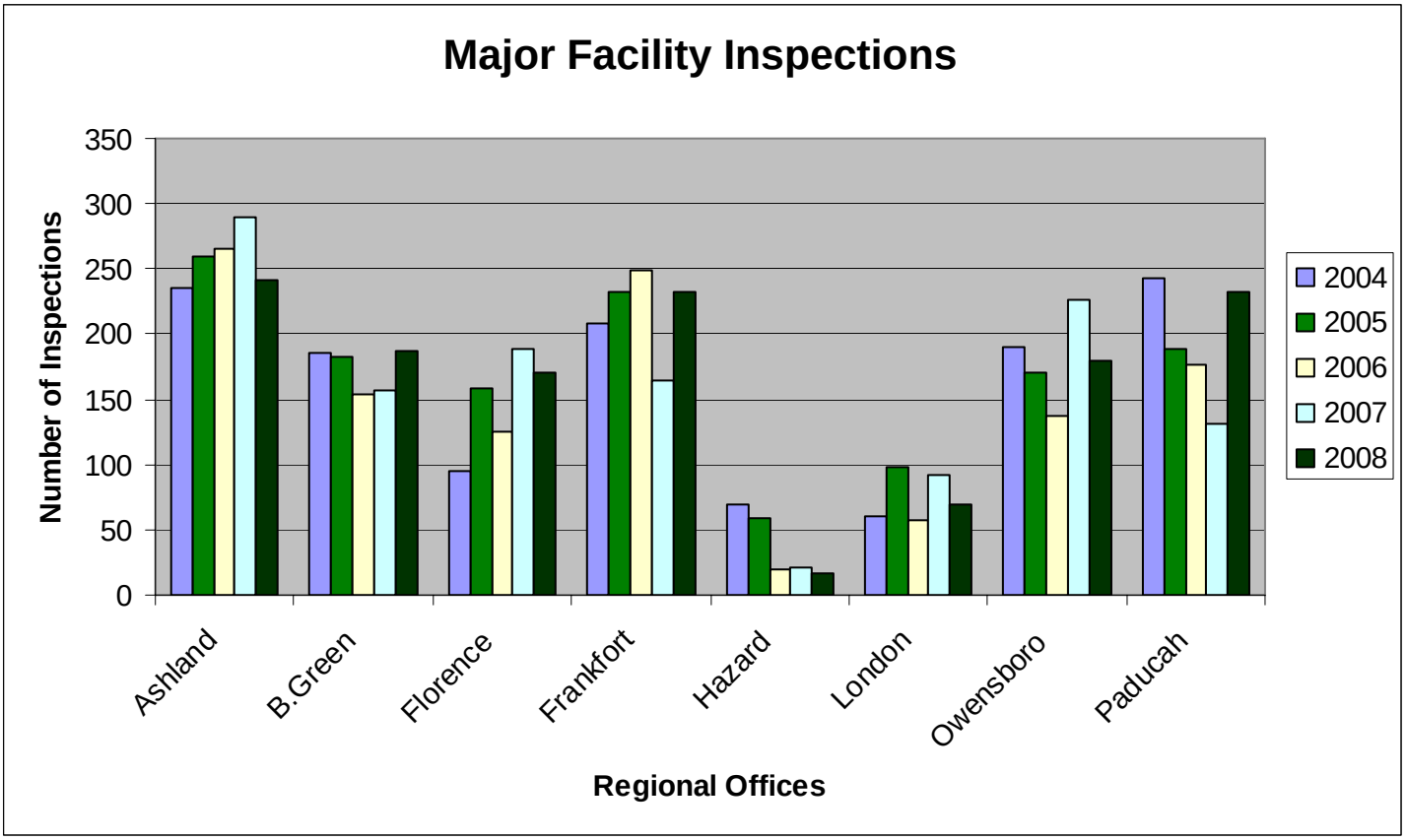


Figure 3: Number of major stationary facility inspections in Kentucky.
**Every type of inspection, excluding complaint investigations*

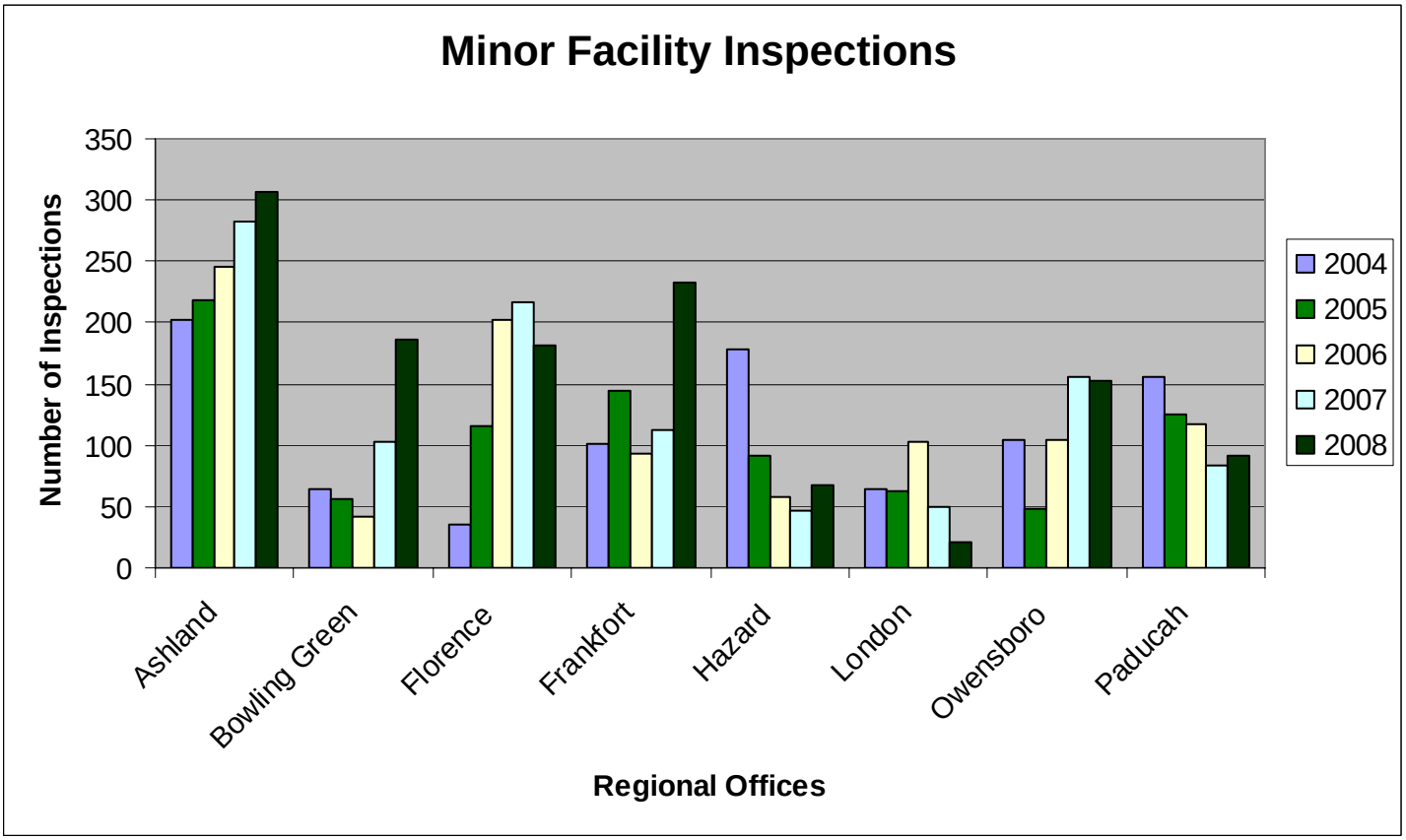


Figure 4: Number of minor stationary source inspections, 2004-2008.
**Inspection Types = state plant classifications of Minor (x), Registered Source (R), and 52:080 (Z) sources; excluding complaint investigations*

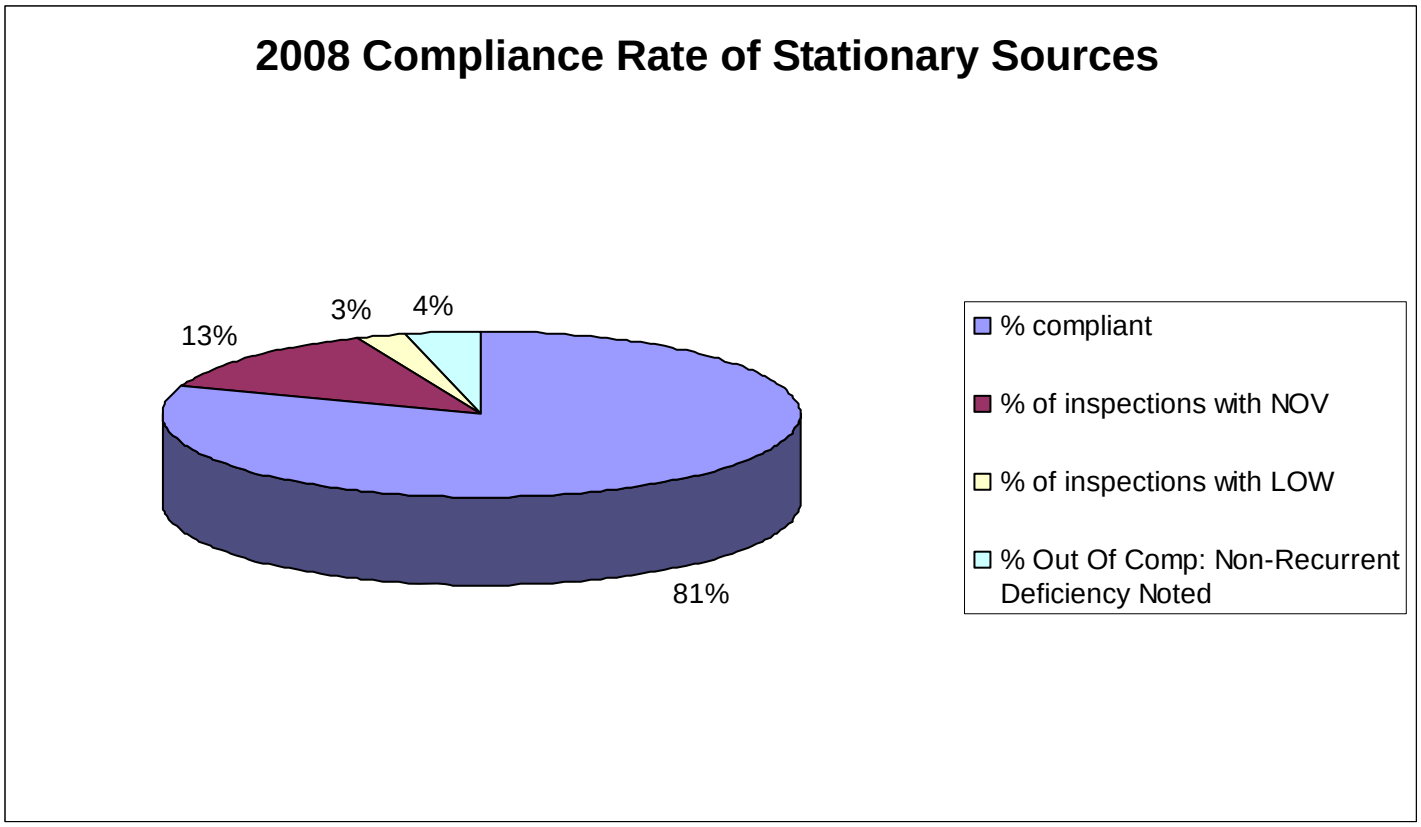


Figure 5: The compliance rate of regulated stationary sources inspected by field office staff in 2008 was 81%. Notices of Violations were issued to 13% of Kentucky's stationary sources, while 3% received Letters of Warning. Four percent were considered minor or were corrected, eliminating the need for any formal enforcement action.

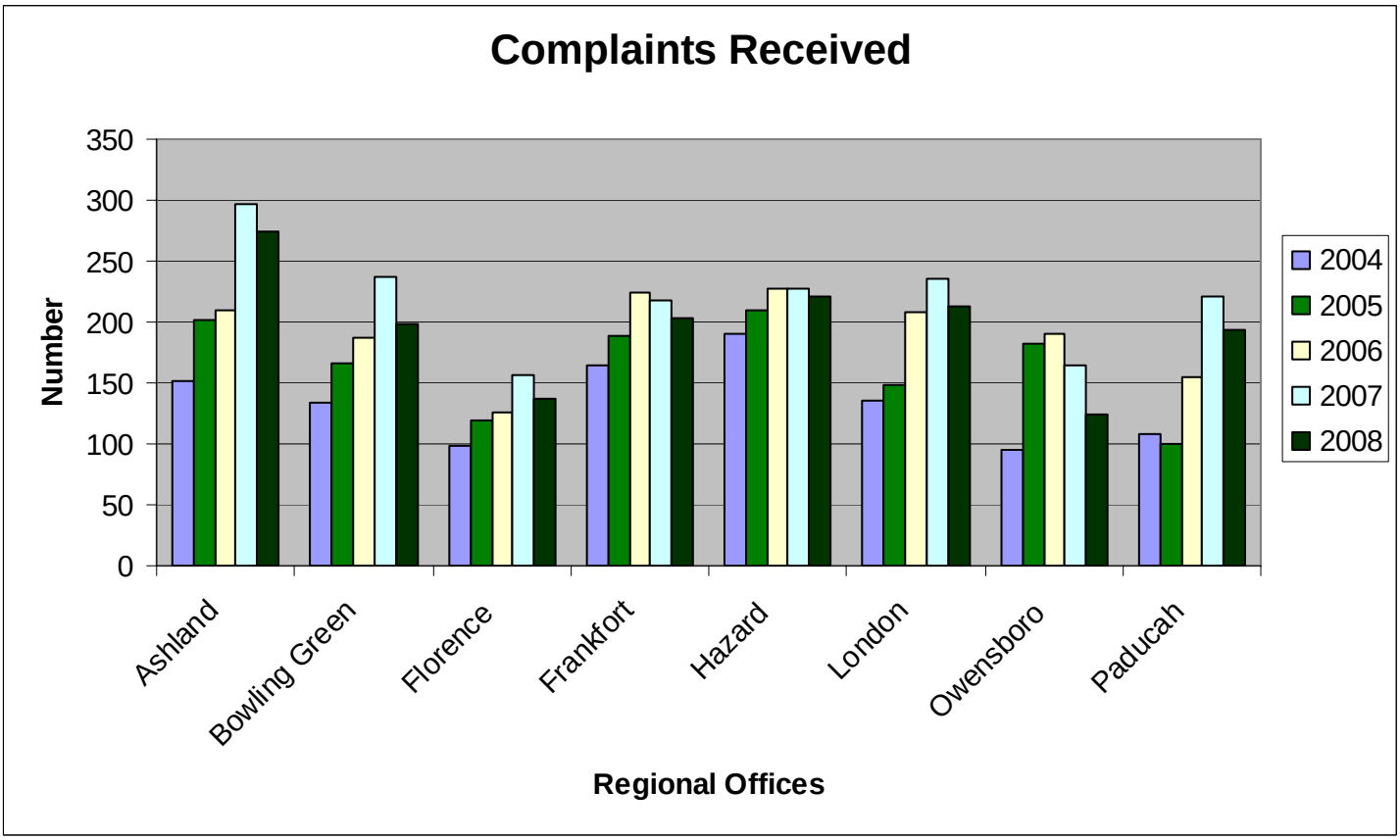


Figure 6: Investigating complaints consumes a significant portion of field office staff time.

Complaint Investigations

In 2008, field office inspectors received a total of 1565 complaints resulting in 1338 field investigations.

The combined 4443 inspections and complaint investigations resulted in the issuance of 519 Notices of Violation and 67 referrals to the Enforcement Branch for additional enforcement. Data on the numbers of Letters of Warning and Notices of Violation resulting from inspections and investigations are included in the charts on the preceding pages. The compliance rates for the measures reflected in Figures 7, 8, and 9 are low because they are complaint-driven. A very high percentage of complaints lead to discovery of violations of a regulation. However, some fugitive emissions and illegal open burns are discovered during routine inspections.

Asbestos

Asbestos removals associated with renovations and demolitions are regulated by the division under the National Emission Standards for Hazardous Air Pollutants (NESHAP). Division regulations also require schools to have their buildings thoroughly checked for asbestos under the Asbestos Hazard Emergency Response Act (AHERA). The inspection results must be documented in a management plan that describes how all asbestos materials in the school's buildings will be managed safely. Compliance with the asbestos regulations is overseen by the Field Support Section and inspectors from the regional offices.

Asbestos is a mineral fiber that is used in thousands of consumer products, many of them building materials. Breathing asbestos fibers can cause lung cancer and other respiratory diseases. The U.S.

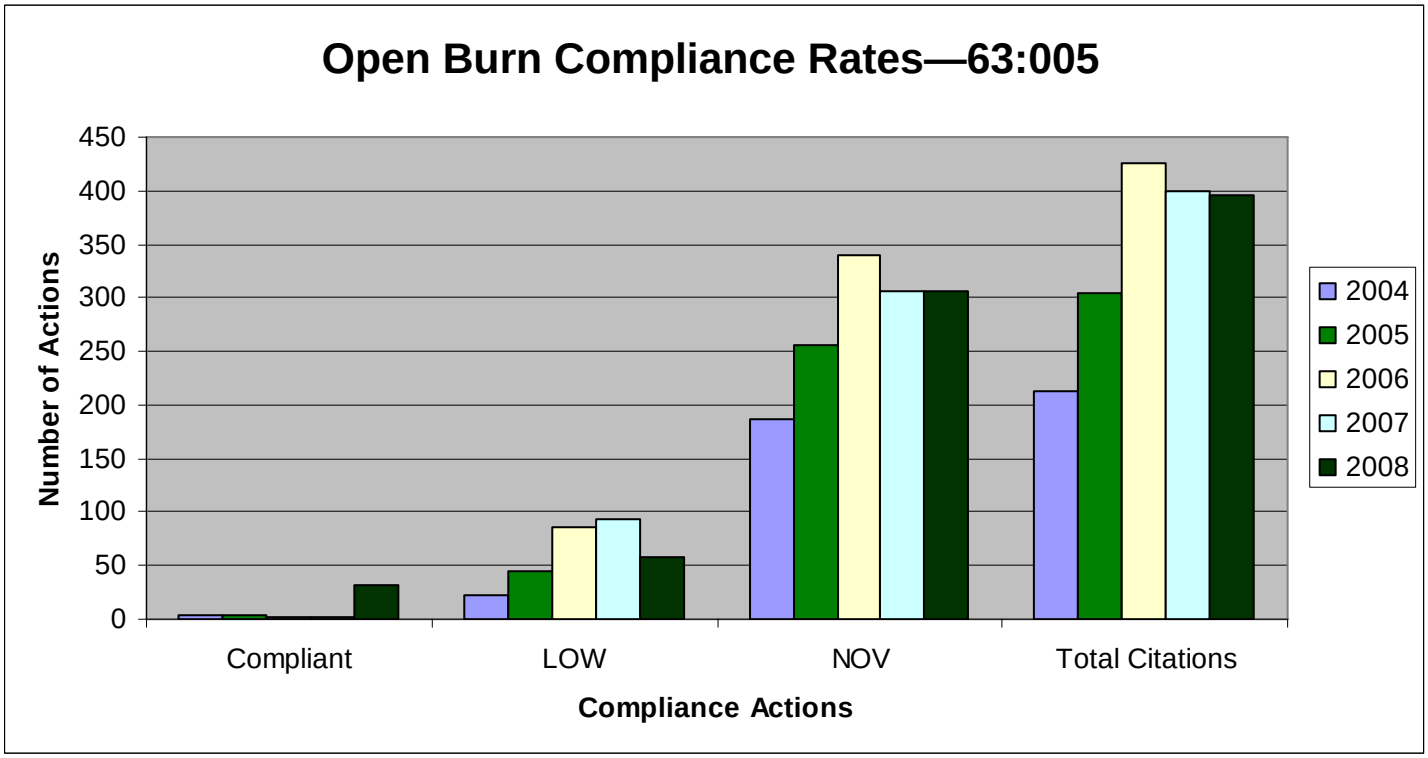


Figure 7: Compliance with the open burn regulation. Education and outreach campaigns targeting illegal open burning may be driving the increase in open burning complaints and associated violations.

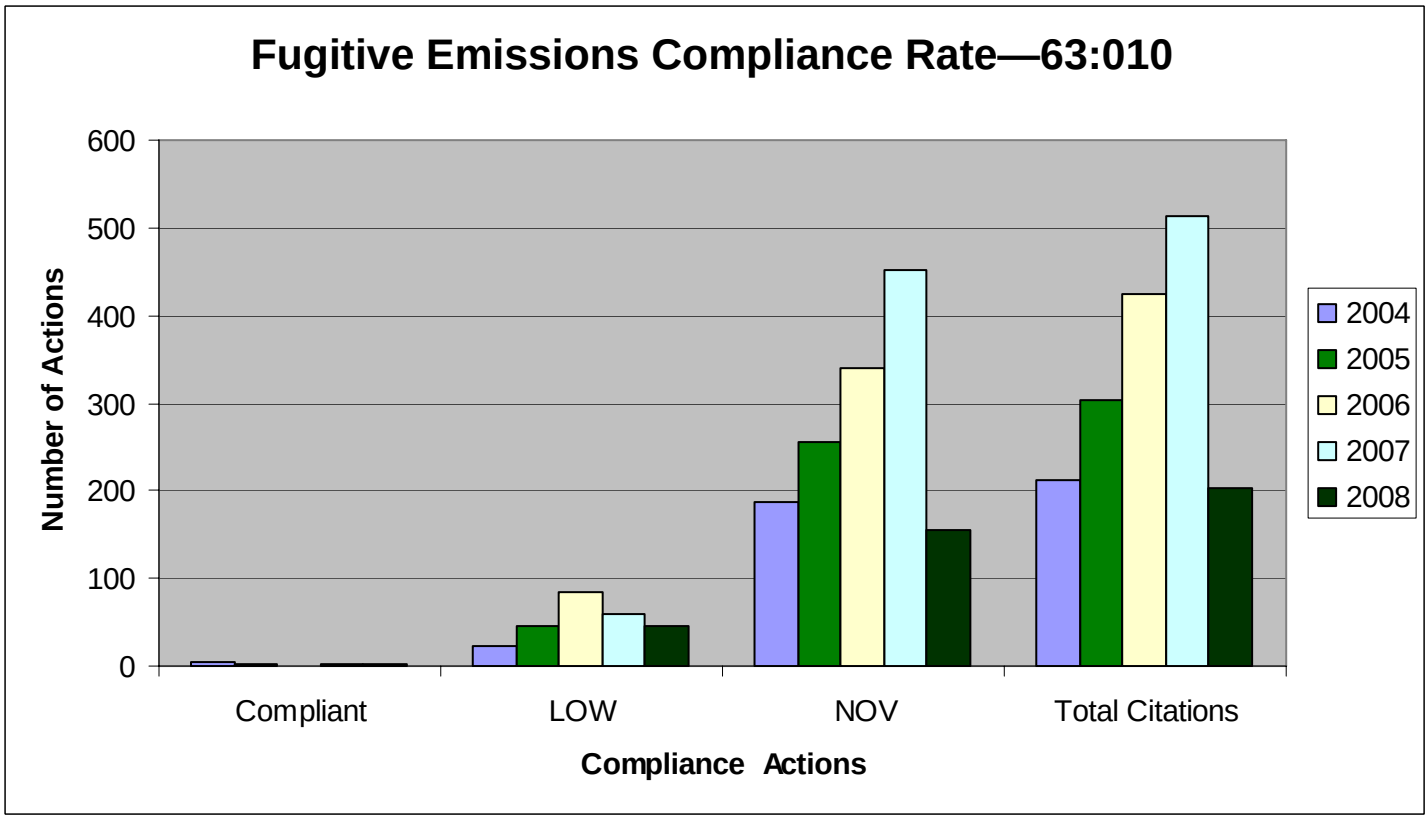


Figure 8: Compliance rates for the fugitive emissions regulation. Fugitive emissions are those that do not come from a stack. Common fugitive emissions are dust from haul roads, quarries, conveyor systems, etc. The drought of 2007 may have contributed to the spike in citations in that year. Complaints often result in a finding of non-compliance.

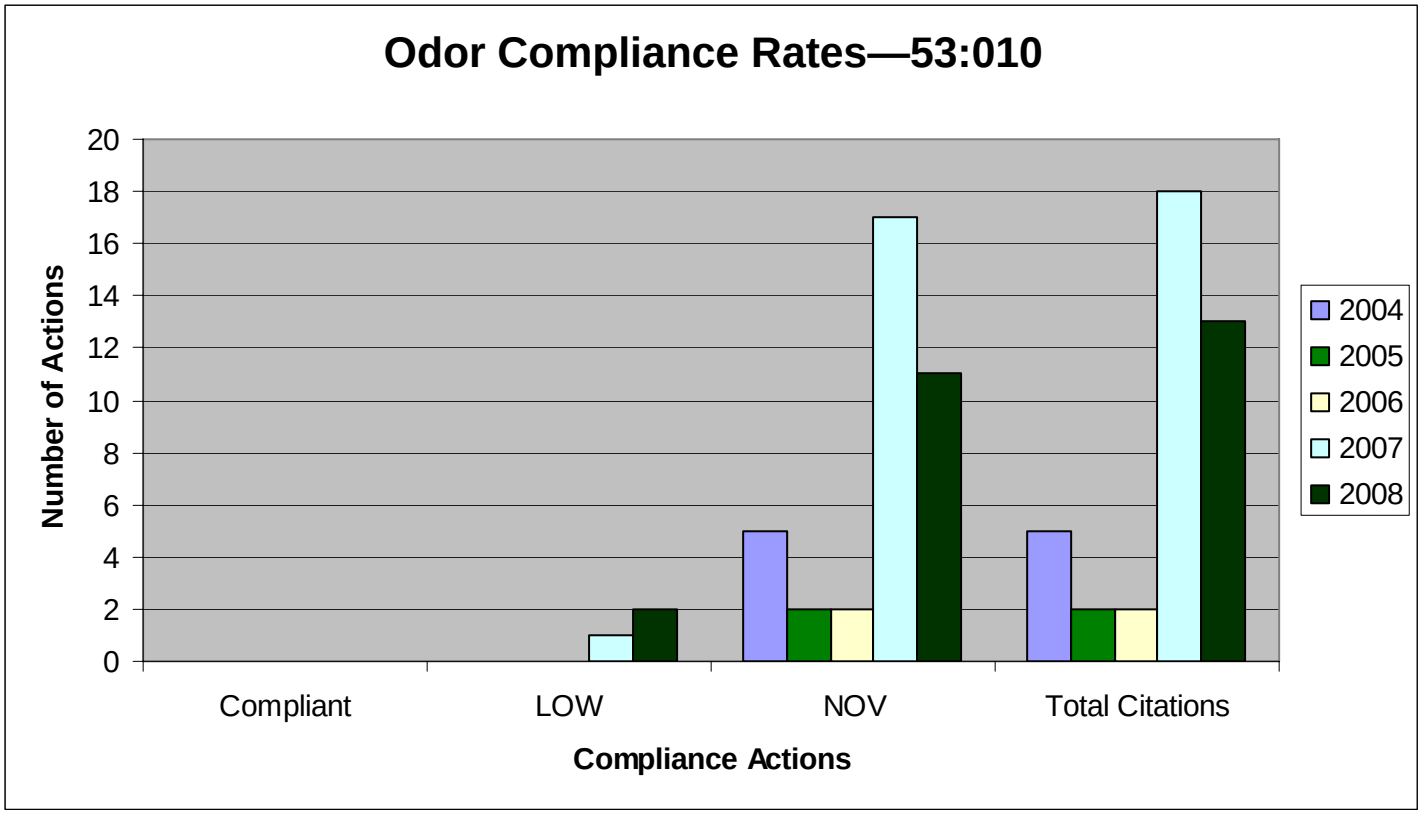


Figure 9: The number of odor complaints and violations have increased. Odor violations occur when an inspector can smell the odor through a "scentometer," which dilutes the ambient air by a magnitude of seven.

EPA has banned some uses of asbestos but has been unsuccessful in its efforts to expand the ban to other products.

Without proper precautions, renovations, demolitions, and even routine maintenance can cause asbestos- containing materials to release microscopic asbestos fibers into the air we breathe. Undisturbed asbestos materials can be safely maintained if they are kept in good condition. Before renovating or demolishing a structure, it should be checked for asbestos by a qualified professional. If at least 160 square, 260 linear, or 35 cubic feet of friable asbestos will be removed over a year's time, the removal must be done by a certified contractor using state-of-the-art work practices.

Measures tracked by the division to evaluate the asbestos program's success are as follows:

- Number of asbestos NESHAP and AHERA inspections conducted;
- Number of non-NESHAP and AHERA complaint investigations conducted; and
- Compliance rate of NESHAP and AHERA related inspections and investigations.

In the case of AHERA inspections, this relatively new program has grown over the years under the care of well trained staff and the division's compliance oversight strategy has evolved from a records review approach to an actual site inspection/records verification process. NESHAP inspections have grown due to a combination of increased renovation/demolition projects and increased awareness. Awareness has increased within the regulated community with respect to notifying the Division about asbestos removals that need to be inspected, and within the general public, who file complaints about potential violations of the regulatory program. The compliance rate for NESHAP is 88 percent, while the compliance rate for AHERA is 67 percent.

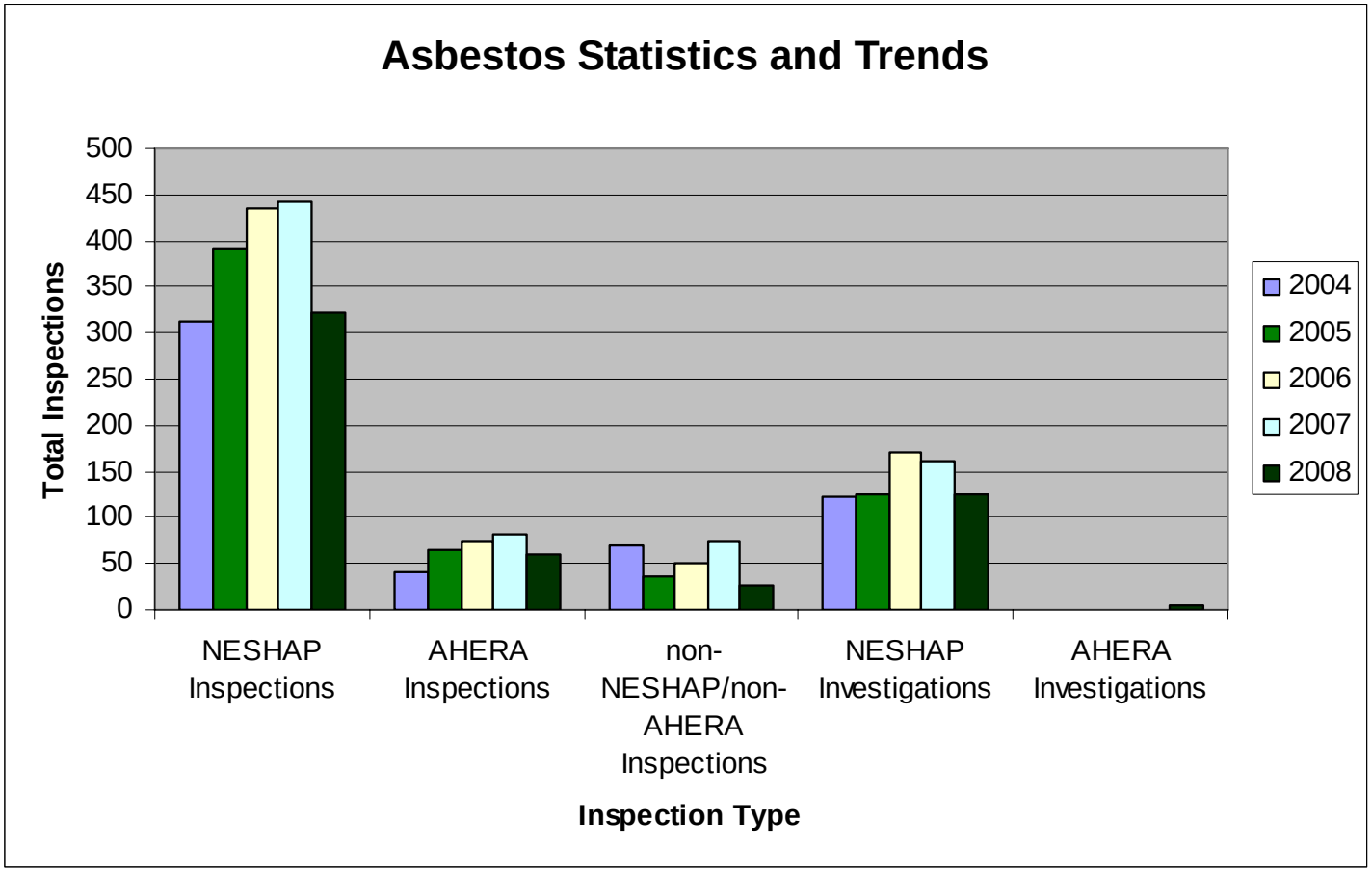


Figure 10: From 2004 to 2008 the number of asbestos inspections and investigations have grown with a slight drop in 2008 attributed to higher staff turnover that year. While AHERA investigations resulting from complaints are a measure for the program, AHERA related complaints are rare (averaging one per year), so the numbers do not show in the above chart.

PERMIT REVIEW

Since the beginning of the industrial age, there has been a continual necessity to minimize air pollution resulting from the provision of services and products to meet human needs. The issuance of permits to construct and operate industrial air contaminant generating sources has long been one of the principal methods of controlling air pollution and ensuring compliance with applicable air quality regulations.

In order to achieve the Cabinet objective of improving regulatory procedures and implementation and making Kentucky's regulatory program rationale reasonable and user-friendly, the Division has continued to successfully implement the permit backlog reduction plan originally begun on July 15, 2006.

Currently, the Permit Review Branch has 134 pending applications in house. Of these, 23 are beyond regulatory time frames (RTF). It is projected that the majority of the remaining applications beyond RTF will be issued in the fourth quarter of 2009.

"I have gotten a steady stream of positive feedback from our regulated community as to how pleased they are with our accurate, easily understood permits, and timely issuances."
-John Castanis,
Supervisor,
PRB Mineral Section

Figure 12 depicts the division's accomplishment in reducing the backlog since July 2006, at which time the division had 719 applications in house. The current number of pending applications represents an 81% reduction during this period. Further, applications beyond regulatory time frames have been reduced by 95%, from a high of 512 in June 2006, to 26 at the close of the 2009 fiscal year. Additional charts in the pages following highlight the division's status for drafted permits, permits pending, permits (and percentage of permits) exceeding RTF and new applications relative to completed permit reviews.



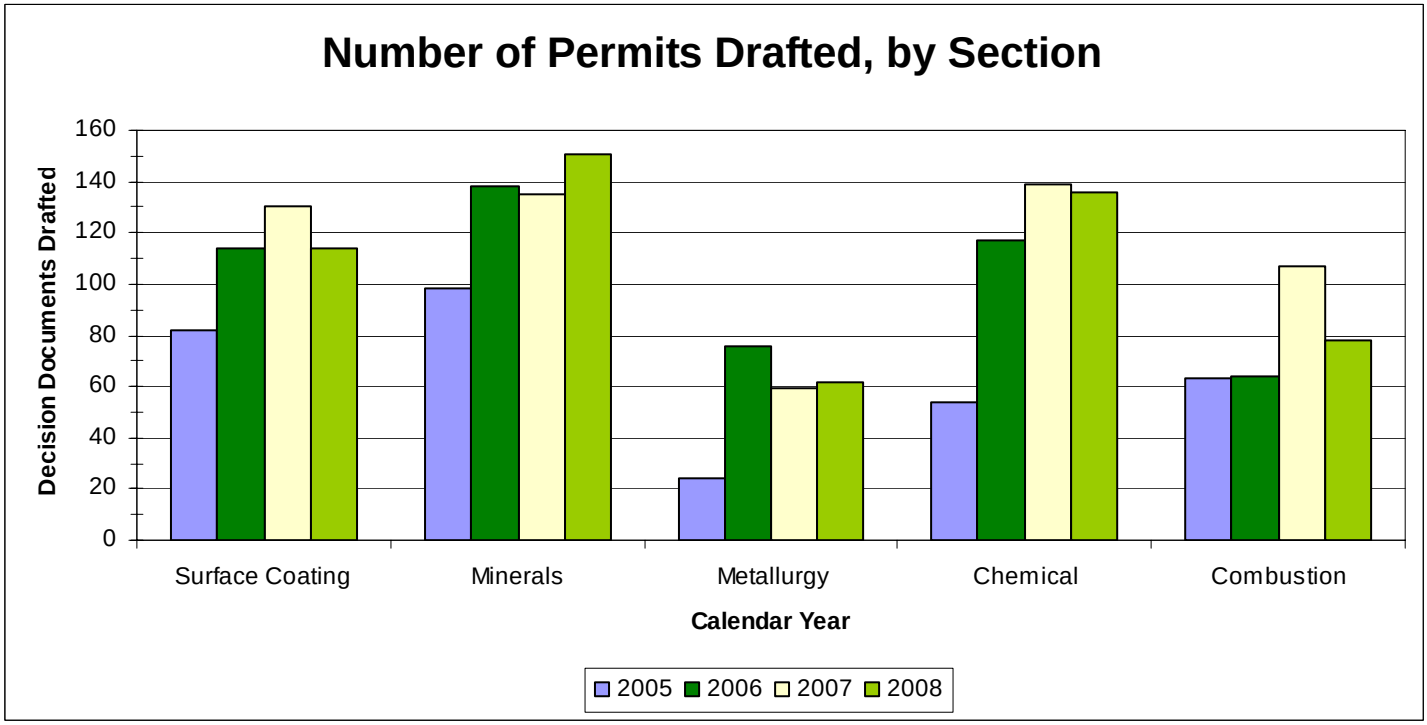


Figure 11: In calendar year 2008, the division drafted 541 permits, depicted here by section category. Examples of the kinds of businesses permitted within each section are found on the following page. The minerals section had the highest number of permits issued, followed by chemical and surface coating section permits.

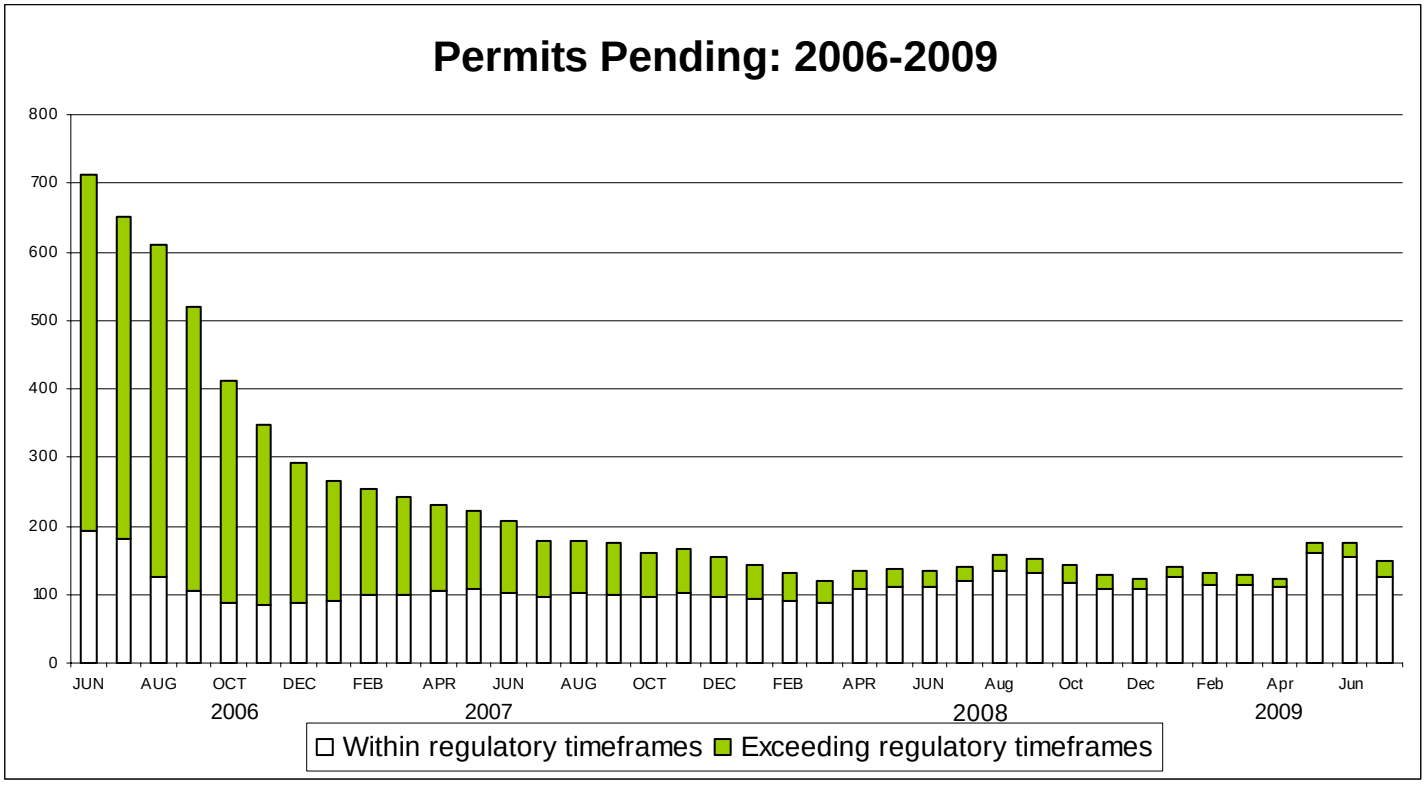


Figure 12: From June, 2006 to June, 2009, the Permit Review Branch has greatly reduced the amount of permit applications pending a final permit issuance as well as the percent of air permit applications that are beyond the Regulatory Time Frame (RTF), the allotted time for the complete permitting process. In June, 2006, 73% of the 716 permits in progress were beyond RTF compared to 17% of 148 permits in June, 2009.

PRB is divided into specialized sections:

Chemical Section - Chemical Plants (Organic and Inorganic), Petroleum Refineries, Coal to Liquids, Bulk Terminals, Brake Manufacturing, Plastic Products and Resins, Paper Mills/Pulp Mills, Electronic Components, Nonwoven Fabrics, Rubber Products, Paperboard Mills, Pharmaceuticals, Paint and Allied Products, Carbon and Graphite Products, Battery Manufacturers.

Combustion Section - Brick and Tile Manufacturing, Charcoal Manufacturing, Combustion (Boilers), Distilleries, Glass Manufacturing, Incineration, Natural Gas Transmission Stations, Power Plants, Sawmills, Soil Remediation Units, Tobacco Processing Plants, Electric Utilities.

Minerals Section - Asphalt Plants, Cement Storage Operations, Chicken Feed Manufacturing Plants, Coal Preparation Plants), Coal Tipples, Coal Terminals, Concrete Block Plants, Edible Oil Plants, Fertilizer Operations (Including Blending), Flour Mills, Grain Elevators, Lime Manufacturing Plants, Limestone Crushing Operations, Limestone Terminals, Pet Food Manufacturers, Pre-stress Concrete Plants, Ready Mix Concrete Plants, Sandstone Crushing Operations, Sand and Gravel Operations, Slag Coal Operations, Soybean Extraction Plants.

Surface Coating Section - Automobile and Light-Duty Trucks, Beverage Cans, Fabric, Vinyl and Paper, Flat Wood Paneling, Flexible Vinyl and Urethane, Large Appliances, Magnet Wire, Magnetic Tape, Metal Coil, Metal Furniture, Miscellaneous Metal Parts and Products, Plastic Parts for Business Machines, Polymeric Coating, Pressure Sensitive Tape and Labels, Publication Rotogravure, Flexography Printing.

Metallurgy Section - Primary Steel And Aluminum Producers, Mini-Steel Mills, Secondary Metal Plants, Various Surface Treatments of Metals.

Air Toxics Section - Any industry that has an air toxics component.

Air Toxics and Kentucky Schools

In the wake of a number of media stories concerning air toxics and the potential for high levels of them in the air outside schools, U.S. Environmental Protection Agency Administrator Lisa Jackson has made monitoring for air toxics outside of schools a priority for the nation.

EPA recently announced a list of 62 schools in 22 states across the country that will be monitored for air toxics in the coming months. These schools were chosen based on information that included the mix of pollution sources in the area, scientific information about certain pollutants and their health effects, results of computer modeling, stories from a newspaper series that looked at outdoor air at schools, and information from the Kentucky Division for Air Quality. Monitoring the air outside these schools and measuring the actual concentrations of these pollutants will help the DAQ and EPA understand if health could be impacted in these areas.

Should DAQ find anything unexpected, the agency would immediately inform school and community officials. Working with concerned stakeholders, the division would locate the exact source(s) of these chemicals that pose an unacceptable health risk and mitigate those exposures. If it becomes apparent that after an initial round of sampling, more data is needed to make an informed decision, sampling will continue until the DAQ and EPA have enough data to be certain of the risks involved. Monitors are in place at the schools and monitoring has commenced.

DAQ staff from the Technical Services Branch install air toxics monitors at one of three elementary schools in Boyd County. The project is a collaborative effort involving the school district, EPA, and DAQ.

This article is excerpted from the original, which appeared in the Summer, 2009 edition of the EEC publication, Land, Air, and Water.

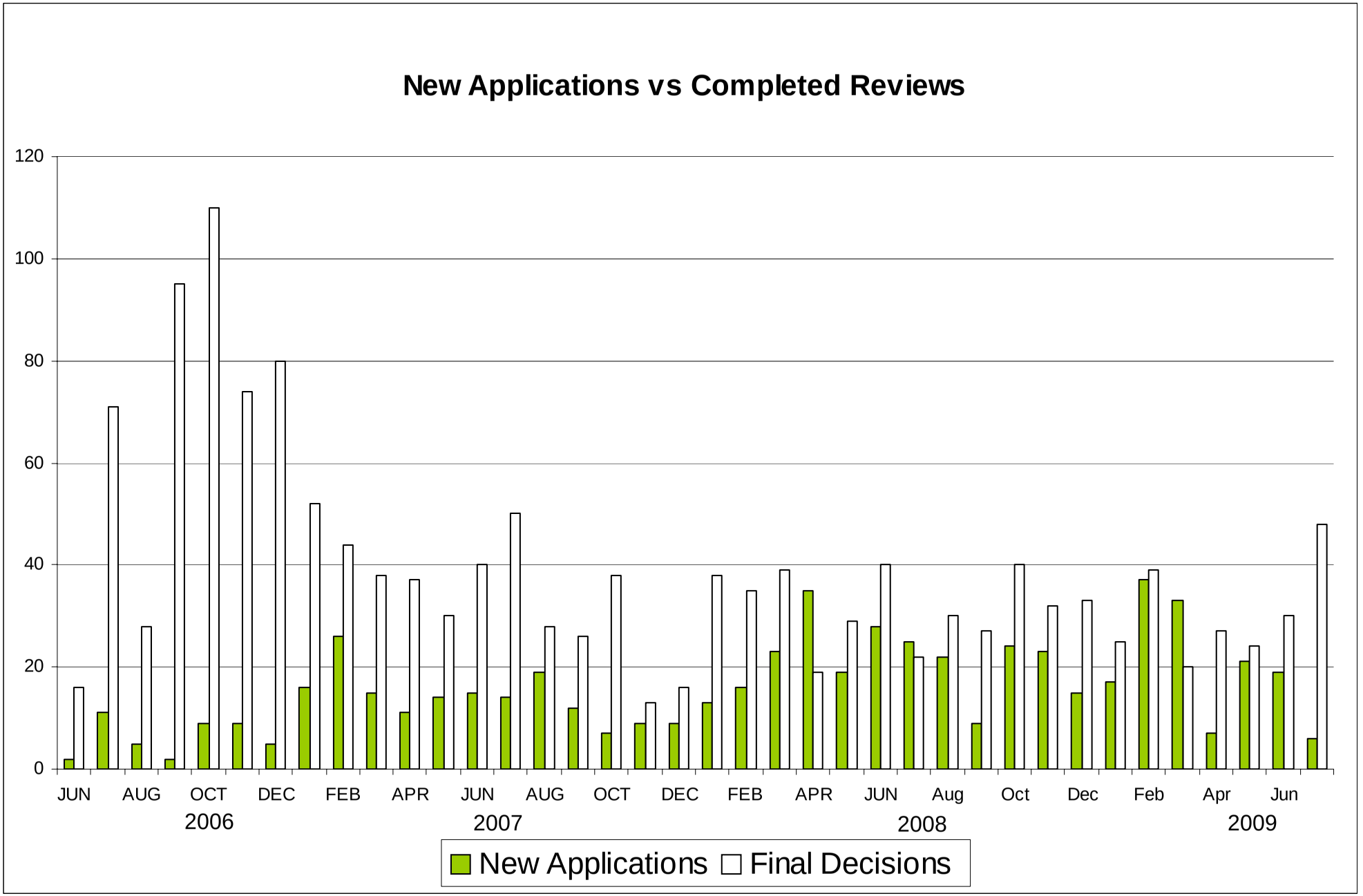


Figure 13: Over the past three years the number of completed reviews have exceeded the number of new applications received by the division. Consistent efficiency has led to a dramatic reduction in the backlog.

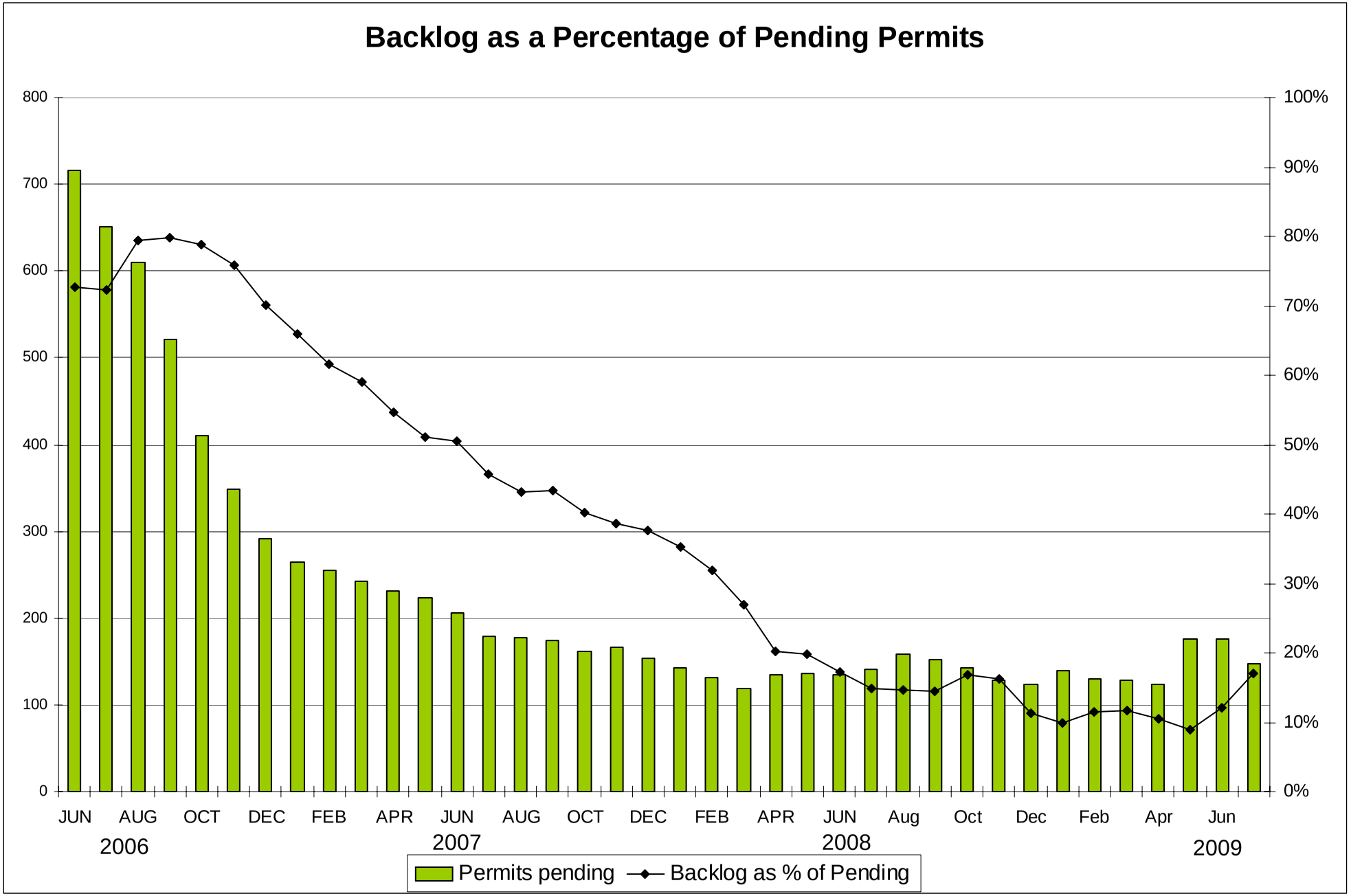


Figure 14: In June 2006, Only 192 of 716 pending permits were within the Regulatory Time Frame. By July of 2009, 125 of the 148 pending permits were within Regulatory Time Frame.

Air Toxics Program

The division established the Air Toxics Section in the fiscal year of 2008. The section's main objective is to provide the division with expertise in airborne toxic pollutants, by means of risk assessment, ambient air monitoring, and air dispersion modeling.

Air toxics are chemicals emitted from industry and transportation sources such as cars, trucks, and buses. The Clean Air Act lists 187 of these pollutants (also known as Hazardous Air Pollutants), which have the potential to harm human health over long-term exposure, and have been linked to increased risk of cancer along with other effects including respiratory and neurological effects. Risk levels for these pollutants are based on health impacts over 70 years of continuous exposure.

At the national level, from 1990 to 2005 levels of toxic air emissions declined by 41%. While this decline is demonstrative of the work of state and federal agencies, levels of air toxics in a local area

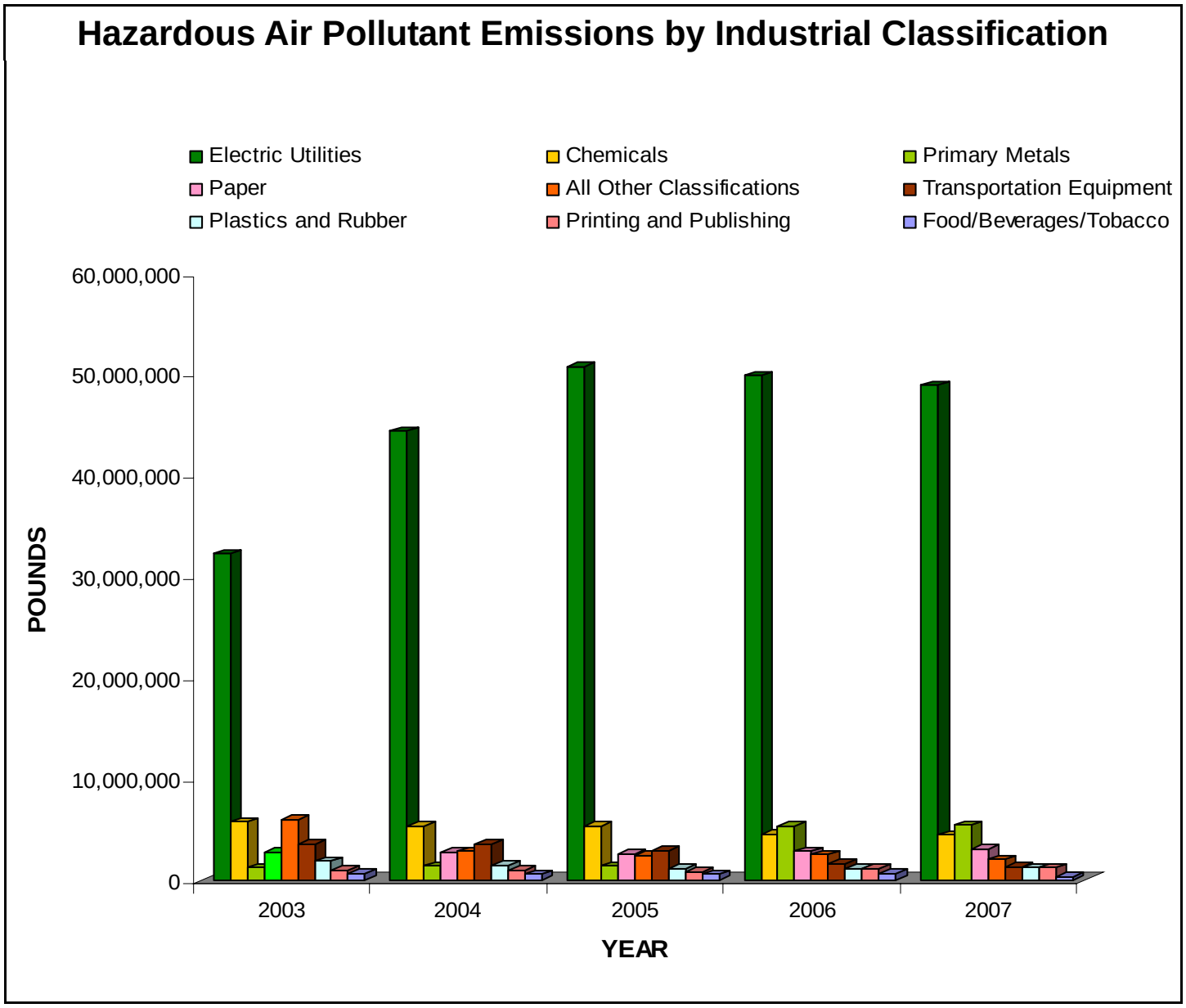


Figure 15: HAP emissions in Kentucky from 2002 through 2006 by industrial classification. Electric utilities (power plants) are the largest emitters in the state, and are responsible for the majority of the hydrochloric acid, sulfuric acid and hydrogen fluoride emitted.
Data Source: EPA Toxic Release Inventory

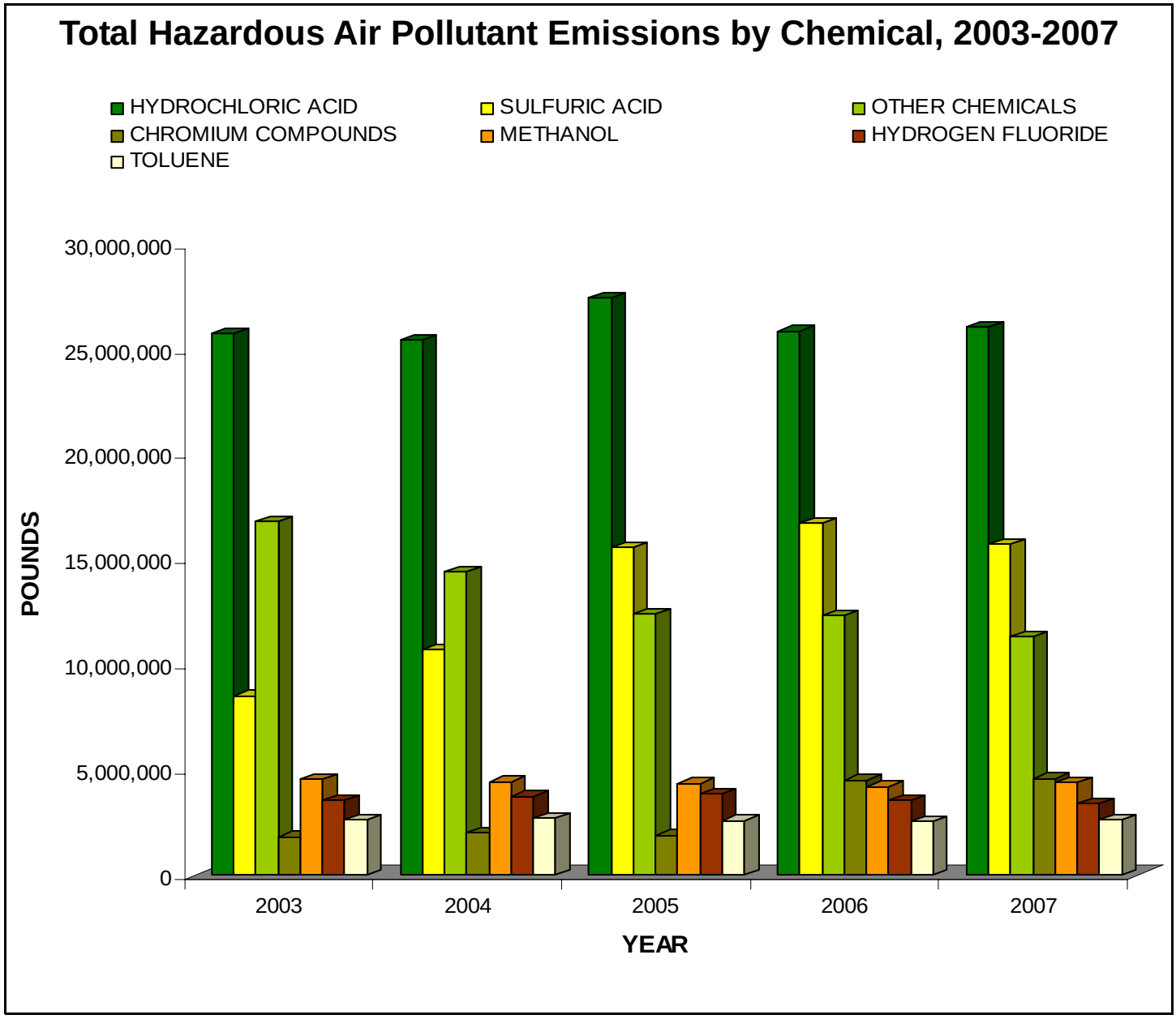


Figure 16: HAP emissions for selected individual chemicals. Hydrochloric and sulfuric acids are emitted in the largest quantities, with sulfuric acid showing an increasing trend over this time period. The increase may be due to increases in electrical production (thereby increasing fuel consumption) required by the increasingly vibrant economy during the period.
Data source: EPA Toxic Release Inventory

can vary due to weather patterns and proximity to sources of the pollutants. According to TRI data from calendar year 2006 to calendar year 2007, in Kentucky there was a reduction in HAPs of 831.7 short tons (see figure 17). Quality Assured data is not yet available for calendar year 2008.

Exercising the authority granted under KRS 224 and operating within the scope of 401 KAR 63:020, the Air Toxics Section is specifically charged with identifying air emissions which pose an unacceptable risk to human health and the environment. The regulatory authority primarily relied on by the air toxics section is found in 401 KAR 63:020, which states that “No owner or operator shall allow any affected facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants.” Risk assessment and risk-based analysis are the standard means by which the section quantifies how harmful a toxic substance may be, and the associated impact to human health.

EPA's Toxic Release Inventory database provides a means of tracking emissions of Hazardous Air Pollutants (HAPs). Figure 17 represents the trend in hazardous air pollutant emissions over the 2003-2007 period. More information can be found at http://www.epa.gov/TRI/.

Air Toxics Section Projects

In fiscal year 2009 the section completed 5 air toxics risk assessments, 24 in-depth HAP-related investigations and numerous evaluations for open permitting actions.

As an example, the section drafted a risk assessment of an industrial area in western Kentucky in the summer of 2009. The risk assessment focused on inhalation risks due to volatile organic compounds. Several year's worth of data were collected at five monitors were set up around the industrial complex. The raw data underwent statistical analyses and was developed into a data set used for risk assessment.

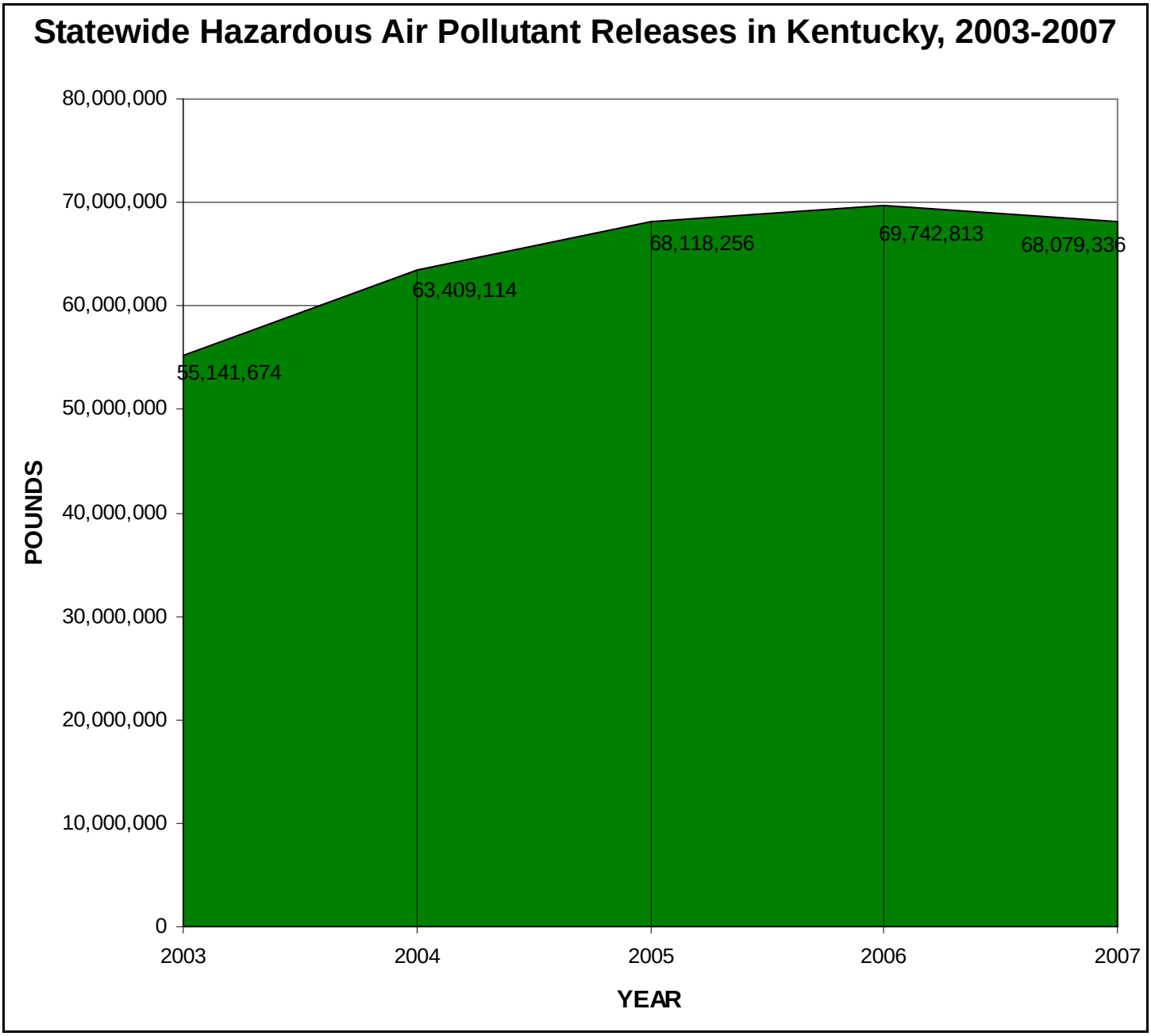


Figure 17: Total HAP releases in Kentucky, 2003-2007.
Data source: EPA Toxic Release Inventory

The section has completed several monitoring events to sample ambient air in response to citizen complaints. The section is capable of sampling both for volatile and semi-volatile organic compounds via EPA test methods. The data collected from these sampling events has been used to ground-truth impacts on human health, make permitting recommendations and in some cases trigger enforcement actions.

Further, the section frequently uses modeling to refine the initial estimates from screening analyses performed by the permit review branch. These refined modeling runs have yielded data which has been used to verify, adjust or establish limits in permits; justify permit conditions; and improve air quality in the commonwealth of Kentucky.

"Since its inception, the air toxics section has had a significant impact on public health and the environment through a number of complex, and in some instances, high profile projects."

Taimur Shaikh,
Supervisor,
Air Toxics Section, PRB

Due to federal requirements, the section modeled nine facilities for lead emissions and the division decided to monitor three of them using site specific monitors at the recommendation of the section (see also page 49).

In summary, the air toxics section has been a welcome addition to the permit review branch. The section's capabilities in risk assessment, monitoring and modeling afford the branch and the division resources and qualifications beneficial to Kentucky's ambient air and human health.

PROGRAM PLANNING and ADMINISTRATION

The Program Planning and Administration Branch (PPAB) is the planning and implementation cornerstone of the Division for Air Quality. This branch has the responsibility of ensuring that:

"During these tough economic times, the Division for Air Quality—like many other state agencies—is facing challenges in maintaining our programs and personnel with increasingly limited resources. We will continue to monitor our expenditures, with the goal of utilizing existing funds in a way that ensures no adverse affect in our ability to maintain the quality and integrity of our services to the citizens of the commonwealth."

-Nina Hockensmith,
Administrative Section Supervisor

- The agency has adequate budget and staffing resources to meet federal and state requirements for the operation of an air quality control program;

- A comprehensive emissions inventory is performed annually on sources within Kentucky, both to ensure the best information is used to develop and evaluate air quality plans and for use in determining air emission fees required under the federal Clean Air Act;

- Appropriate regulations are researched and promulgated within Kentucky to meet federal and state mandates to control air pollution; and

- Comprehensive plans to attain and maintain the National Ambient Air Quality Standards (NAAQS) are developed and submitted to U.S. EPA for approval. These plans are part of Kentucky's State Implementation Plan (SIP).

Fiscal Management

The Division for Air Quality operates primarily on Title V emissions fees and federal grant funds.

Funding under the Title V program (mandated by the 1990 CAA) is through emission fees assessed to air pollution sources in the state that meet specific criteria. Further authorized in Kentucky by state statute in KRS 224.20-050, and regulation KAR 50:038, the division is mandated to charge fees sufficient to cover the cost of implementing and carrying out the requirements of the Title V program annually.

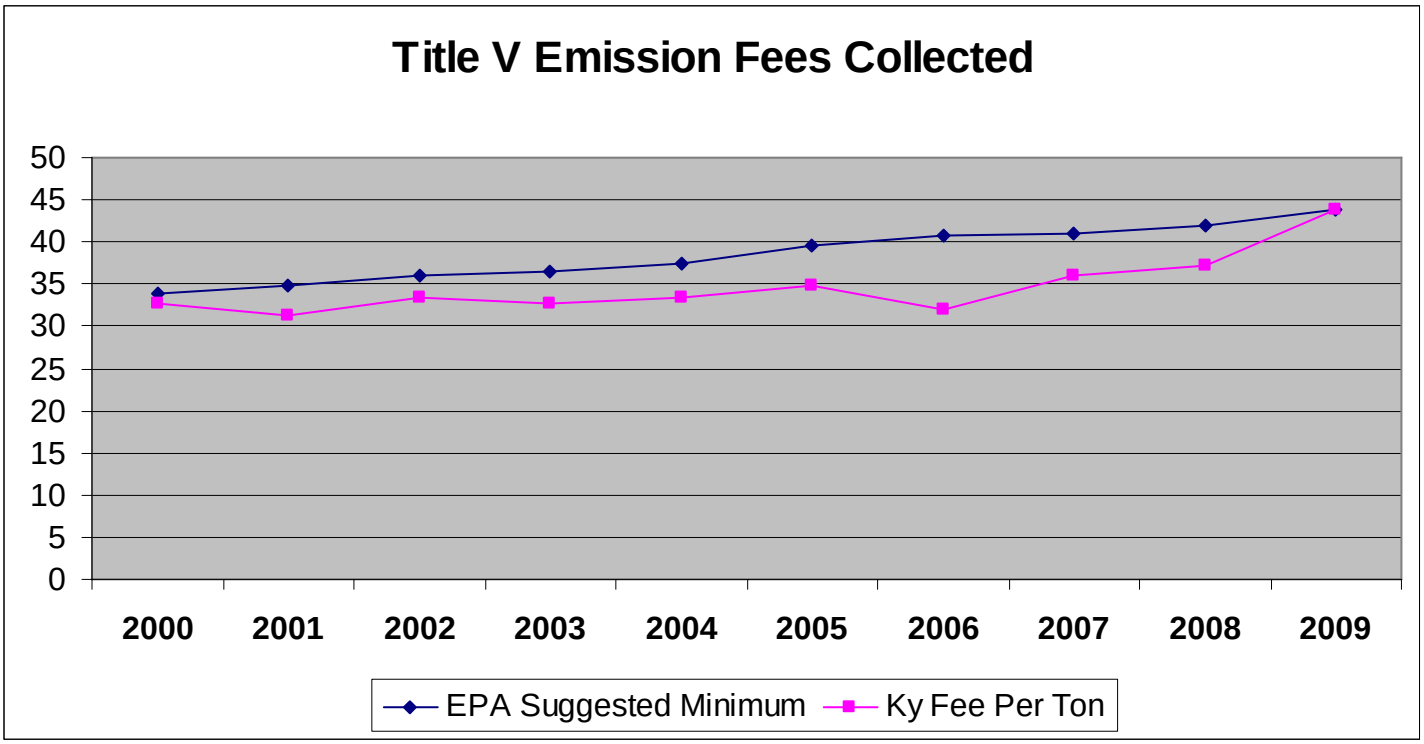


Figure 18: Title V Emission Fees Collected. DAQ surveys regulated entities to determine actual tons emitted by those sources, and charges them a standard Cost per Ton (CPT), according to Clean Air Act and state statute protocol.

The division surveys permitted sources subject to the Title V fee program each year. Once the agency has determined the overall cost of the program for the fiscal year, the number of tons of pollutants that will be emitted in Kentucky will be divided into the projected operating costs to develop a per ton cost. Each source within the Title V program will then be issued a bill based on that per ton cost (see Figure 18).

The agency also receives federal grants in support of the air quality program. The "general" air quality grant, known as the 105 grant, is in support of the general air quality program and covers such activities as minor (or smaller emitting) source inspections and permitting. It also covers such vital activities as public outreach and transportation coordination in relation to air quality issues. Additionally, the agency also receives specific grants for the operation of the $PM_{2.5}$ monitoring network and asbestos activities within the state.

A smaller portion of the agency's funding comes from direct fees used to offset the cost of specific agency activities. The agency collects a fee for the issuance of gasoline tank truck stickers, to ensure that gasoline delivery tanks meet vapor tightness and do not leak harmful gasoline vapors. Asbestos fees are assessed for the review of asbestos abatement plans in our schools and to certify

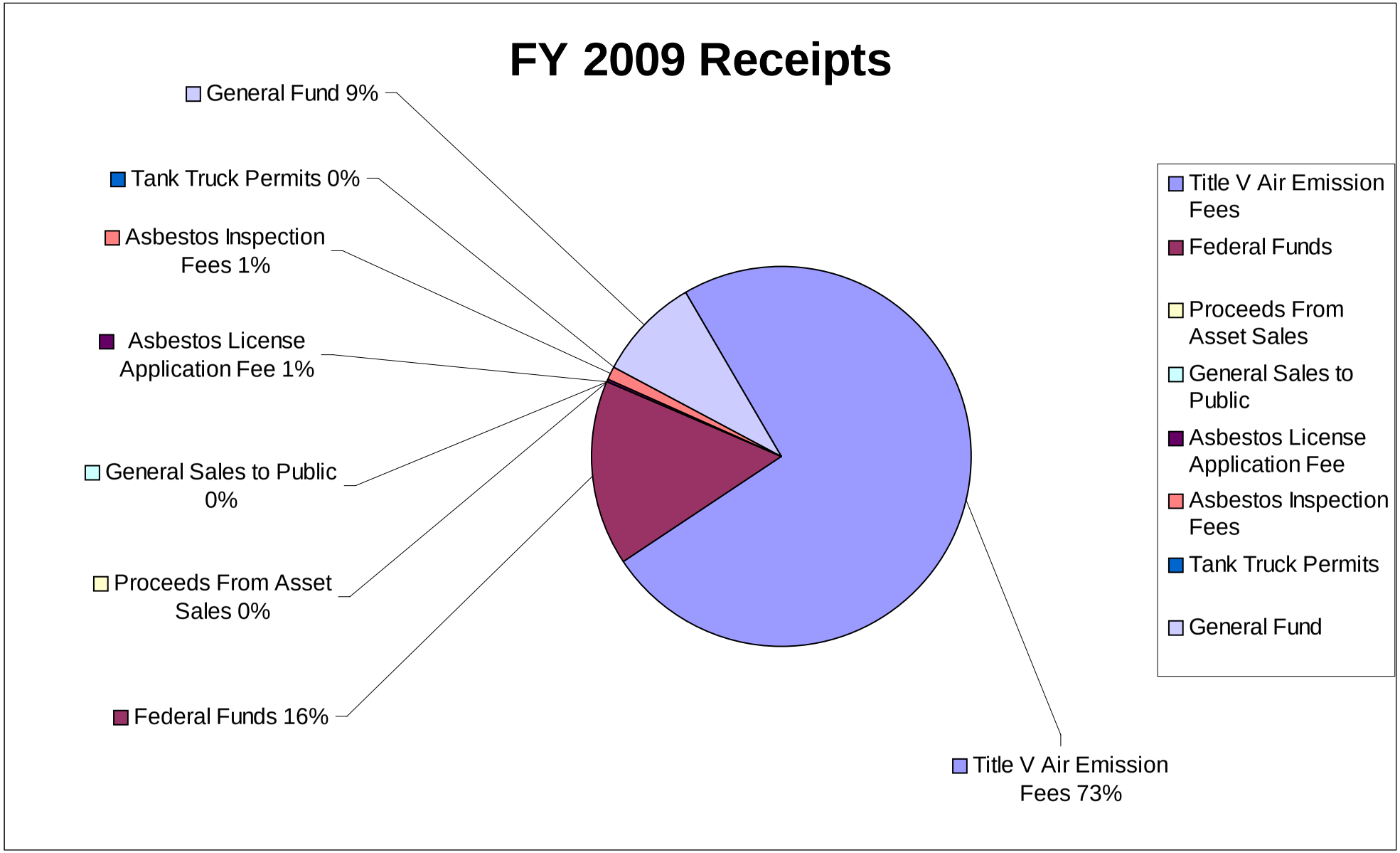


Figure 19: DAQ Fiscal Year 2009 Receipts. The division operates primarily on Title V Emission Fees and federal grant funds. Other funds are derived from tank truck fees, asbestos fees, and general fund dollars.

and accredit asbestos contractors and professionals who remove asbestos in the state (see Figure 19).

Emissions Inventory

The main thrust of an air quality program is the effort to achieve or secure desired standards of air quality though controlling emissions of contaminants in the air. Clearly, management of these programs must be based on knowledge of actual air quality and actual pollutant emissions. The ambient air monitoring program is designed to measure the quality of the air our citizens breathe, and use it to gauge whether that air meets the federal standards. The emissions inventory systems are designed to document and track actual and potential air pollutant emissions and those data are used to develop air quality improvement programs when necessary.

In its most basic form, an emissions inventory is a list of sources of air pollutants, and for each source, or source type, the amount of each pollutant emitted, or has the potential to be emitted. Kentucky's emissions inventory is maintained in three parts:

"The emissions inventory section surveys approximately 1150 plants per year. This year, DAQ implemented use of a new Internet-based survey system, increasing efficiency and accuracy during the survey process. Overall, users reported being quite satisfied with the new system and we were pleased with how successfully it was implemented."

-Melissa Duff,
Emissions Inventory Supervisor

- The point source inventory includes all actual and potential emissions from typically industrial sources at fixed locations;
- An area source inventory includes information on other pollution causing activities in a given area and documents the contribution of emissions from typically numerous small entities, or human activities. These include activities such as home heating, small print shops, agricultural activities, structure fires, road striping, and consumer products consumption;
- The third sector of the emissions inventory includes information on emissions from mobile sources. This sector is then broken down even further by estimating the contributions by on-highway vehicles and off-highway mobile sources such as construction equipment, lawn equipment, airplanes and locomotives.

The point source emissions inventory is performed and maintained by the Emissions Inventory Section. The main function of this section is to continue to improve the comprehensiveness and accuracy of point source emissions information and ensure the information is up to date and useable by the Administration Section for billing calculations; the Program Evaluation Section for developing and evaluating control programs; and the Permit Review Branch for permitting additional large sources within a given geographic area.

As mentioned previously, point sources in Kentucky are surveyed annually to determine actual air pollutant emissions for the previous year (see Figure 20). This process begins in January and continues through October. The emissions inventory section surveys approximately 1150 plants per year using the following survey criteria, used to determine the sources that are surveyed in the state:

- Any major source (potential to emit 100 tons or more of a criteria pollutant – criteria pollutants are CO, NO2, PM, SO2, VOC (as a precursor for ozone);
- Any conditional major source (a source that has taken permitted limits to keep it below the 100 tons potential noted above);
- Any source subject to a federal regulation such as a NSPS (New Source Performance Standard), NESHAP (New Emission Source of Hazardous Air Pollutant), or MACT (Maximum Achievable Control Technology – for hazardous air pollutants);
- Any source of Volatile Organic Compounds (VOCs) in areas of the state not meeting the federal ozone standards or that had previously been designated as not meeting those standards. (Boone,

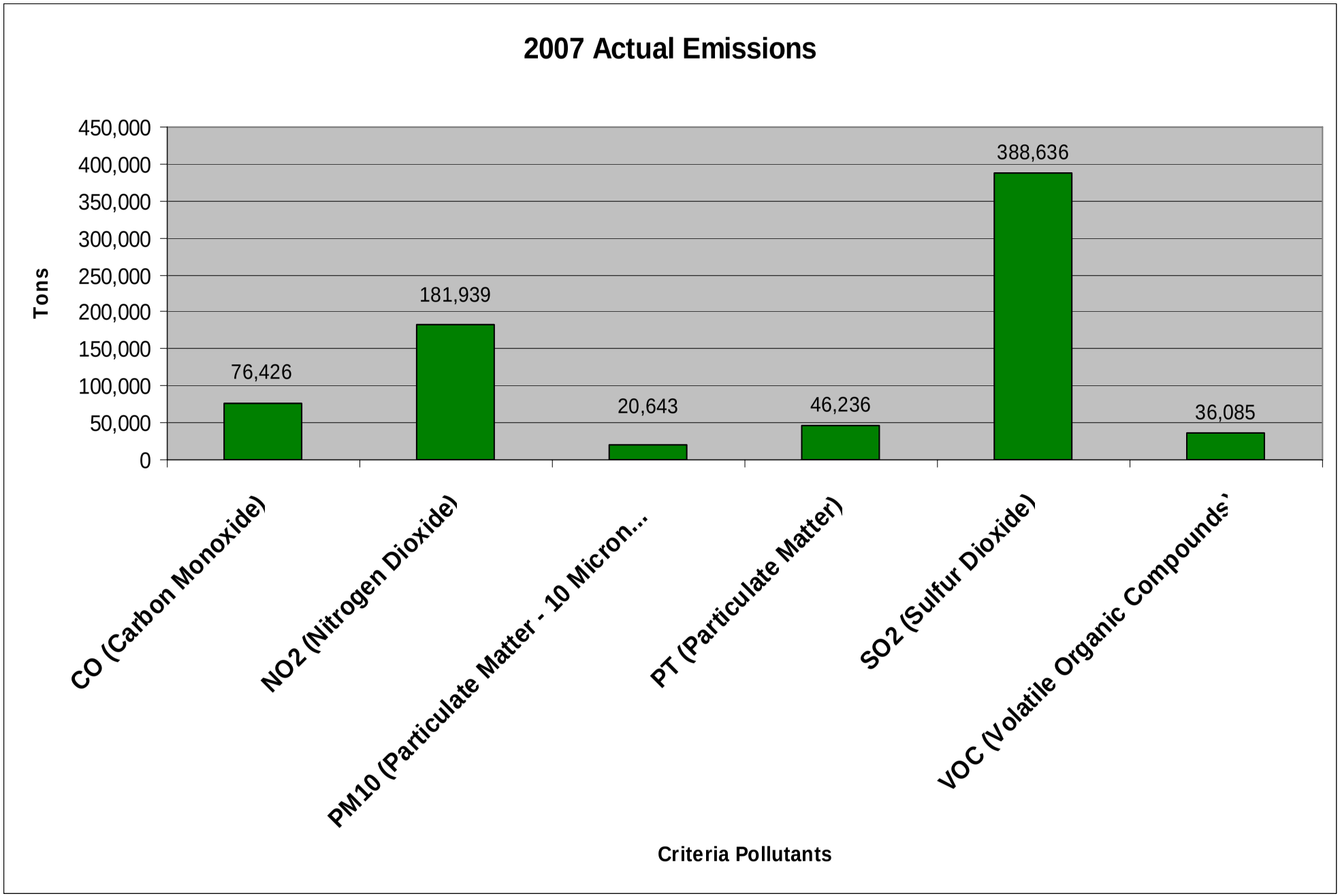


Figure 20: Actual tons of pollutants emitted by surveyed, regulated entities in Kentucky for the calendar year 2007. DAQ receives inventory emission data at the beginning of each calendar year; it takes approximately nine months to verify and complete the inventory.

Boyd, Campbell, Christian, Daviess, Edmonson, Fayette, Greenup, Hancock, Kenton, Livingston, Marshall, or Scott);
- All sources where the actual or potential emissions of an individual hazardous air pollutant is equal to or greater than 10 tons per year;
- All sources where the actual or potential emissions of combined hazardous air pollutants are equal to or greater than 25 tons per year.

The responsibility for assembling the other portions of the emission inventory for specific areas falls in the Evaluation Section.

These inventories are typically performed for areas that are not meeting a federal air quality standard or when a control program has been put in place and the overall effectiveness of that control program is being evaluated.

The pollutants being inventoried, and therefore the source of pollutants being documented, changes based on the air quality problems of an area. Typically for the last several years, pollutants contributing to either fine particulate or ozone problems are those that have comprehensive, consolidated inventories performed.

For area sources (those smaller businesses or human activities) typically federally supplied emissions factors are used and adjusted based on population data for a given area.

For mobile source related emissions, mathematical models are used to determine emissions contributions. For on-road mobile emissions, data gathered by the Kentucky Transportation Cabinet is used to determine “vehicle miles traveled” for a given area. This information is used in conjunction with any mobile controls, such as fuel programs, or gasoline pump controls to determine the mobile source contribution in an area. For off-highway mobile emissions such as airplanes, another mathematical model is used, with flight landing and take-off data used to calculate emissions.

Regulation Development

The Regulation Development Section drafts and adopts regulations to control air pollution in the state. This section is responsible for reviewing federally adopted regulations and recommending whether or not to adopt and/or request delegation of those regulations in Kentucky.

Regulations can either be drafted in response to:
- Federal mandates to control air pollution or specific air pollution sources;
- A state mandate made by either the governor or the legislature to control air pollution within the commonwealth; or
- An action identified by the cabinet as necessary to protect human health and the environment.

Regulations can be adopted for specific controls to address specific air quality concerns within the state.

While the agency receives its authority to draft and adopt air quality regulations under KRS Chapter 224, it is also governed on the drafting of those regulations by KRS 13A, which specifies regulatory drafting procedures as well as public participation in the regulatory promulgation process.

After the need for a new regulation or a regulatory amendment has been identified, it becomes the responsibility of the Regulation Development Section to compile all input and policy decisions into a regulatory draft and guide the process through promulgation. The promulgation process could include gaining inter-agency and federal U.S. EPA input into the regulation content, advertising the regulation or regulatory amendment for public comment, responding to those comments and making

any subsequent changes found necessary, and tracking the regulation through final legislative approval.

Several regulations were adopted or revised in Kentucky from June 2008 through June 2009:

401 KAR 50:066 - The amendment to 401 KAR 50:066, Conformity of transportation plans, programs, and projects, which became effective in Kentucky on 11/12/08, was necessary in order to meet the amended federal requirements as published in the January 24, 2008 Federal Register. The amendment contains interagency consultation procedures to be used by state, local and federal air quality and transportation planning agencies when determining whether or not federally funded transportation activities conform to the Kentucky State Implementation Plan.

"U.S.EPA has faced many challenges over the past few years relating to clean air regulatory decisions that have been vacated or remanded to the agency by the courts. Many states, including Kentucky, have debated whether to proceed with regulations at the state level to address levels of pollutants having the potential to impact public health."

-Lora Gowins,
Regulation Section Supervisor

401 KAR 59:015, New indirect heat exchangers; 401 KAR 59:017, Repeal of 401 KAR 59:016; 401 KAR 61:005, General provisions – The amendments to 401 KAR 59:015 and 61:005 provide owners and operators of indirect heat exchangers the option of using a particulate matter continuous emissions monitoring system (PM CEMS) in lieu of a continuous opacity monitoring system (COMS) to demonstrate compliance. The repealer regulation, 401 KAR 59:017, repeals 401 KAR 59:016, which is redundant to the federal New Source Performance Standard (NSPS), 40 C.F.R. Part 60, Subpart D, as adopted in 401 KAR 60:005. The amendments and the repeal became effective in Kentucky on 4/3/09.

401 KAR 60:021 - 401 KAR 60:021 repealed 401 KAR 60:020, Mercury Budget Trading Program, because the federal rule from which it was promulgated, the Clean Air Mercury Rule (CAMR), was vacated (made null and void) by the D.C. Court of Appeals on March 14, 2008. The repeal became effective in Kentucky on 9/12/08.

401 KAR 52:081 – 401 KAR 52:081 repealed 401 KAR 52:080, Regulatory limit on potential to emit. The repeal was necessary to allow sources to transition from state-origin permits to either a Title V permit under 52:020, or an Conditional Major permit under 401 KAR 52:020. The repeal became effective in Kentucky on 12/9/08.

Additional work is also ongoing to adopt the revised National Ambient Air Quality Standards and designations of areas meeting or not meeting those revised standards. Complications of this process include the court's vacature of U.S. EPA's implementation rules for both the ozone and fine particulate standards.

State Implementation Plan

The State Implementation Plan is a federally mandated plan to ensure attainment and maintenance of the various NAAQS within a state or region within a state. Once regulations or programs are adopted into the SIP, they become federally enforceable. This means that if for some reason a state cannot or will not enforce the regulations included in a respective SIP, the U.S. EPA can step in and enforce those provisions.

Overall, the framework and components of the SIP are designed to ensure that states continue to move toward all areas achieving air quality that meets the national standards, and once achieved, that air quality continues to maintain those standards. In short, the SIP is the mechanism for air re-

Current and Former Nonattainment Counties
1997 8-Hour Ozone Standard (.085 ppm)

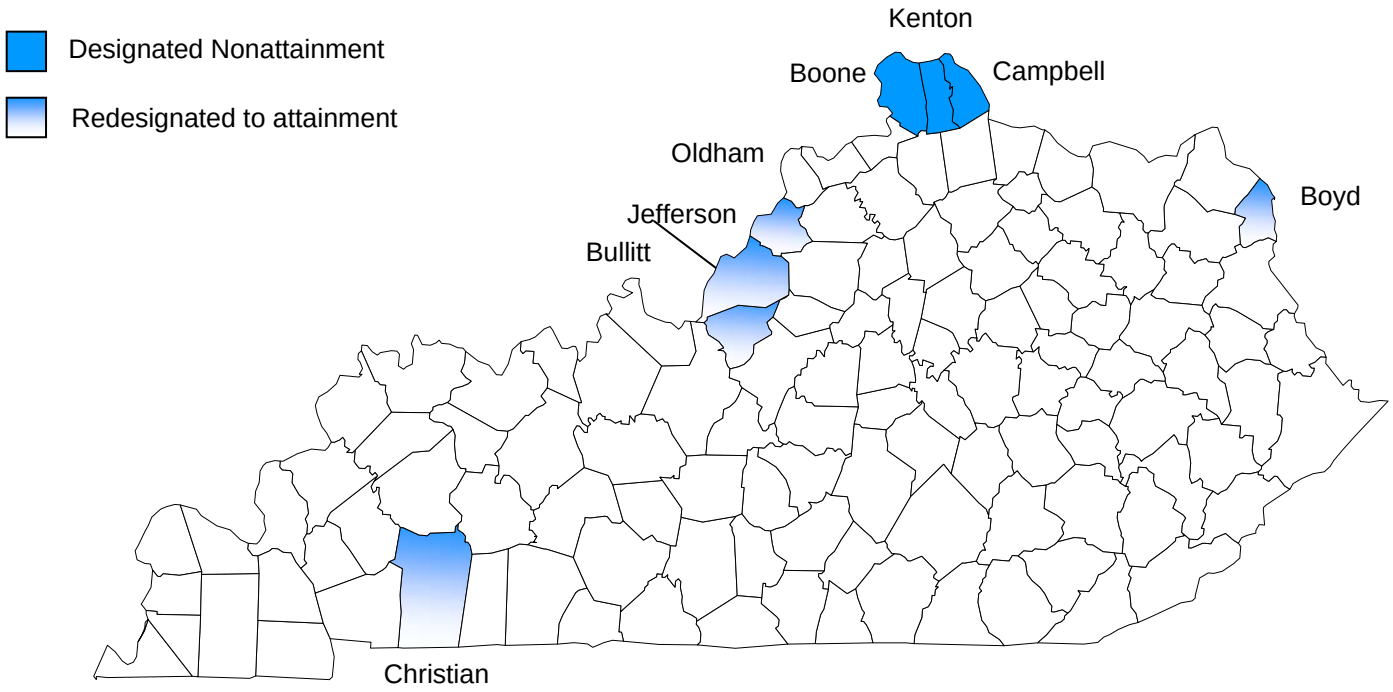


Figure 21: All counties highlighted on the map were in violation of the 1997 8-hour ozone standard. The shaded counties (Boyd, Bullitt, Christian, Jefferson and Oldham) have been redesignated as meeting that standard.

source management. Air resource management begins with:

- A determination of existing conditions – air quality, meteorological conditions, and an inventory of emissions;
- Goals or objectives for an area must be developed (typically air quality standards that must be met or maintained); and
- Control strategies developed, that may include emission reduction measures or measures to ensure no further degradation of air quality occurs.

A key component of air resource management, or SIP development, is the coordination of plan development with the local communities who have a stake in how a plan is to be implemented.

Of notable mention during the last fiscal year are issues and submittals pertaining to both the changes in the ozone and fine particulate standards, as well as conclusion of the regional haze plan designed to improve visibility conditions at our national parks and recreation areas.

Ozone

In 2004, the U.S. EPA designated areas as nonattainment (not meeting) the 1997 8-hour ozone NAAQS. These designations were based on 2001, 2002, and 2003 monitoring data and were the first designations made under this revised standard. Effective June 2004, Bullitt, Jefferson, Boone, Campbell, Kenton, Boyd and Christian counties were designated as not meeting this standard (see Figure 21). Therefore, a new air quality plan had to be developed to bring them back into compliance. This plan was due in June 2007, three years after the designations became effective.

Recommended Ozone Nonattainment Areas
2008 8-Hour Ozone Standard (.075 ppm)

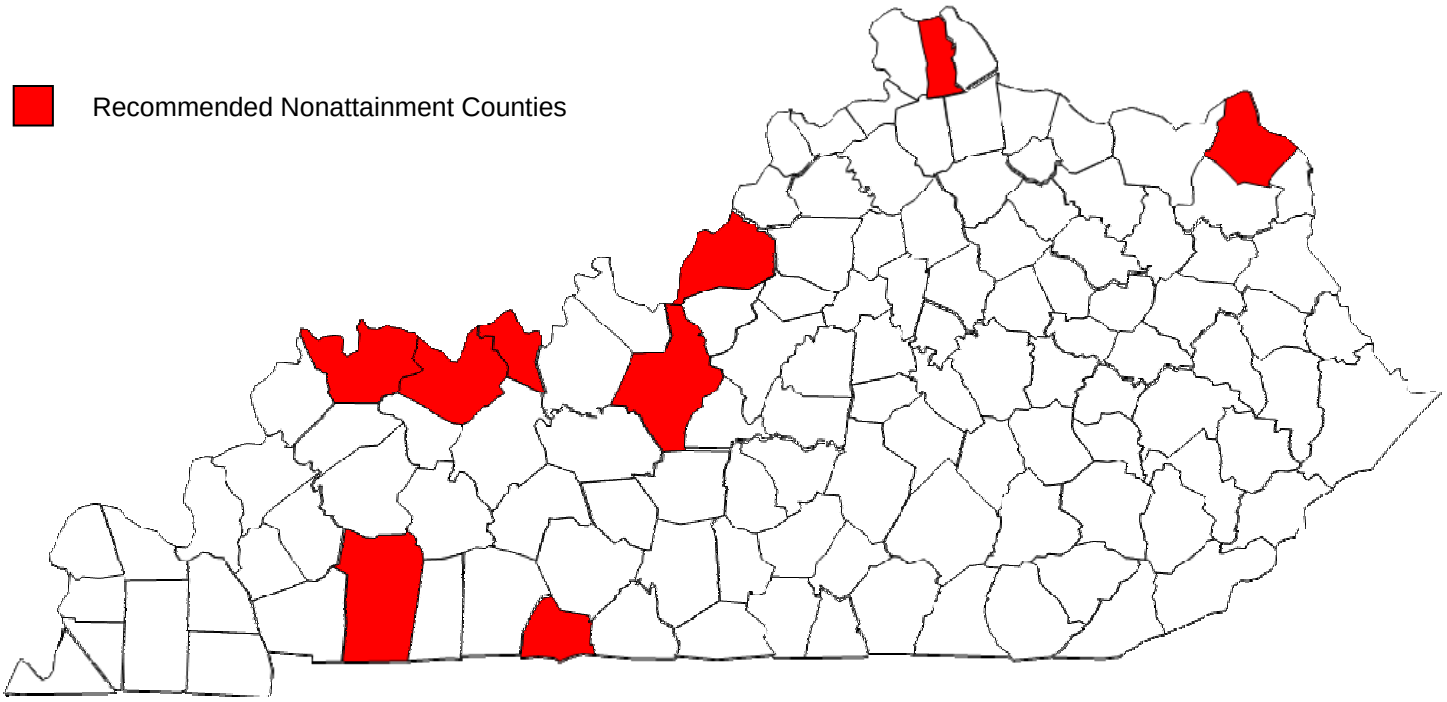


Figure 22: Potential nonattainment counties for the 2008 8-Hour Ozone Standard. The chart above shows what counties were recommended for not meeting the standard based on data for 2006-2008. For 2010 final designation, EPA will use data from years 2007-2009. The counties shown in red are: Christian, Daviess, Greenup, Hancock, Hardin, Henderson, Jefferson, Kenton, and Simpson.

During that time, monitoring data showed that several Kentucky counties came back into compliance with the 8-hour ozone standard. Kentucky requested that the U.S. EPA re-designate those areas as meeting the 1997 standard. Prior to the attainment demonstration being submitted, the U.S. EPA re-designated Bullitt, Jefferson, Boyd and Christian counties as in attainment (compliance) with the standard. The plans submitted to the U.S. EPA, with the request to re-designate those counties, documented that the areas should continue to have emission levels that would allow them to remain in compliance.

On March 12, 2008, the U.S.EPA significantly strengthened the NAAQS for ground-level ozone, the primary component of smog, to better protect public health. The previous standard was set at .08 ppm (parts per million). The new standard is set at .075 ppm. Both standards use three years of monitoring data and the 4th highest recorded 8-hour average to determine compliance.

The U.S. EPA will make designations under the 2008 8-hour standard in 2010. States were required to submit recommendations for these designations to the federal agency in March, 2009. Kentucky analyzed data—such as emission contributions, changes in monitoring levels from one year to another, population density differences, emission impacts from down-wind sources and transportation impacts on areas to develop recommendations for nonattainment areas.

U.S. EPA will make designation decisions using monitoring data from 2009 and possibly even 2010. Based on the monitoring data available (2006-2008) Figure 22 depicts the counties in the state that were recommended as not meeting the new 8-hour standard.

2007 Nonattainment Counties
1997 Annual $PM_{2.5}$ Standard (15 µg/m^3)

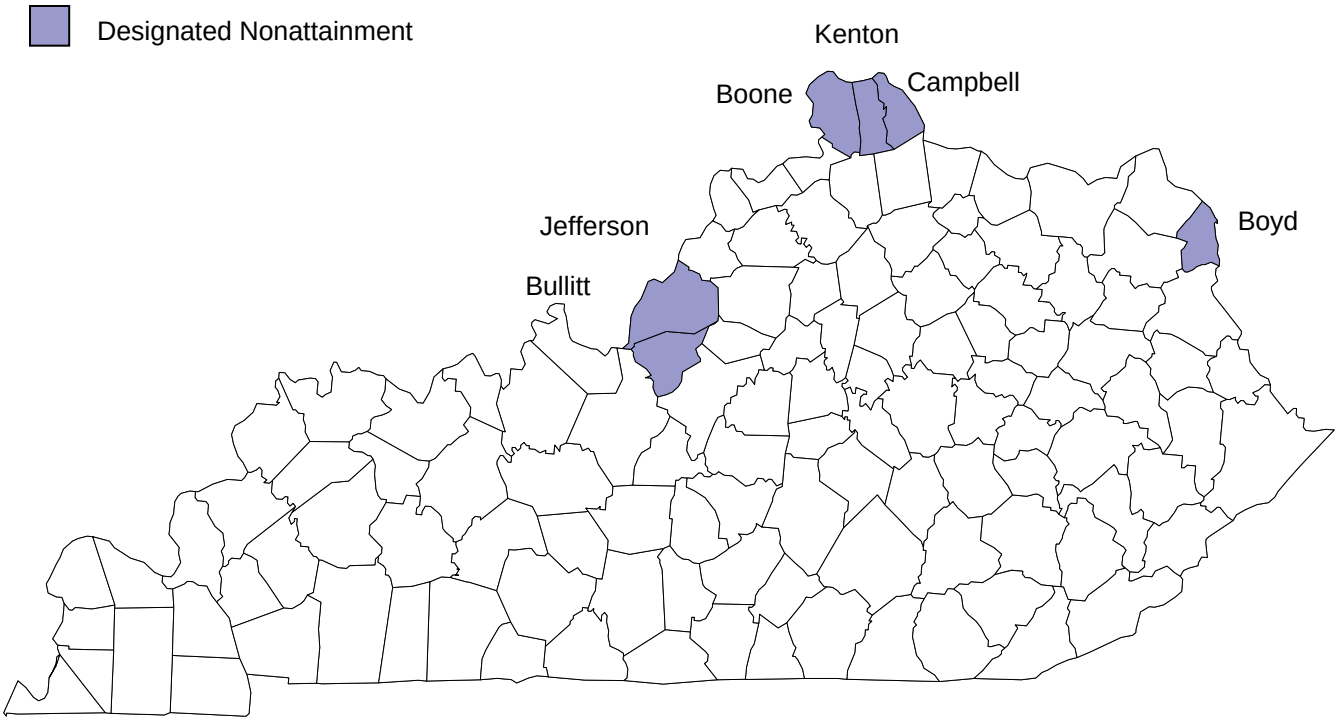


Figure 23: All counties highlighted on the map were in violation of the 1997 Annual $PM_{2.5}$ standard in 2007.

Fine Particulate Matter

In 2006, the U.S. EPA strengthened the NAAQS for the 24-hour fine particulate standard ($PM_{2.5}$) from 65 ug/m^3 to 35 ug/m^3. There are actually two standards set for fine particulate. In addition to the 24-hour average, there is a 1997 standard for an annual average, set at 15 ug/m^3,which was not changed in 2006.

Kentucky and all other states were required to submit recommendations to the U.S. EPA in December, 2007 for areas to be designated as meeting or not meeting the newly revised 24-hour standard. Kentucky proposed that no counties should be listed as nonattainment for the newly revised standard. This recommendation was based on a combination of 2004-2006 monitoring data, and an exceptional events package that was submitted to the U.S. EPA. The exceptional events package is a request from the division to the federal agency that they not use certain air monitoring data, due to impacts from forest fires and other exceptional events.

The monitoring data for 2005-2007 indicated that no areas in Kentucky were in violation of the 24-hour standard, and Kentucky provided documentation to EPA of this fact. Therefore it is anticipated that when the U.S. EPA makes final designations for this standard there will be no counties in Kentucky in violation.

Annual $PM_{2.5}$ Attainment Demonstration

As mentioned previously, there are two fine particulate ($PM_{2.5}$) standards. The first is the 24-hour standard, for which U.S. EPA is preparing to make designations. The second is the annual stan-

dard, for which designations were made in 2005. In Kentucky, there were three areas of the state which were designated as not meeting the annual standard of 15 ug/m^3, based on monitoring data from 2001-2003. They were Jefferson, Bullitt, Boone, Campbell, Kenton, Boyd and a portion of Lawrence counties (see Figure 23).

In July 2008, Kentucky submitted a draft attainment demonstration to EPA that covers all of the above mentioned areas. This demonstration showed that, based on modeling performed through the VISTAS workgroup and other regional planning organizations, all areas would come back into compliance with the annual fine particulate standard by 2010. A final submittal was made to EPA in December of 2008.

Figure 24: Hazy (left photo, visibility range less than 10 miles) and clear (right photo, visibility range less than 190 miles) days at Mammoth Cave National Park. Historical and real time images from this and other national parks can be viewed by clicking the Webcam link at www.airnow.gov. *Photos Courtesy of Mammoth Cave National Park*

Visibility

Regional haze is pollution that impairs visibility over a large region, including national parks, forests, and wilderness areas (many termed "Class I" areas). An easily understood measure of visibility to most people is visual range. Visual range is the greatest distance, in kilometers or miles, at which a dark object can be viewed against the sky (see Figure 24).

As part of the Clean Air Act Amendments and further regulations adopted by the EPA, states must develop plans to restore natural visibility conditions in the 156 Class I areas throughout the nation. Kentucky's Mammoth Cave National Park is included in the list of areas.

Although the goal to achieve natural visibility conditions is slated for 2064, states had to develop the first phase of the plan and demonstrate reasonable progress toward meeting the national goal. In addition, states also had to determine if emissions from within their boundaries were having an adverse impact on other Class I areas. Figure 46 depicts the Class I areas in the southeast as well as others in nearby states.

Regional haze is typically caused by sources and activities emitting fine particles and their precursors, often transported over large regions. Particles affect visibility through the scattering and absorption of light. Reducing fine particles in the atmosphere is an effective method of improving visibility.

The development of these Regional Haze plans was accomplished through coordinating information and modeling conducted by a regional planning organization (RPO). VISTAS was the organizational means for performing the modeling and emissions analysis that allowed the states to develop these plans. VISTAS included representation from Kentucky, Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, and the eastern band of the Cherokee Indians (see Figure 25).

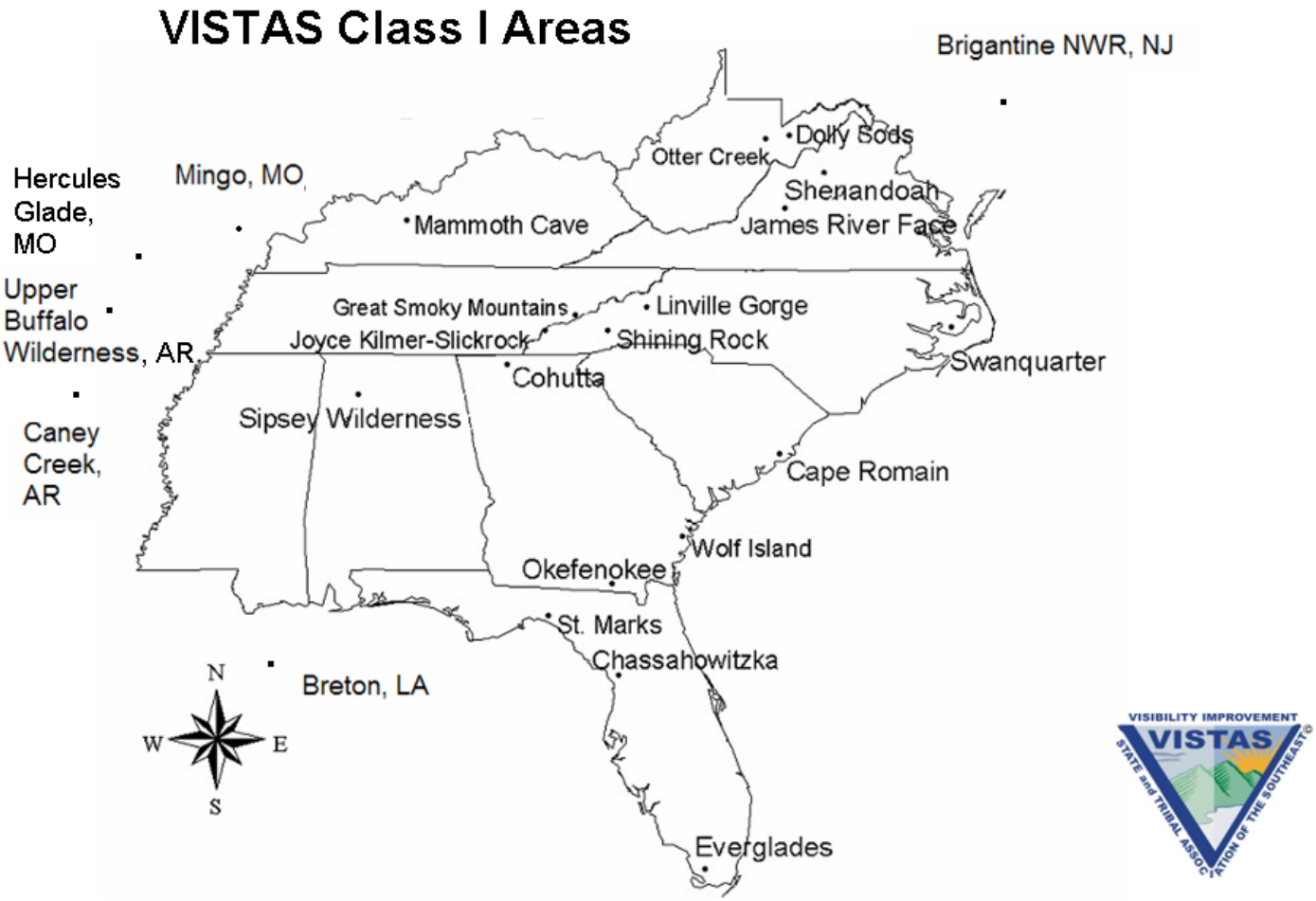


Figure 25: The Clean Air Act seeks to prevent significant deterioration of air quality. Areas of special natural, scenic, or historic importance are known as "Class I Areas," and are protected to maintain long distance, panoramic views.

As federally required, the Division for Air Quality submitted Kentucky's draft plan to the Federal Land Managers and the U.S. EPA for review in December, 2007. After receiving comments on the draft document and making necessary revisions, the agency posted the proposed plan for public comment and submitted it to EPA in March, 2008. The public hearing on the proposed plan was held in April 2008. After addressing comments received during the public comment period in the statement of consideration, the division submitted for approval the final Kentucky Regional Haze SIP to the U.S. EPA in June, 2008. The SIP package is currently under review by the U.S. EPA.

TECHNICAL SERVICES (AMBIENT AIR MONITORING)

Since July 1967, the state has operated an air quality monitoring network. The calendar year 2008 network included 43 monitoring stations in 29 counties (this total includes monitors operated by the Louisville Metro Air Pollution Control District [LMAPCD] and the National Park Service [NPS] at Mammoth Cave).

The monitoring station locations are selected in accordance with U.S. EPA regulations (40 CFR 58, Appendix D) 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 and regulatory requirements are met.

Many staff hours are devoted to the operation of the monitoring network. Division staff routinely visit our sites to calibrate and maintain the monitoring equipment, collect samples, and verify and document data from the continuous monitors. Because it is imperative that the air monitoring data be 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 process includes monitors operated by the LMAPCD, the NPS and industrial networks.

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

The public has access to the monitoring data on a daily basis through the Air Quality Index (AQI) message on our website (www.air.ky.gov) or toll free (1-800-AIR-IN-KY). The AQI is a 24-hour report on Kentucky's air quality. The public can access daily ozone and particulate matter reports through EPA's AIRNOW website at www.epa.gov/airnow.

Detailed monitoring information is published annually by the division via this report. This year, the Surveillance Network Report, which in the past has been published separately and which focuses on the division's network of air quality monitors, is merged into this annual report.

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.

Figure 26: Understanding the Air Quality Index (AQI). The purpose of the AQI is to help you understand what local air quality means to your health.

The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. The U.S. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health.

How Does the AQI Work?

Think of the AQI as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while a value over 300 signifies hazardous air quality.

An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is considered to be unhealthy; at first for certain sensitive groups of people, then for everyone as AQI values get higher.

Where can I find out about the AQI?

The Division for Air Quality reports nearly real-time AQI values on our website, at www.air.ky.gov, and via a toll-free telephone number, 1-800-AIR-IN-KY. Forecasted AQI data can be viewed at the U.S. EPA website, www.airnow.gov. Forecasted AQI data is generated using a combination of forecasted weather data and known pollution emission values. DAQ does not forecast for air pollution. In Kentucky, the Louisville Air Pollution Control District forecasts due to its population size as required by the CAA.

National Ambient Air Quality Standards (NAAQS)

Pollutant	MAXIMUM CONCENTRATION	
	Primary Standard	Secondary Standard
Carbon Monoxide 8 hour average 1 hour average	9 ppm(1) 35 ppm(1)	None None
Lead Calendar quarter average	.15 µg/m^3 (7)	Same as primary
Nitrogen Dioxide Annual Average	0.053 ppm	Same as primary
Ozone 8 hour average	0.075 ppm (2008 std) (6) 0.08 ppm(3)	Same as primary
Particulate Matter (measured as $PM_{2.5}$) 24 hour average Annual Average	35 µg/m^3 (4) 15 µg/m^3 (5)	Same as primary
Particulate Matter (measured as PM_{10}) 24 hour Average	150 µg/m^3 (2)	
Sulfur Oxides 24 hour average Annual Average 3 hour average	0.14 ppm(1) 0.03 ppm ———	——— ——— 0.5 ppm

Figure 27: The National Ambient Air Quality Standard determines what levels of each pollutant are acceptable in terms of protecting human health (primary standard) and public welfare (secondary standard).

Understanding the National Ambient Air Quality Standard

The federal Clean Air Act (42 U.S.C. 7401-7671), as amended by the U.S. Congress in 1970, 1977 and 1990, directs the U.S. Environmental Protection Agency to establish NATIONAL AMBIENT AIR QUALITY STANDARDS 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 pollutant in the table at left.

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 welfare. Welfare includes damage to plants and animals, impairment of visibility and property damage.

Units of measure in the chart are micrograms of pollutants per cubic meter of air (μg/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 number of days per calendar year with a twenty-four (24) hour average concentration above 150 μg/m^3 equal to or less than one (1).

(3) 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.

4) The standard is attained when the 3-year average of the annual 98th percentile is less than or equal to 35 μg/m^3.

(5) The standard is attained when the 3-year average of annual means is less than or equal to 15 μg/m3.

(6) 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 0.075 ppm (effective May 27, 2008).

(7) The standard is attained when a rolling 3-month average is less than or equal to .15 μg/m^3. The final rule for the new standard was signed November 12, 2008.

2008 KYDAQ/LMAPCD NETWORK MAP

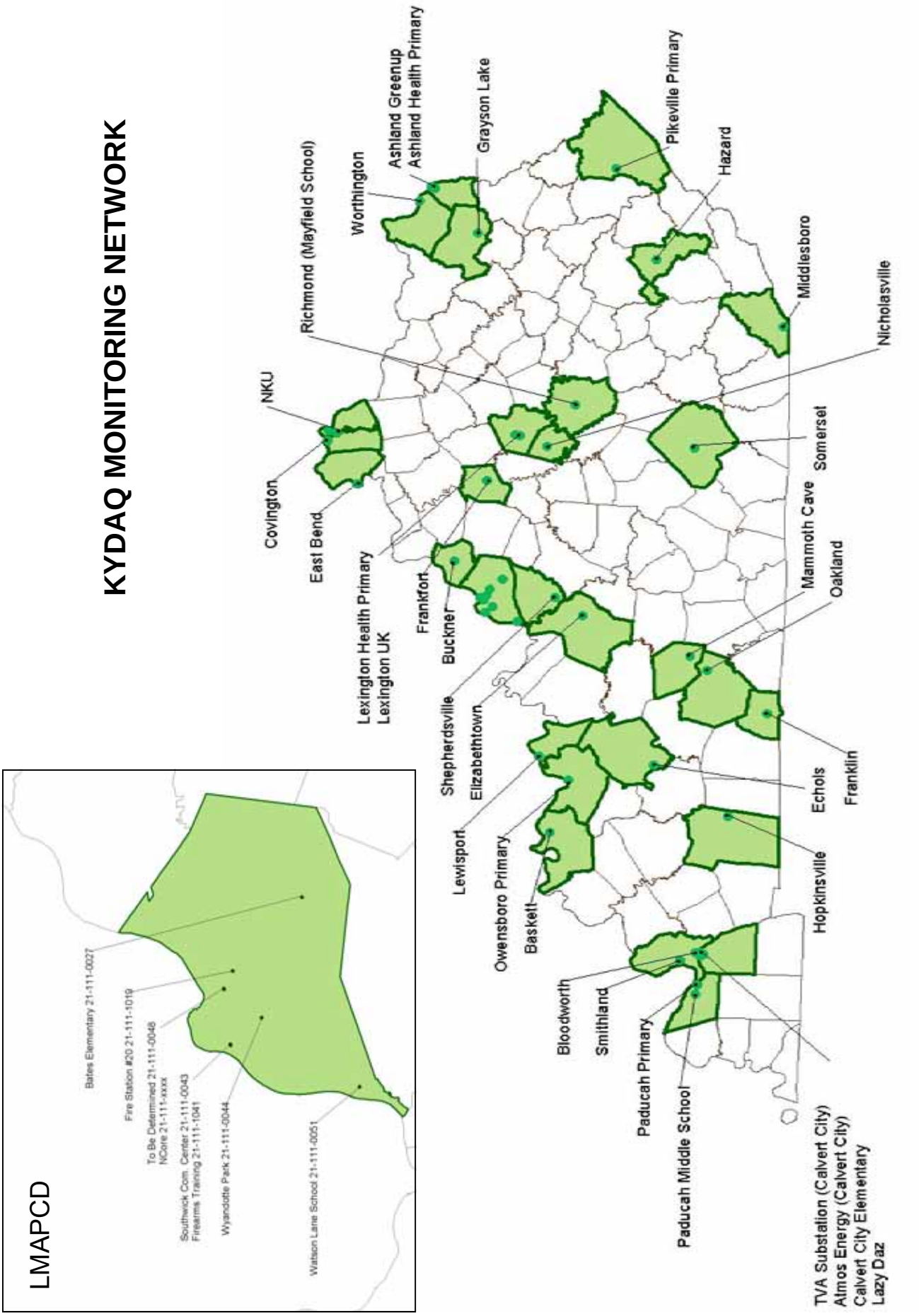


Figure 28: The Kentucky Division for Air Quality monitoring network. Inset is the Louisville Metropolitan Air Pollution Control District monitoring network.

Metropolitan Statistical Area	Number of Sites	$PM_{2.5}$		PM_{10}		PM_{coarse}	SO_2	NO_2	NO_y	CO	O_3	Metals		Hg	Wet Dep	VOC	Carbonyl	Speciation	MET
Bowling Green, KY	2	4	CT	0		0	1	1	0	1	2	0		1	0	0	0	0	1
Cincinnati-Middletown, OH-KY-IN	3	4	T	0		0	1	1	0	0	3	0		1	1	1	1	1	2
Clarksville, TN-KY	1	1		0		0	0	0	0	0	1	0		0	0	0	0	0	0
Elizabethtown, KY	1	2	T	0		0	0	0	0	0	1	0		0	0	0	0	0	0
Evansville, IN-KY	1	3	T	0		0	1	0	0	0	1	0		0	0	0	0	0	0
Huntington-Ashland, WV-KY-OH	3	2	T	2	C**	0	2	1	0	0	2	2	C	0	0	1	1	1	1
Lexington-Fayette, KY	3	3	T	1	**	0	2	1	0	0	2	1		1	1	1	1	1	1
Louisville-Jefferson County, KY-IN	10	12	CT	4	C**	1	3	1	1	2	5	0		0	0	0	0	1	3
Owensboro, KY	2	2	CT	0		0	1	1	0	0	2	0		0	0	0	0	0	1
Micorpolitan Statistical Area																			
Paducah, KY-IL	4	2	T	1		0	2	1	0	0	2	0		1	1	1	0	0	1
Somerset, KY	1	0		0		0	0	0	0	0	1	0		0	0	0	0	0	0
Middlesborough, KY	1	1		0		0	0	0	0	0	1	0		0	0	0	0	0	1
Richmond-Berea, KY	1	1		0		0	0	0	0	0	0	0		0	0	0	0	0	0
Frankfort, KY	1	1		0		0	0	0	0	0	0	0		0	0	0	0	0	0
Not in a MSA																			
Carter County	1	1		2	C	0	0	0	0	0	1	2	C	1	2	2	2	1	1
Marshall County	4	0		1		0	0	0	0	0	0	1		0	0	5	0	0	1
Ohio County	1	2	T	1	**	0	0	0	0	0	0	1		1	1	0	0	0	1
Perry County	1	1	T	0		0	0	0	0	0	1	0		0	0	0	0	0	1
Pike County	1	3	T	0		0	0	0	0	0	1	0		0	0	0	0	0	0
Simpson County	1	0		0		0	0	0	0	0	1	0		0	0	0	0	0	1
TOTALS	**43**	**45**		**12**		**1**	**13**	**7**	**1**	**3**	**27**	**7**		**6**	**6**	**11**	**5**	**5**	**16**

C=Collocated monitors; D=Duplicate monitors; T=TEOM2.5 continuous PM2.5 monitors or TEOM10 continuous PM10 monitors; **=Multiple analysis: PM10 Teflon filters used for PM10 monitoring, Metals monitoring and PMcoarse)

Louisville Metro Air Pollution Control District: Carbon Monoxide Ambient Air Monitoring Network

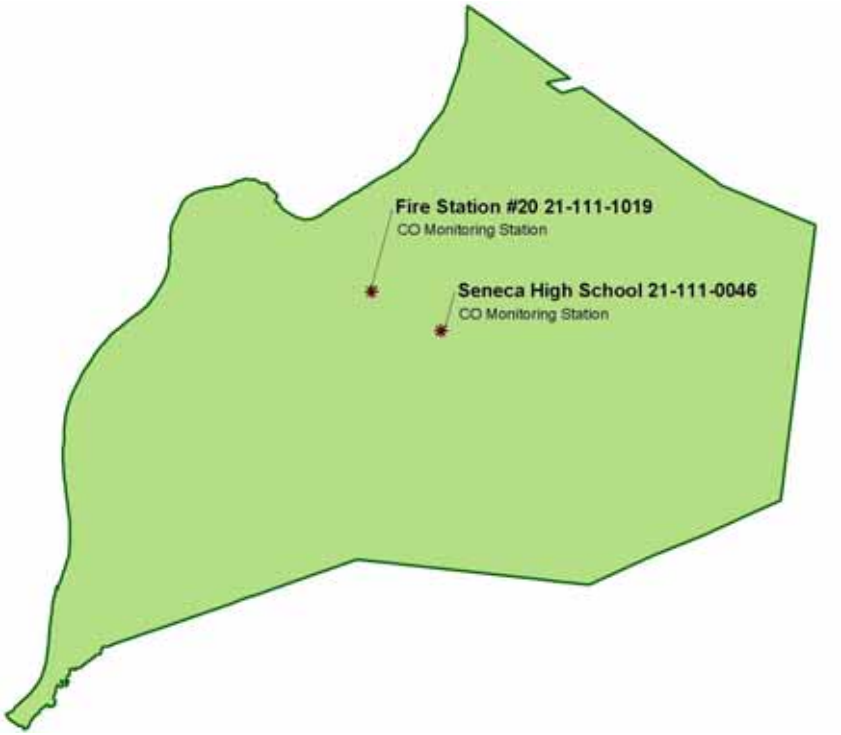


Figure 29: Carbon monoxide monitoring in Kentucky is currently conducted only in the Louisville Metro region due to statewide compliance; Jefferson County historically has had higher levels of CO than elsewhere in the state, perhaps due to the high levels of vehicle traffic in the area.

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 that includes highway and off-road vehicles such as construction equipment. Other sources include industrial processes, kerosene and wood burning stoves in homes.

Environmental Impacts

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.

How is CO Monitored?

Carbon monoxide is monitored continuously by analyzers that 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 2008, the Louisville Metro Air Pollution Control District operated two CO monitors in Jefferson County.

Results

There were no exceedances of the CO standards in 2008. The last exceedance of a standard occurred on January 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.

Statewide and regional carbon monoxide levels have declined substantially since 1980, primarily due to improved emission controls on motor vehicles. Due to the substantial drop in monitored levels, carbon monoxide monitoring was discontinued statewide in 2003 except for Jefferson County. The 2003 statewide discontinuation of CO monitors accounts for the dramatic uptrend from 2003 to 2004 because since 2004, the annual average has been based on data only from Jefferson County. Jefferson County has historically had higher CO levels than the rest of the state.

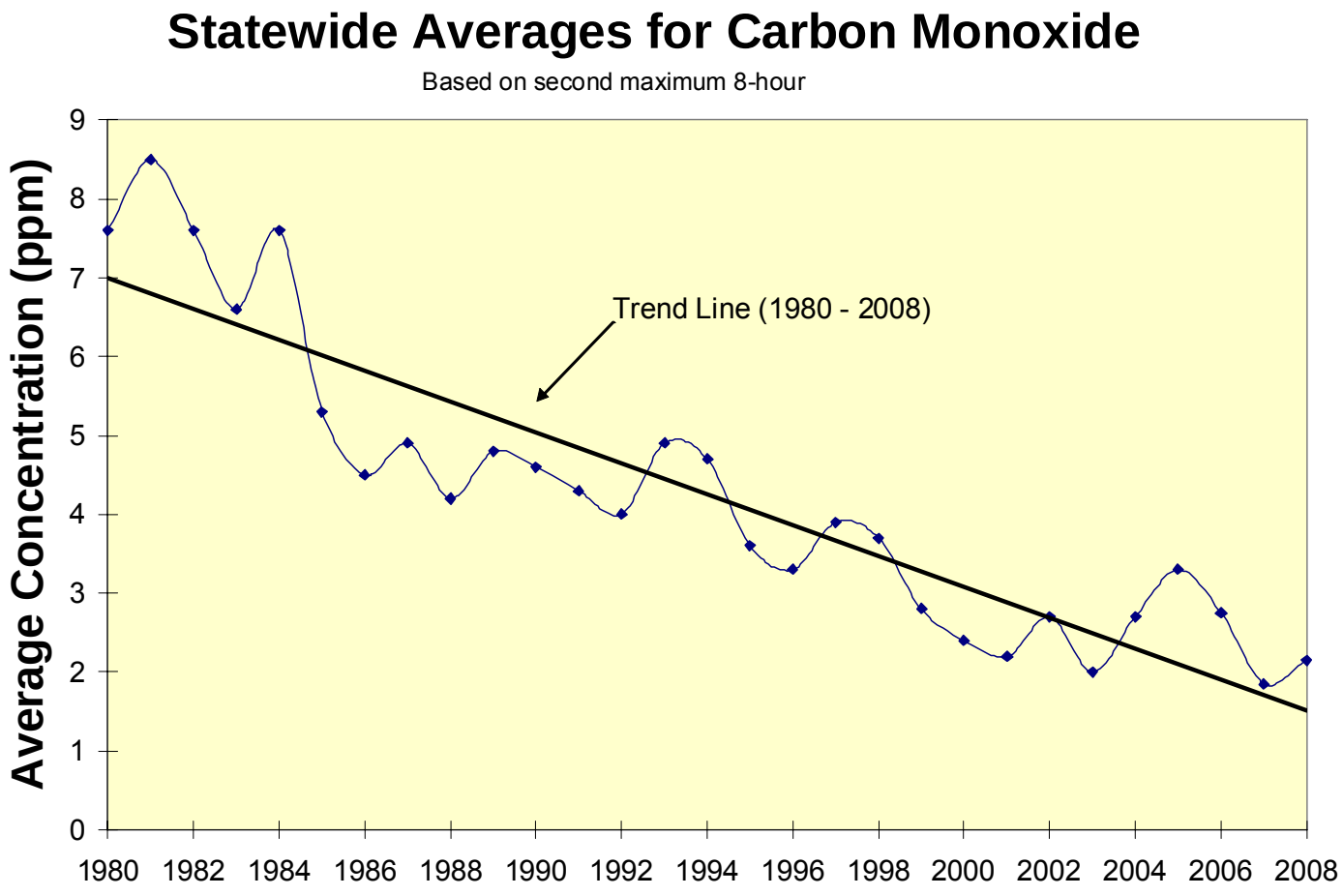


Figure 30: Statewide averages for CO monitoring indicate pollution reductions.

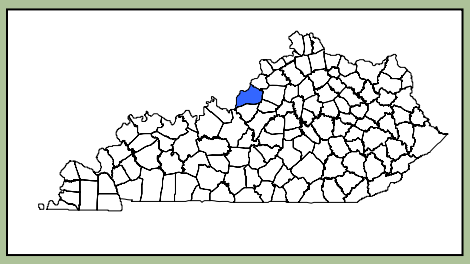
National Ambient Air Quality Standards for Carbon Monoxide

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: **None.**

Criteria Pollutant Summary Report – 2008

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



County	Site Address	AQS-ID	# Obs	1-Hr Averages			8-Hr Averages		
				1st max	2nd max	Obs> 35.0	1st max	2nd max	Obs > 9.0
Jefferson	3510 Goldsmith Lane Louisville	21-111-0046	8525	8.8	6.9	0	2.8	2.2	0
Jefferson	1735 Bardstown Road Louisville	21-111-1019	8354	3.8	3.1	0	2.7	2.1	0

Carbon monoxide monitors located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Proposed 2010 Lead Ambient Air Monitoring Network

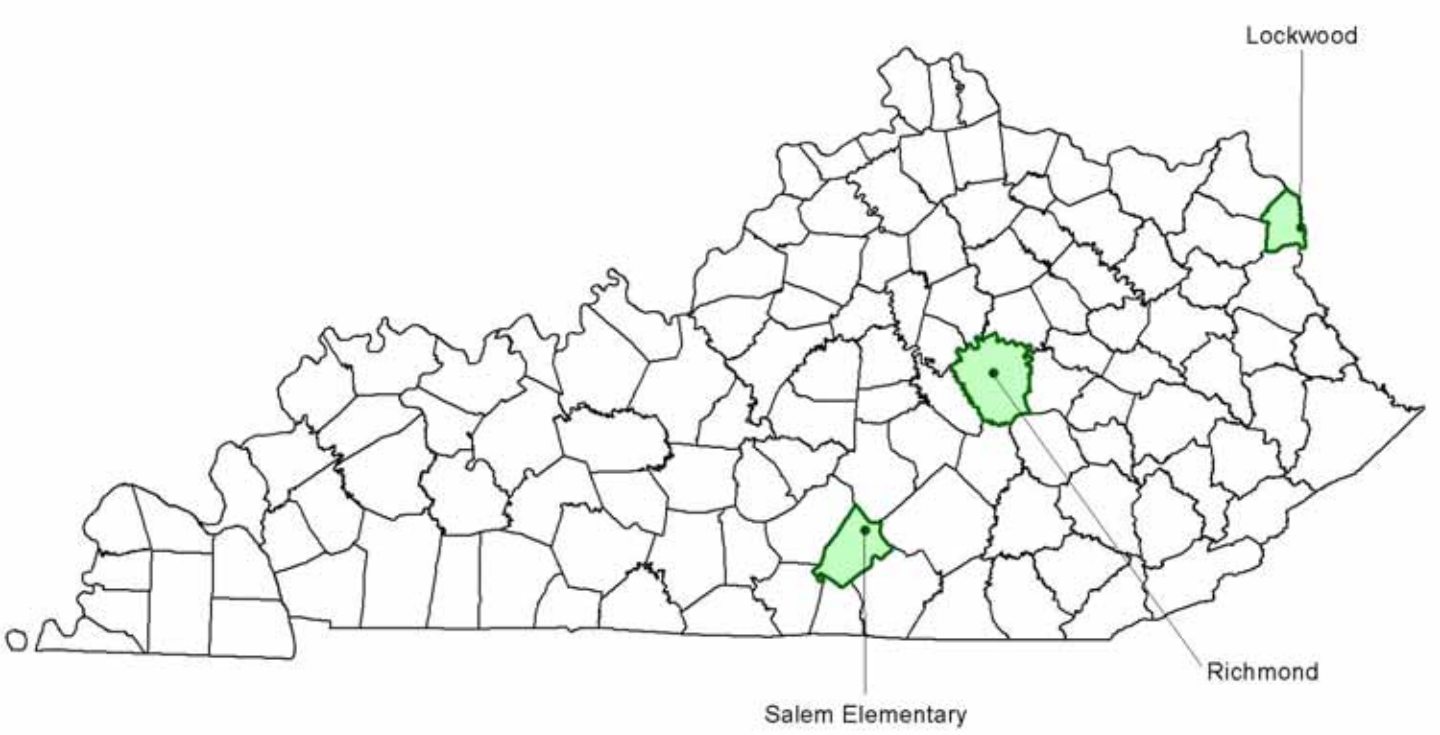


Figure 31: Proposed Lead monitoring locations in Kentucky.

Lead is a soft, blue-gray metal that occurs naturally. However, the historical use of lead in gasoline, paint, and plumbing along with its modern use in batteries, bridge paint and plastic has caused lead to accumulate in the environment. The accumulation of lead in the environment is the reason lead can be found in everyone's body today.

On November 12, 2008, the NAAQS for lead was lowered from 1.5 $\mu g/m^3$ to .15 $\mu g/m^3$. The new NAAQS also required State, Tribal and Local agencies to monitor near sources that emit one or more tons of lead each year. The division identified three sources that emitted over one ton of lead annually and will begin monitoring near the sources in January 2010.

Environmental Impacts

Injestion of lead is the first major pathway of exposure. Inhalation is the second leading pathway of exposure for lead. Only 20 percent to 70 percent of injested lead is absorbed into the body whereas almost all of the lead inhaled is absorbed into the body. Children absorb lead into their system faster than an adult.

Lead can accumulate in soil, water and sediments through deposition from air sources. The accumulation can damage ecosystems through the loss of biodiversity, community composistion and decreased growth and reproductive rates in plants and animals.

Lead contmaination can cause nervous system and kidney damage, learning disabilities, poor muscle coordination, decreased bone and muscle growth and hearing damage in children. Lead can also effect adult nervous systems. However, most adults require a much large exposure dose than a child to have a negative health impact.

NITROGEN DIOXIDE (NO_2)

Nitrogen Dioxide Ambient Air Monitoring Network

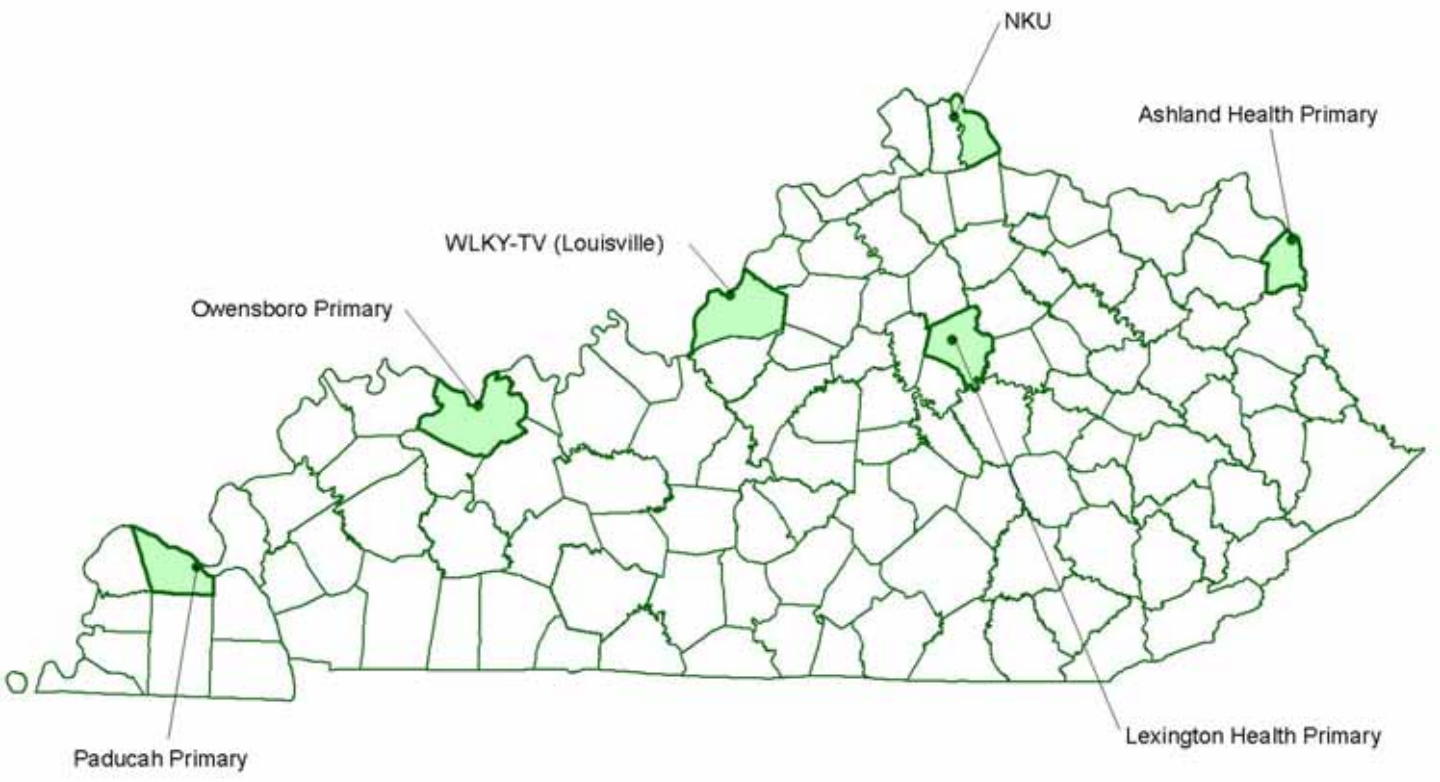


Figure 32: Nitrogen dioxide monitoring locations in Kentucky.

Nitrogen dioxide is a reddish brown gas that is produced during high temperature combustion. During combustion, nitrogen and oxygen are combined, or oxidized, to form a family of highly reactive gases called nitrogen oxides (NOx), which includes nitrogen dioxide (NO_2) and nitrogen oxide (NO). In addition to the NO_2 produced during combustion, the NO produced may, in the presence of sunlight, undergo a photochemical reaction that will also form NO_2. The rate of reaction is dependent upon the intensity of the sunlight.

Major combustion or oxidation sources that produce NO_2 include motor vehicles, power plants, incinerators, boilers and chemical processes.

Environmental Impacts

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 an increase the susceptibility of the respiratory system to infection. Nitrogen oxides are also considered detrimental to human health due to their association in the formation of ozone and the resulting health effects caused by that pollutant.

Nitrogen dioxide is a contributor to the formation of acid precipitation, which can damage plant life, aquatic life, cause the deterioration of stone/masonry-type buildings and deteriorate statues.

Nitrogen oxides also react with ammonia to form ammonium nitrate, a component of $PM_{2.5}$. Nitrates are also a key component in regional haze that has been attributed to poor visibility in the southeast region of the United States.

How is NO_2 monitored?

Nitrogen dioxide is monitored continuously by analyzers that utilize the principle of photometric detection of the chemiluminescence (light) resulting from the gas phase reaction of nitric oxide (NO) 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 air stream reacts 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. The second air stream then reacts with ozone, providing a total measurement of nitrogen oxides (NOx) in the sample.

The assumption is that the majority of the NOx value is not NO_2. Through subtraction of the first air stream NOx concentration from the second stream NOx concentration, a NO_2 value is obtained. Data from the analyzer is transmitted into an automated data storage system. In 2008, the DAQ and the LMAPCD operated six nitrogen dioxide monitors in Kentucky.

Results

There were no exceedances of the NO_2 standard in 2008, and there have been no recorded exceedances of the NAAQS since the inception of sampling in 1970. Statewide nitrogen dioxide levels show a steady, downward trend, primarily due to the use of pollution control devices on motor vehicles, power plants and industrial boilers.

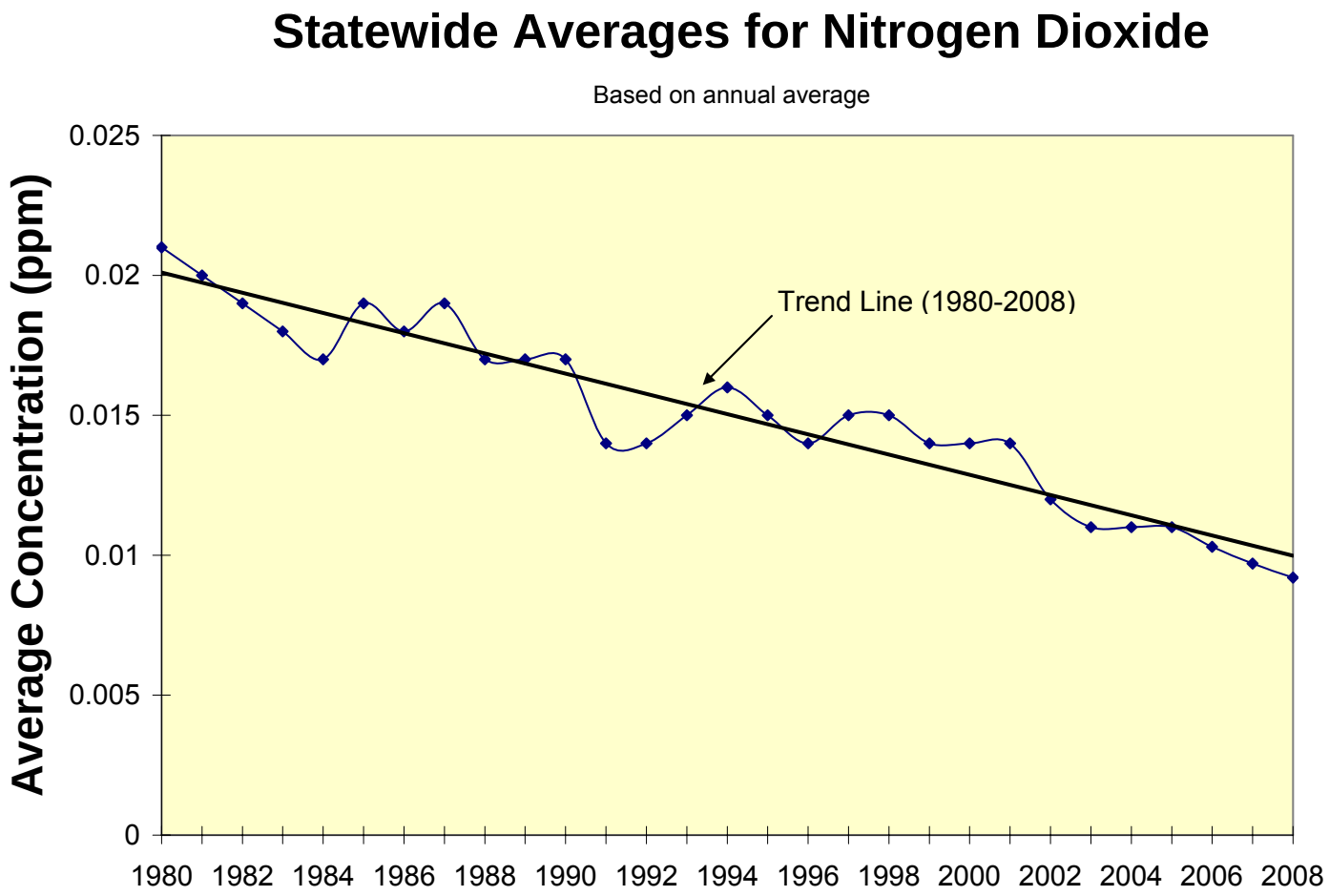


Figure 33: Statewide averages for nitrogen dioxide monitoring indicate pollution reductions.

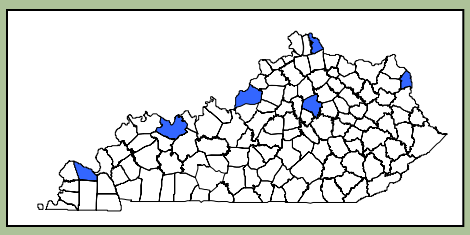
National Ambient Air Quality Standards for Nitrogen Dioxide

Primary NAAQS: **Annual Arithmetic Mean 0.05 ppm.**

Secondary NAAQS: **Same as Primary Standard.**

Criteria Pollutant Summary Report – 2008

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



County	Site Address	AQS-ID	# Obs	Mean	1-Hr Average	
					1st max	2nd max
Boyd	2924 Holt Street Ashland	21-019-0017	8307	.0102	.056	.050
Campbell	524A John Hill Road Highland Heights	21-037-3002	8292	.0066	.044	.044
Daviess	US 60 and Pleasant Valley Road Owensboro	21-059-0005	7348	.0070	.042	.039
Fayette	650 Newtown Pike Lexington	21-067-0012	8221	.0082	.059	.059
Jefferson	1918 Mellwood Avenue Louisville	21-111-1021	8271	.0153	.091	.077
McCracken	2901 Powell Street Paducah	21-145-1024	8183	.0077	.061	.053

Nitrogen dioxide monitors located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Ozone Ambient Air Monitoring Network

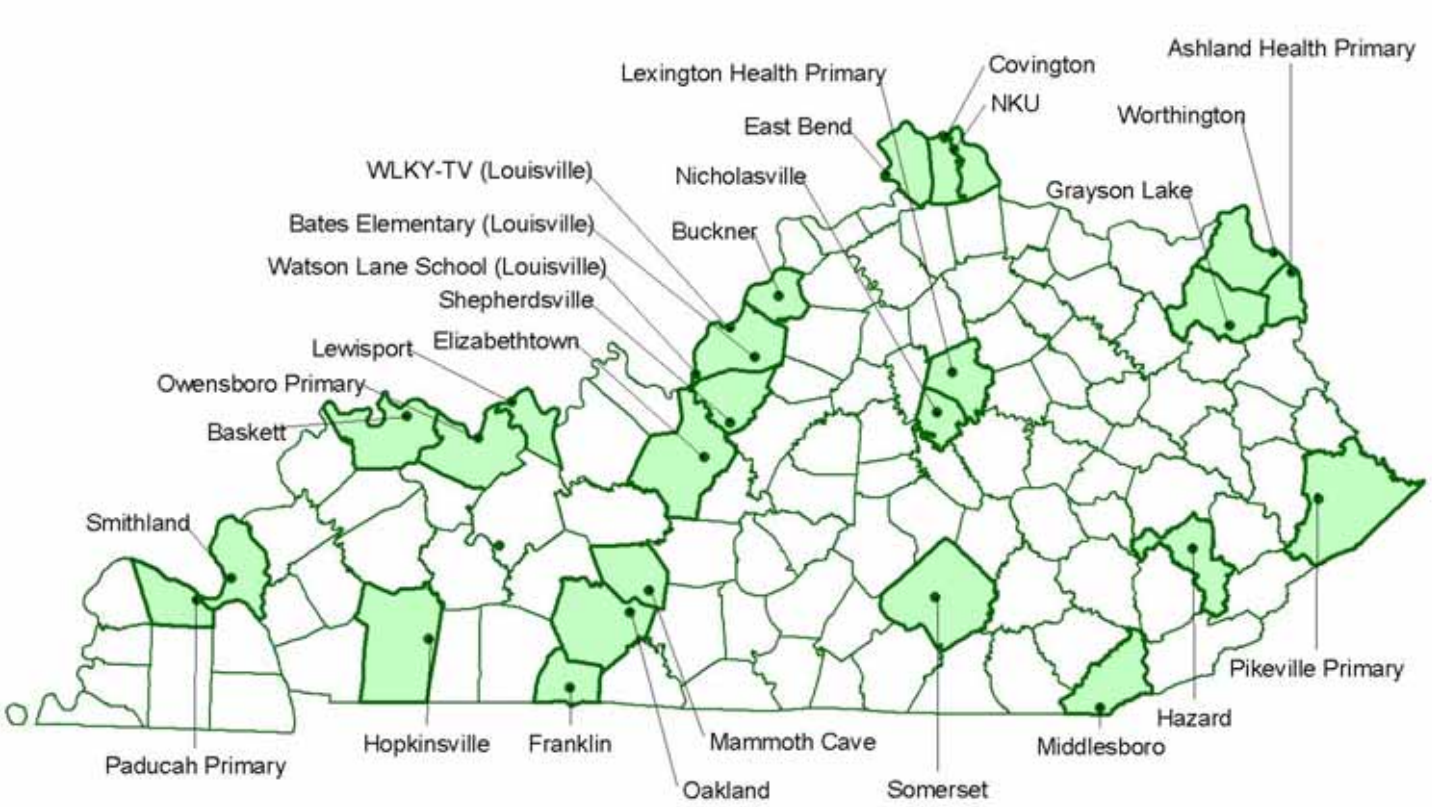


Figure 34: Ozone monitoring locations in Kentucky.

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

Environmental Impacts

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 ozone, also known as ground-level ozone, can trigger health problems at low level exposure, cause permanent lung damage after long term exposure and damage ecosystems.

How is O_3 monitored?

Ozone is monitored from March 1st through October 31st each year, when meteorological conditions are most conducive to the formation of ozone. Analyzers, which operate continuously, monitor ozone by using the ultraviolet photometry method. In this method, ambient air is drawn into a sample cell and a beam of ultraviolet light is passed through the cell.

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 are transmitted into an automated data storage system. In 2008, DAQ, the National Park Service at Mammoth Cave and the Louisville Metro Air Pollution Control District operated a total of 27 ozone monitors in Kentucky.

Results

In November, 1997 the U.S. EPA adopted an eight-hour ozone standard based on scientific and medical research, which indicated that extended exposure to lower levels of ozone might be as harmful as short-term exposure to elevated levels. The eight-hour standard was set at 0.08 ppm and was exceeded when the average level of ozone over an eight hour period was 0.085 ppm or greater. On May 27, 2008, the U.S. EPA adopted a new 8-hour standard set at .075 ppm.

The standard is attained when the fourth highest daily 8-hour average for each of the three most recent years are averaged and that average is less than 0.075 ppm. In 2008, there were 29 exceedances of the current 8-hour standard, statewide.

Generally, there has been a decline in ozone levels over the past twenty-five years based on one-hour data. This downward trend is the result of emission controls on vehicles and a regional strategy controlling of NOx emissions from large stationary internal combustion engines, large boilers and turbines used in power plants and other industrial applications.

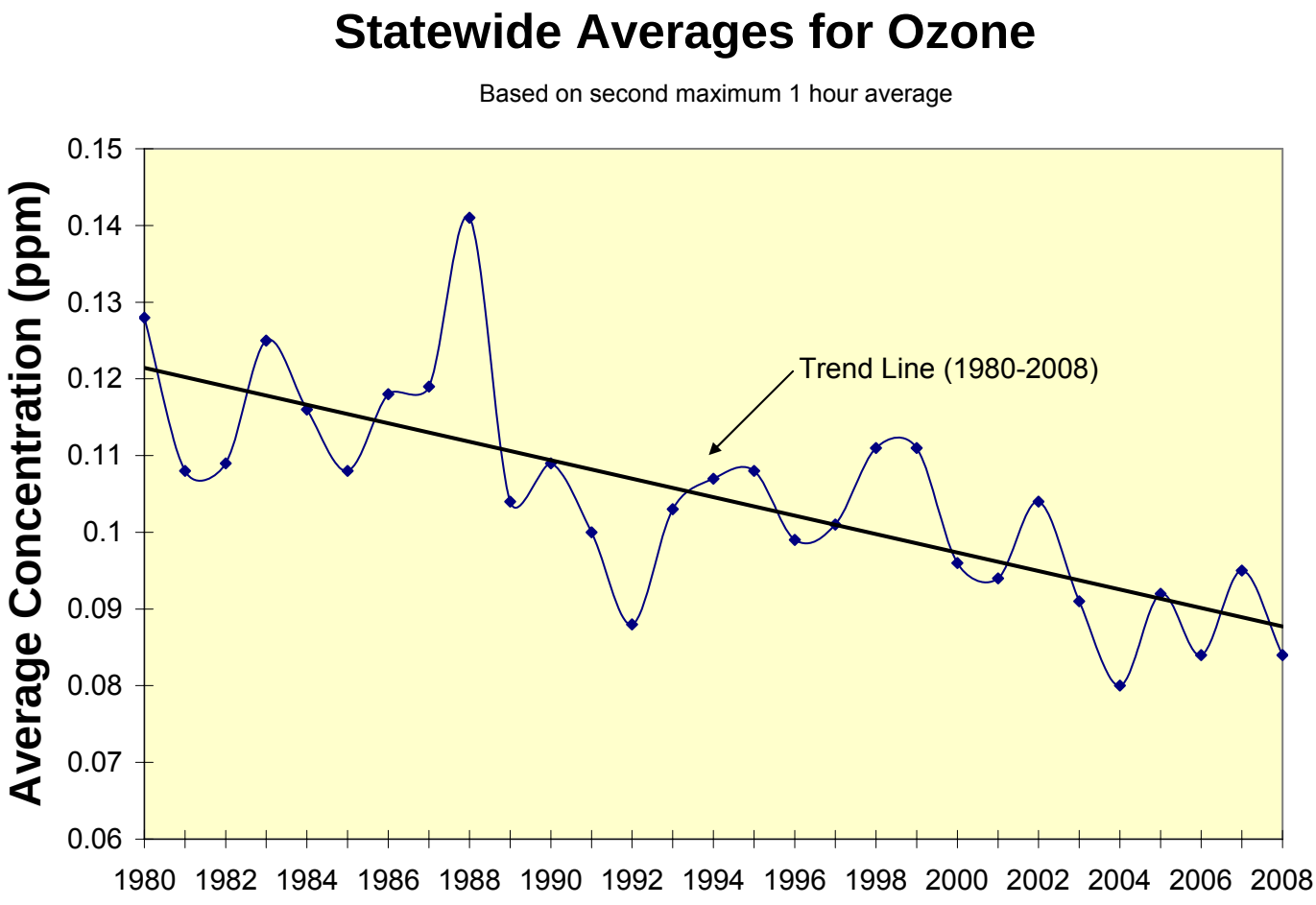


Figure 35: Statewide averages for ozone monitoring indicate pollution reductions.

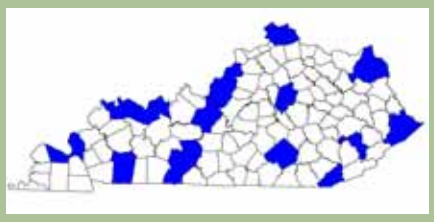
National Ambient Air Quality Standards for Ozone

Primary NAAQS: **8-Hour Concentration (3 year avg. of 4th max.) not to exceed 0.075 ppm**

Secondary NAAQS: **Same as Primary Standard.**

Criteria Pollutant Summary Report – 2008

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



County	Site Address	AQS-ID	Valid Days Meas.	8-Hr Average				
				Obs> 0.075	1st max	2nd max	3rd max	4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	244	2	.078	.077	.075	.070
Boone	KY 338 & Lower River East Bend	21-015-0003	241	0	.065	.064	.064	.064
Boyd	2924 Holt Street Ashland	21-019-0017	242	3	.080	.079	.077	.073
Bullitt	2nd & Carpenter St Shepherdsville	21-029-0006	241	2	.087	.076	.072	.069
Campbell	524A John Hill Rd Highland Heights	21-037-3002	242	2	.084	.083	.075	.075
Carter	Camp Webb Grayson Lake	21-043-0500	235	2	.082	.078	.075	.072
Christian	10800 Pilot Rock Hopkinsville	21-047-0006	242	0	.072	.072	.069	.069
Daviess	US 60 and Pleasant Valley Owensboro	21-059-0005	243	1	.080	.074	.072	.072
Edmonson[1]	Alfred Cook Road Mammoth Cave	21-061-0501	243	0	.073	.073	.071	.070
Fayette	650 Newtown Pike Lexington	21-067-0012	240	1	.078	.071	.070	.070
Greenup	Scott & Center St Worthington	21-089-0007	244	2	.077	.076	.075	.074
Hancock	2nd & Caroline Lewisport	21-091-0012	234	0	.075	.074	.073	.072
Hardin	801 North Miles St Elizabethtown	21-093-0006	245	2	.077	.076	.075	.074
Henderson	Baskett Fire Dept. Baskett	21-101-0014	237	1	.077	.074	.074	.074
Jefferson[2]	7601 Bardstown Rd Louisville	21-111-0027	228	2	.076	.076	.074	.072
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	242	2	.083	.082	.075	.075
Jefferson[2]	1918 Mellwood Ave Louisville	21-111-1021	242	1	.089	.069	.068	.068

Ozone Criteria Pollutant Summary Report – 2008 Continued

County	Site Address	AQS-ID	Valid Days Meas.	8-Hr Average				
				Obs> 0.075	1st max	2nd max	3rd max	4th max
Jessamine	KYDOT, Etter Drive Nicholasville	21-113-0001	243	0	.075	.071	.070	.069
Kenton	1401 Dixie Highway Covington	21-117-0007	242	2	.080	.077	.074	.073
Livingston	KYDOT 811 US 60E Smithland	21-139-0003	245	0	.069	.066	.065	.065
McCracken	2901 Powell Street Paducah	21-145-1024	245	0	.074	.072	.072	.071
Oldham	DOT Garage, 3995 Morgan Buckner	21-185-0004	238	4	.089	.080	.080	.077
Perry	Perry Co Horse Park Hazard	21-193-0003	243	0	.075	.074	.073	.073
Pike	101 North Mayo Trail Pikeville	21-195-0002	245	0	.075	.074	.074	.071
Pulaski	Clifty Street Somerset	21-199-0003	244	0	.072	.068	.067	.066
Simpson	KYDOT, HWY 1008 Franklin	21-213-0004	245	0	.075	.075	.072	.071
Warren	Oakland Elementary School Oakland	21-227-0008	243	0	.073	.069	.069	.068

[1] Monitor operated by the National Park Service at Mammoth Cave.
[2] Ozone monitors located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Ozone Criteria Pollutant Multi-year Summary Report – 2008
8-hour 4th Maximum 3 Year Average

County	Site Address	AQS-ID	2006 4th max	2007 4th max	2008 4th max	3 year Avg. 4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	0.066	0.071	0.070	**0.069**
Boone	KY 338 & Lower River Road EastBend	21-015-0003	0.071	0.078	0.064	**0.071**
Boyd	2924 Holt Street Ashland	21-019-0017	0.079	0.072	0.073	**0.075**
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	0.071	0.078	0.069	**0.073**
Campbell	524A John Hill Highland Heights	21-037-3002	NA	0.086	0.075	**0.081**
Carter	Camp Webb Grayson	21-043-0500	0.065	0.072	0.072	**0.070**
Christian	10800 Pilot Hopkinsville	21-047-0006	0.076	0.089	0.069	**0.078**
Daviess	US 60 & Pleasant Valley Rd Owensboro	21-059-0005	0.075	0.086	0.072	**0.078**
Edmonson[1]	Alfred Cook Road Mammoth Cave	21-061-0501	0.071	0.082	0.070	**0.074**
Fayette	650 Newtown Pike Lexington	21-067-0012	0.068	0.077	0.070	**0.072**
Greenup	Scott & Center Streets Worthington	21-089-0007	0.077	0.079	0.074	**0.077**
Hancock	2nd & Caroline Streets Lewisport	21-091-0012	0.076	0.081	0.072	**0.076**
Hardin	801 North Miles Street Elizabethtown	21-093-0006	0.074	0.083	0.074	**0.077**
Henderson	Baskett Fire Dept Baskett	21-101-0014	0.074	0.083	0.074	**0.077**
Jefferson[2]	7601 Bardstown Road Louisville	21-111-0027	0.074	0.086	0.072	**0.077**
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	0.077	0.085	0.075	**0.079**
Jefferson[2]	1918 Mellwood Avenue Louisville	21-111-1021	0.067	0.079	0.068	**0.071**
Jessamine	KYDOT, Etter Drive Nicholasville	21-113-0001	0.072	0.080	0.069	**0.074**
Kenton	1401 Dixie Highway Covington	21-117-0007	0.075	0.085	0.073	**0.078**
Livingston	KYDOT, 811 US 60 East Smithland	21-139-0003	0.071	0.078	0.065	**0.071**
McCracken	2901 Powell Street Paducah	21-145-1024	0.075	0.079	0.071	**0.075**
Oldham	DOT Garage, Morgan Rd. Buckner	21-185-0004	0.083	0.084	0.077	**0.081**
Perry	Perry County Horse Park Hazard	21-193-0003	0.072	0.076	0.073	**0.074**
Pike	101 North Mayo Trail Pikeville	21-195-0002	0.063	0.079	0.071	**0.071**
Pulaski	Clifty Street Somerset	21-199-0003	0.064	0.076	0.066	**0.069**
Simpson	KYDOT, HWY 1008 Franklin	21-213-0004	0.076	0.081	0.071	**0.076**
Warren	Oakland Elementary School Oakland	21-227-0008	0.068	0.077	0.068	**0.071**

[1] Monitor operated by the National Park Service at Mammoth Cave.[2] Ozone monitors located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

PARTICULATE MATTER ($PM_{2.5}$)

Particulate Matter ($PM_{2.5}$) Ambient Air Monitoring Network

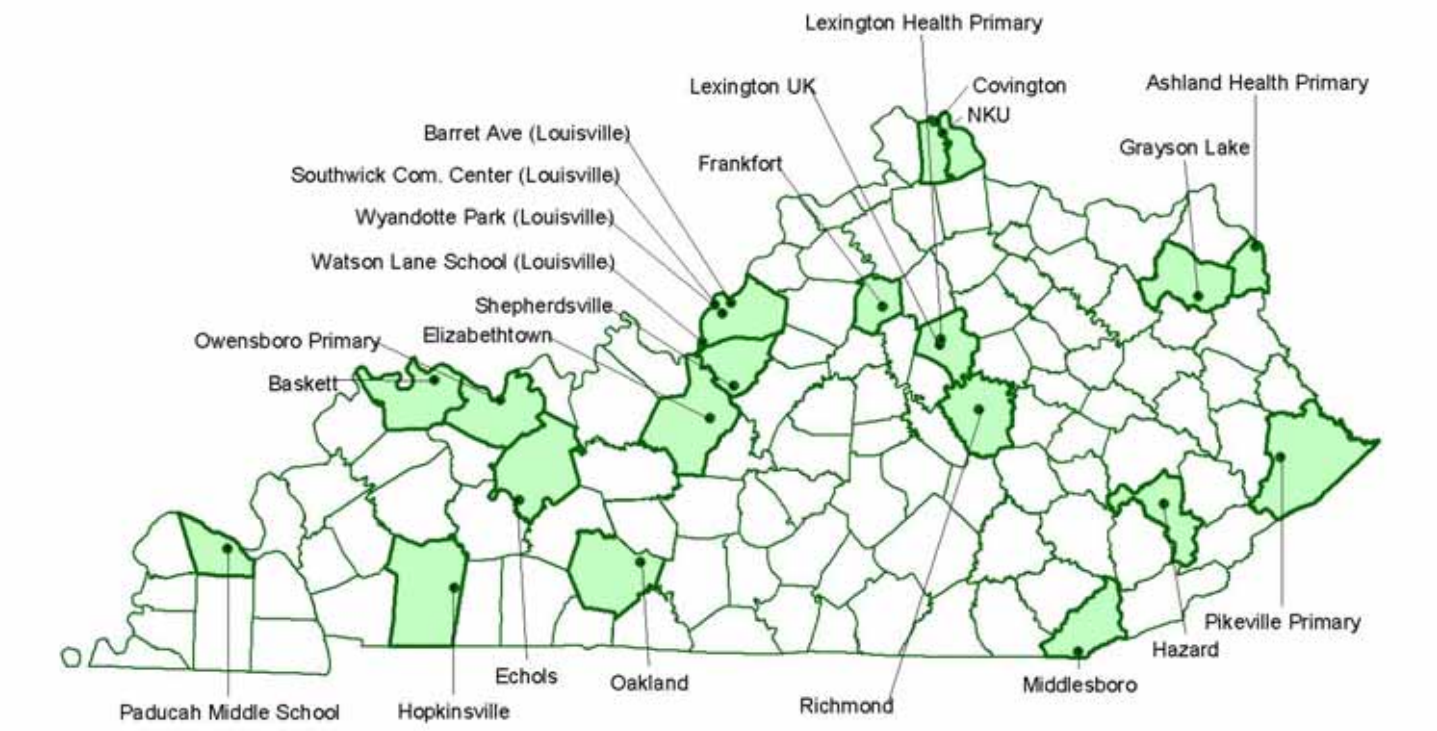


Figure 36: $PM_{2.5}$ monitoring locations in Kentucky.

Particulate Matter ($PM_{2.5}$) is a mixture of solid particles and liquid droplets that are 2.5 microns or smaller in size. Sources of $PM_{2.5}$ include power plants, wood burning, industrial processes, and fuel combustion. Fine particulates are also formed in the atmosphere when gases are transformed through chemical reactions. Sulfur dioxide, nitrogen oxides and VOCs are all examples of gases that can transform by chemical reactions.

Environmental Impacts

Particulate matter of 2.5 microns or less has the ability to penetrate into the deepest parts of the lungs, causing chronic respiratory symptoms in sensitive populations and premature deaths in the elderly. $PM_{2.5}$ also affects the environment by reducing visibility (up to 70% in some areas of the U.S.) and contributing to acid rain.

How is $PM_{2.5}$ monitored?

Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitors must be used for NAAQS comparisons. FRM, FEM or continuous Tapered Element Oscillating Microbalance (TEOM) monitors may be used for daily $PM_{2.5}$ Air Quality Index (AQI) results. TEOM samplers determine sample weights electronically and transmit results into an automated data storage system. Currently, TEOM monitors are not FRM or FEM equivalent. FRM and FEM $PM_{2.5}$ is monitored by an intermittent type sampler and the continuous 24-hour, 1-hour average measurement, FEM Beta Attenuation Mass Monitor (BAM-1020).

The intermittent-type monitors collect a sample over a 24-hour run cycle. While most samplers operate every third day, some operate every sixth day and some every day. These samplers operate by drawing a measured volume of air through a pre-weighed filter. Before reaching the filter, the 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 removed from the sampler and reweighed to determine the mass of the particulates collected. In 2008, the DAQ, the NPS at Mammoth Cave and the LMAPCD operated a network of 24 samplers.

Results

There were three exceedances of the 24-hour $PM_{2.5}$ standard and zero exceedances of the annual standard in 2008.

Zero samplers exceeded the three year 24-hour (2005-2007) standard and seven samplers exceeded the three year (2005-2007) annual standard. This is a significant accomplishment.

Generally, statewide $PM_{2.5}$ levels have declined from 2000-2008 time period with a slight increase in 2005 and 2007.

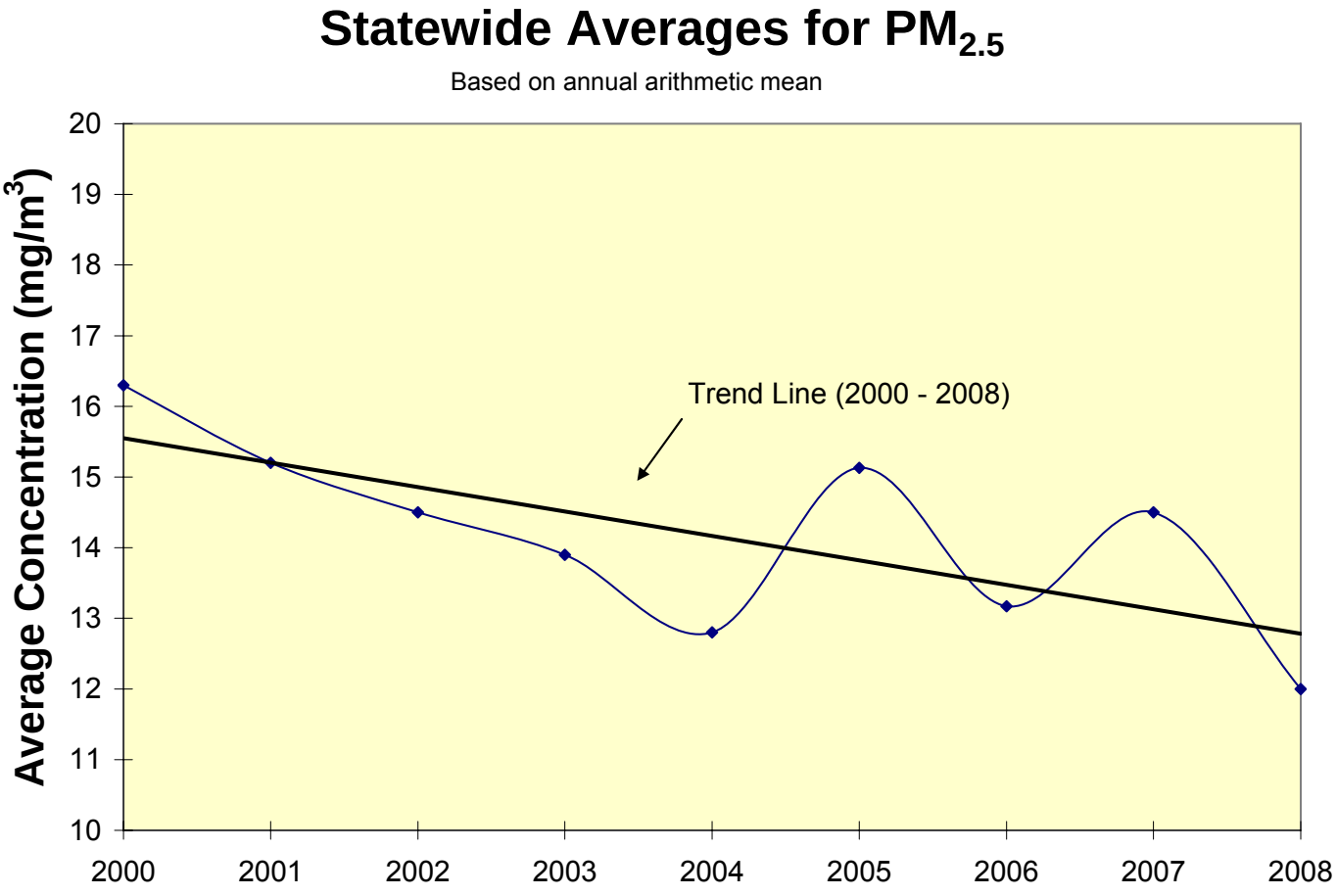


Figure 37: Statewide averages for $PM_{2.5}$ monitoring indicate pollution reductions.

National Ambient Air Quality Standards for Particulate Matter $PM_{2.5}$

Primary NAAQS: **Annual Arithmetic Mean not to exceed 15 mg/m^3 (based on a three-year avg.).**
24-hour Concentration not to exceed 35 mg/m^3. (based on a three-year average of the 98th percentiles).

Secondary NAAQS: **Same as Primary Standard.**

Criteria Pollutant Summary Report – 2008

Pollutant: **Particulate Matter $PM_{2.5}$**
Method: Gravimetric
Data Interval: 24-hour
Units: Micro-grams per cubic meter (mg/m^3)

County	Site	AQS-ID	# Obs	Mean	24-Hour Average				
					Obs >35	1st max	2nd max	3rd max	4th max
Bell	34th & Dorchester Middlesboro	21-013-0002	59	12.53	0	30.3	24.4	23.1	23.1
Boyd	2924 Holt Street Ashland	21-019-0017	121	12.06	0	27.8	25.8	24.3	23.8
Bullitt	2nd & Carpenter Street Shepherdsville	21-029-0006	121	12.84	0	29.3	25.9	25.4	24.8
Campbell	524A John Hill Rd Highland Heights	21-037-3002	119	11.83	0	30.5	27.3	26.1	24.4
Carter	Camp Webb Grayson Lake	21-043-0500	121	10.25	0	25.2	24.5	22.6	21.2
Christian	10800 Pilot Rock Hopkinsville	21-047-0006	117	11.90	0	28.4	27.9	27.2	26.7
Daviess	US 60 and Pleasant Valley Rd Owensboro	21-059-0014	115	11.99	0	28.9	24.6	24.4	23.4
Fayette	650 Newtown Pike Lexington	21-067-0012	119	12.09	0	26.0	23.6	23.5	23.0
Fayette	533 South Limestone Lexington	21-067-0014	116	12.10	0	28.8	24.6	22.7	22.4
Franklin	803 Schenkel Lane Frankfort	21-073-0006	119	11.45	0	27.8	24.5	23.2	22.7
Hardin	801 North Miles Street Elizabethtown	21-093-0006	110	12.22	0	25.9	25.4	25.2	24.6
Henderson	Basket Fire Dept Baskett	21-101-0014	113	11.92	0	25.5	25.0	24.3	23.8

$PM_{2.5}$ Criteria Pollutant Summary Report – 2008 Continued

County	Site	AQS-ID	# Obs	Mean	24-Hour Average				
					Obs >35	1st max	2nd max	3rd max	4th max
Jefferson[2]	37th & Southern Avenue Louisville	21-111-0043-01	333	13.17	1	35.6	32.5	31.9	31.6
Jefferson[2]	37th & Southern Avenue Louisville	21-111-0043-02	328	13.01	0	34.7	31.9	31.6	31.3
Jefferson[2]	1032 Beecher Avenue Louisville	21-111-0044	342	13.41	2	36.2	35.9	31.9	31.8
Jefferson[2]	850 Barret Avenue Louisville	21-111-0048	116	13.44	1	35.0	31.3	30.7	25.1
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	57	12.78	0	30.3	28.6	24.6	24.4
Kenton	1401 Dixie Highway Covington	21-117-0007	121	11.99	0	30.5	27.3	25.2	25.0
McCracken	342 Lone Oak Road Paducah	21-145-1004	117	11.80	0	26.4	25.7	25.3	25.3
Madison	Mayfield School Richmond	21-151-0003	119	10.45	0	25.3	23.5	23.5	20.8
Ohio	Keytown Road Echols	21-183-0032	60	12.07	0	28.0	25.4	24.1	21.4
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	10.97	0	22.5	20.0	16.5	14.8
Pike	101 North Mayo Trail Pikeville	21-195-0002	85	10.49	0	25.8	21.2	19.7	18.0
Warren	Oakland Elementary Oakland	21-227-0008	115	12.16	0	29.2	28.9	28.6	25.3

[1] Sampler operated by the National Park Service at Mammoth Cave.

[2] $PM_{2.5}$ samplers located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Values in blue are incomplete data sets. The mean does not satisfy summary criteria.

Values in red are a visual representation of an exceedances of the 24-hour, 98th percentile.

$PM_{2.5}$ Criteria Pollutant Multi-year Summary Report – 2008
24-hour 98th Percentile, 3 Year Average

County	Site	AQS-ID	2006 98th %	2007 98th %	2008 98th %	3 year Avg. 98th %
Bell	34th & Dorchester Middlesboro	21-013-0002	25.7	29.5	24.4	26.5
Boyd	2924 Holt Street Ashland	21-019-0017	28.6	38.5	24.3	30.5
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	33.5	35.1	25.4	31.3
Campbell	524A John Hill Highland Heights	21-037-3002		34.0	26.1	NA
Carter	Camp Webb Grayson Lake	21-043-0500	25.5	30.9	22.6	26.3
Christian	10800 Pilot Rock Road Hopkinsville	21-047-0006	30.3	35.5	27.2	31.0
Daviess	US 60 and Pleasant Valley Rd Owensboro	21-059-0005	30.0	34.9	24.4	29.8
Fayette	650 Newtown Pike Lexington	21-067-0012	30.4	33.7	23.5	29.2
Fayette	533 South Limestone Lexington	21-067-0014	32.2	32.0	22.7	29.0
Franklin	803 Schenkel Lane Frankfort	21-073-0006	28.1	35.3	23.2	28.9
Hardin	801 North Miles Street Elizabethtown	21-093-0006	31.8	38.4	25.2	31.8
Henderson	Baskett Fire Dept Baskett	21-101-0014	28.9	31.4	24.3	28.2
Jefferson[2]	37th & Southern Avenue Louisville	21-111-0043	36.0	34.1	28.7	32.9
Jefferson[2]	1032 Beecher Avenue Louisville	21-111-0044	36.3	33.5	29.5	33.1
Jefferson[2]	850 Barrett Avenue Louisville	21-111-0048	36.7	31.9	30.7	33.1
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	32.5	32.5	28.6	31.2
Kenton	1401 Dixie Highway Covington	21-117-0007	32.6	31.6	25.2	29.8
McCracken	342 Lone Oak Road Paducah	21-145-1004	36.7	33.9	25.3	32.0
Madison	Mayfield School Richmond	21-151-0003	28.2	31.9	23.5	27.9
Ohio	Keytown Rd. Echols	21-183-0032	24.2	38.6	25.4	29.4
Perry	Perry County Horse Park Hazard	21-193-0003	26.9	31.2	22.5	26.9
Pike	101 North Mayo Trail Pikeville	21-195-0002	29.4	33.0	21.2	27.9
Warren	Kereiakes Park Bowling Green	21-227-0007	34.8	38.0	NA	NA
Warren	Oakland Elementary Oakland	21-227-0008	NA	37.5	28.6	NA

[1] Sampler operated by the National Park Service at Mammoth Cave.

[2] PM2.5 samplers located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Values in blue are incomplete data sets. There is not enough data for an annual or three year average

Values in red are a visual representation of an exceedances of the 24-hour, 98th percentile.

$PM_{2.5}$ Criteria Pollutant Multi-year Summary Report – 2008
Annual Arithmetic Mean, 3 Year Average

County	Site	AQS-ID	2006 mean	2007 mean	2008 mean	3 year Avg.
Bell	34th & Dorchester Middlesboro	21-013-0002	13.75	15.24	12.53	13.84
Boyd	2924 Holt Street Ashland	21-019-0017	13.76	14.34	12.06	13.39
Bullitt	2nd & Carpenter Streets Shepherdsville	21-029-0006	14.14	15.14	12.84	14.04
Campbell	524A John Hill Highland Heights	21-037-3002		14.36	11.83	NA
Carter	Camp Webb Grayson Lake	21-043-0500	11.49	12.81	10.25	11.52
Christian	10800 Pilot Rock Road Hopkinsville	21-047-0006	12.63	13.99	11.90	12.84
Daviess	US 60 and Pleasant Valley Rd Owensboro	21-059-0005	13.05	14.17	11.99	13.07
Fayette	650 Newtown Pike Lexington	21-067-0012	13.67	14.39	12.09	13.38
Fayette	533 South Limestone Lexington	21-067-0014	13.86	14.12	12.10	13.36
Franklin	803 Schenkel Lane Frankfort	21-073-0006	12.43	13.54	11.45	12.47
Hardin	801 North Miles Street Elizabethtown	21-093-0006	13.23	14.36	12.22	13.27
Henderson	Baskett Fire Dept Baskett	21-101-0014	13.35	14.15	11.92	13.14
Jefferson[2]	37th & Southern Avenue Louisville	21-111-0043	14.96	15.09	13.17	14.41
Jefferson[2]	1032 Beecher Avenue Louisville	21-111-0044	15.18	14.85	13.41	14.48
Jefferson[2]	850 Barrett Avenue Louisville	21-111-0048	13.87	14.96	13.44	14.09
Jefferson[2]	7201 Watson Lane Louisville	21-111-0051	13.67	15.37	12.78	13.94
Kenton	1401 Dixie Highway Covington	21-117-0007	13.29	13.99	11.99	13.09
McCracken	342 Lone Oak Road Paducah	21-145-1004	13.61	13.89	11.80	13.10
Madison	Mayfield School Richmond	21-151-0003	12.31	13.32	10.45	12.03
Ohio	Keytown Road Echols	21-183-0032	12.67	14.40	12.07	13.05
Perry	Perry County Horse Park Hazard	21-193-0003	12.36	14.03	10.97	12.45
Pike	101 North Mayo Trail Pikeville	21-195-0002	13.44	14.19	10.49	12.71
Warren	Kereiakes Park Bowling Green	21-227-0007	13.83	16.63	NA	NA
Warren	Oakland Elementary Oakland	21-227-0008		12.54	12.16	12.35

[1] Sampler operated by the National Park Service at Mammoth Cave.

[2] PM2.5 samplers located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Values in blue are incomplete data sets. There is not enough data for an annual or three year average

Values in red are a visual representation of an exceedances of the 24-hour, 98th percentile.

PARTICULATE MATTER ($PM_{2.5}$): SPECIATION

Particulate Matter ($PM_{2.5}$) Speciation Ambient Air Monitoring Network

Figure 38: $PM_{2.5}$ speciation monitoring locations in Kentucky.

The promulgation of the new $PM_{2.5}$ standards may require all future areas not meeting the standards to reduce emissions of fine particulates and their precursors. Efficient air quality management requires knowing which sources contribute to the problem and estimating how much. However, determining $PM_{2.5}$ source contributions is complicated due to the fact that often half or more of the $PM_{2.5}$ mass is composed of secondarily formed species, therefore hiding their point of origin. In addition, $PM_{2.5}$ may remain in the atmosphere for several days enabling sources several hundred miles away to affect an area. Realizing this, EPA established the Speciation Trends Network designed to assist in identifying the compounds associated with fine particulates. The network is used to provide data on a target group of chemical species known to be significant contributors to $PM_{2.5}$ mass. The data provided by the network can be used to support several areas that include:

- Assisting the implementation of the $PM_{2.5}$ standard by using speciated data as input to air quality modeling analyses and as indicators to track progress of controls.
- Aiding the interpretation of health studies by linking effect to $PM_{2.5}$ constituents.
- Understanding the effect of atmospheric constituents on visibility impairment.
- Using the speciated particulate data to aid in monitoring network design and siting adjustment.

How is $PM_{2.5}$ speciation monitored?

The approach to be used for chemical speciation involves both sampling and analysis components. The target groups of chemical species include a list of analytes that consist of an array of cations, anions, carbon species, and trace elements. Because no one sample media is capable of providing the appropriate sample collection for all of the target analytes, each series of analytes requires

sample collection on the appropriate media and utilization of the appropriate analytical techniques.

Listed below are the target analytes and the analytical techniques used:

- **Trace Elements** -X-ray fluorescence and particle induced X-ray emission
- **Anion and Cations** -Ion chromatography
- **Carbon** -Controlled-combustion/thermal optical

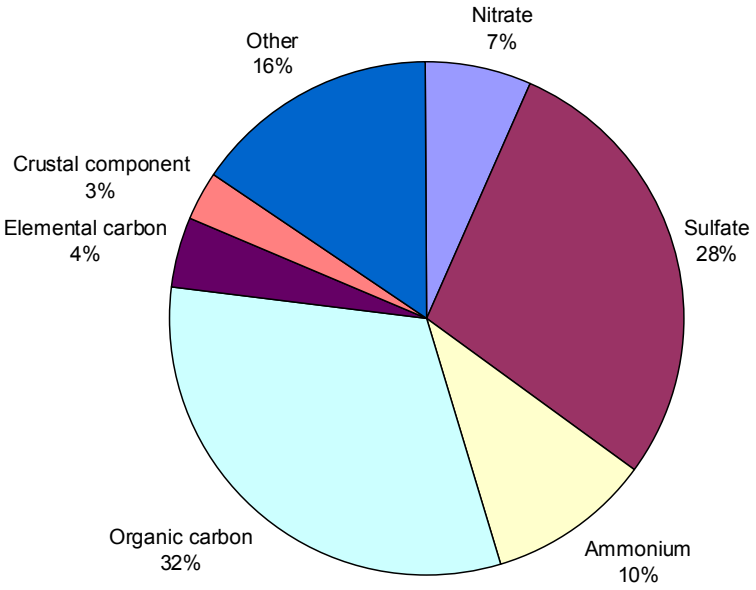
Once analysis is complete, the analytes are grouped into the target chemical species listed below. These species in turn can be linked to source categories that ultimately can be used to assist in understanding $PM_{2.5}$ and developing control strategies needed to reduce ambient levels.

- Nitrate (total)
- Sulfate
- Ammonium
- Organic Carbon
- Elemental Carbon
- Crustal Component (trace elements, fine soil)
- Other (PM2.5 mass unaccounted for by analytical methods)

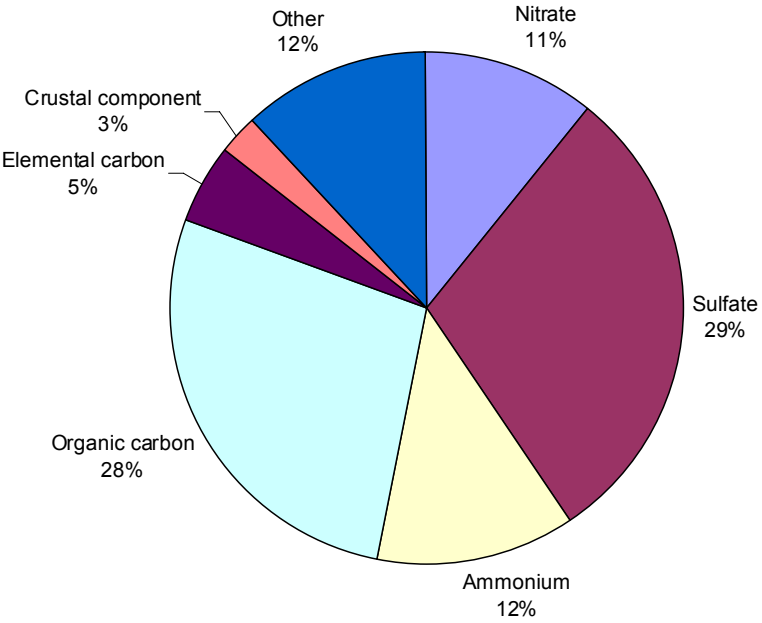
Results

In 2008, the Kentucky Division for Air Quality operated a network of four Speciation Trends Network monitors and the Louisville Metro Air Pollution Control District operated one monitor. The sites are strategically located to address different types of land use ranging from heavy industrial, urban, and rural. The charts on the following pages provide a visual representation of speciation data collected at each site during 2008. The data suggests that sulfate and organic carbon are the primary contributors to $PM_{2.5}$ in Kentucky. Sulfates are formed from sulfur dioxide emissions with the major sources of those emissions being coal-fired power plants. Organic carbon comes from a combination of mobile and stationary combustion sources.

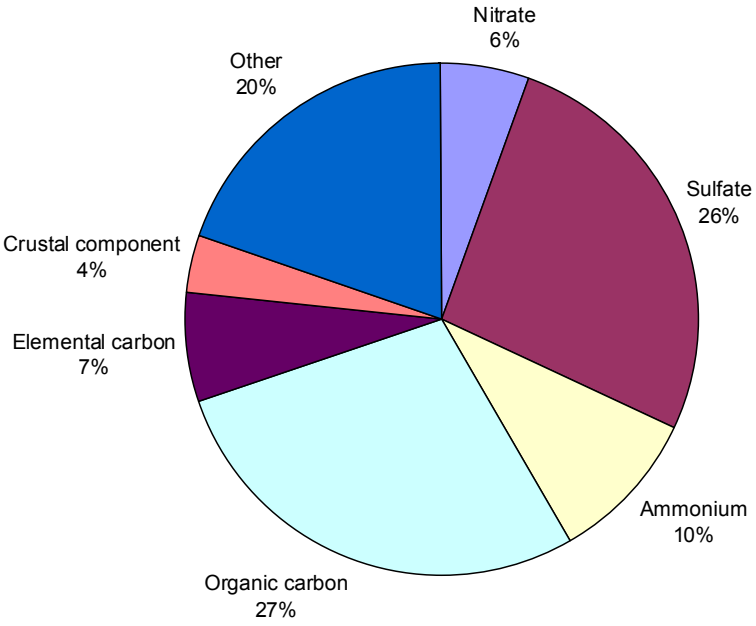
Ashland Health Department
AIRS Code 210190017 POC 5 (ROUTINE)
Date(s): 1/1/2008 - 12/26/2008
Average Concentration (µg/m³)



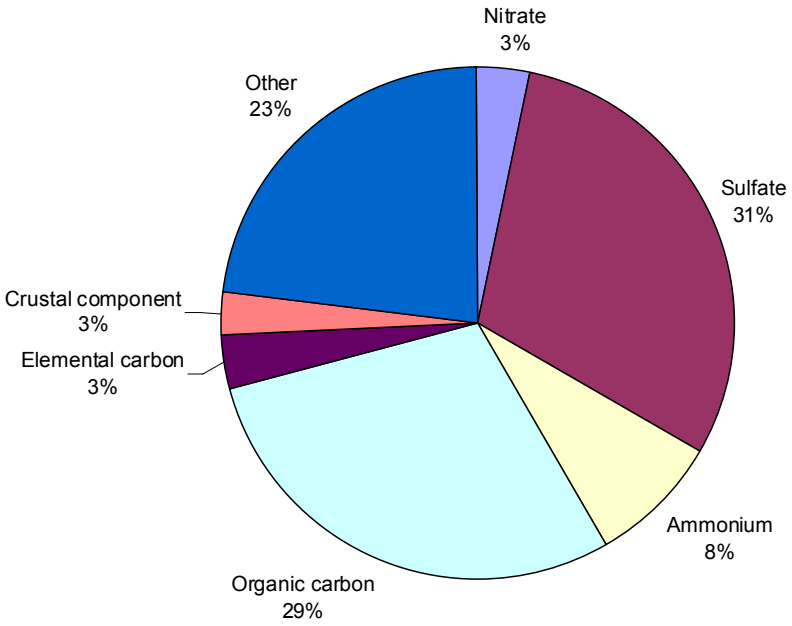
Covington - University College
AIRS Code 211170007 POC 5 (ROUTINE)
Date(s): 1/1/2008 - 12/26/2008
Average Concentration (µg/m³)



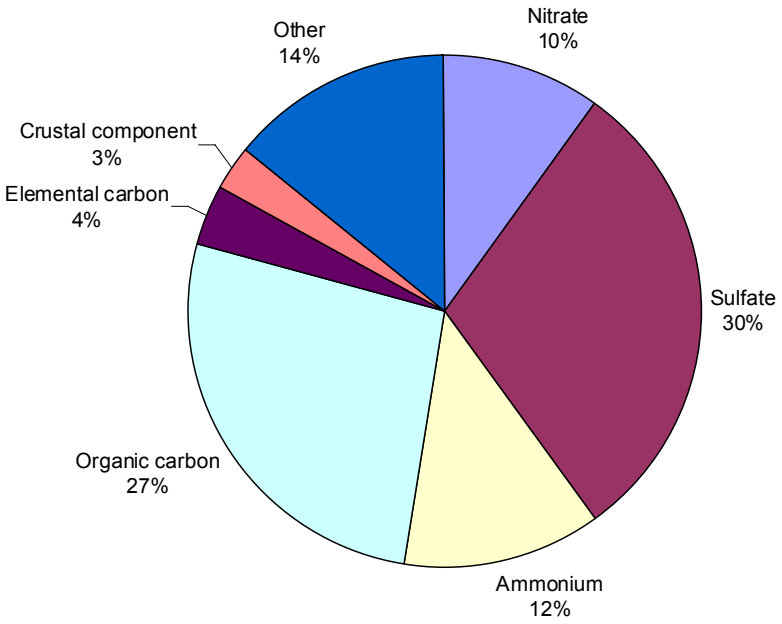
Hazard - Perry County Horse Park
AIRS Code 211930003 POC 5 (ROUTINE)
Date(s): 1/1/2008 - 5/30/2008
Average Concentration (µg/m³)



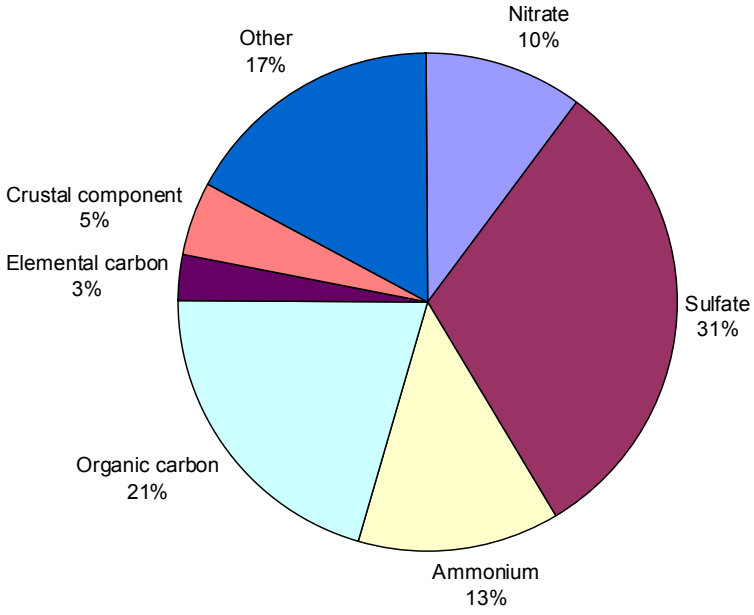
Grayson
AIRS Code 210430500 POC 5 (ROUTINE)
Date(s): 7/1/2008 - 12/26/2008
Average Concentration (µg/m³)



Lexington Health Department
AIRS Code 210670012 POC 5 (ROUTINE)
Date(s): 1/1/2008 - 12/26/2008
Average Concentration (µg/m³)



Southwick Community Center
AIRS Code 211110043 POC 5 (ROUTINE)
2008
Average Concentration (µg/m³)



Particulate Matter (PM_{10}) Ambient Air Monitoring Network

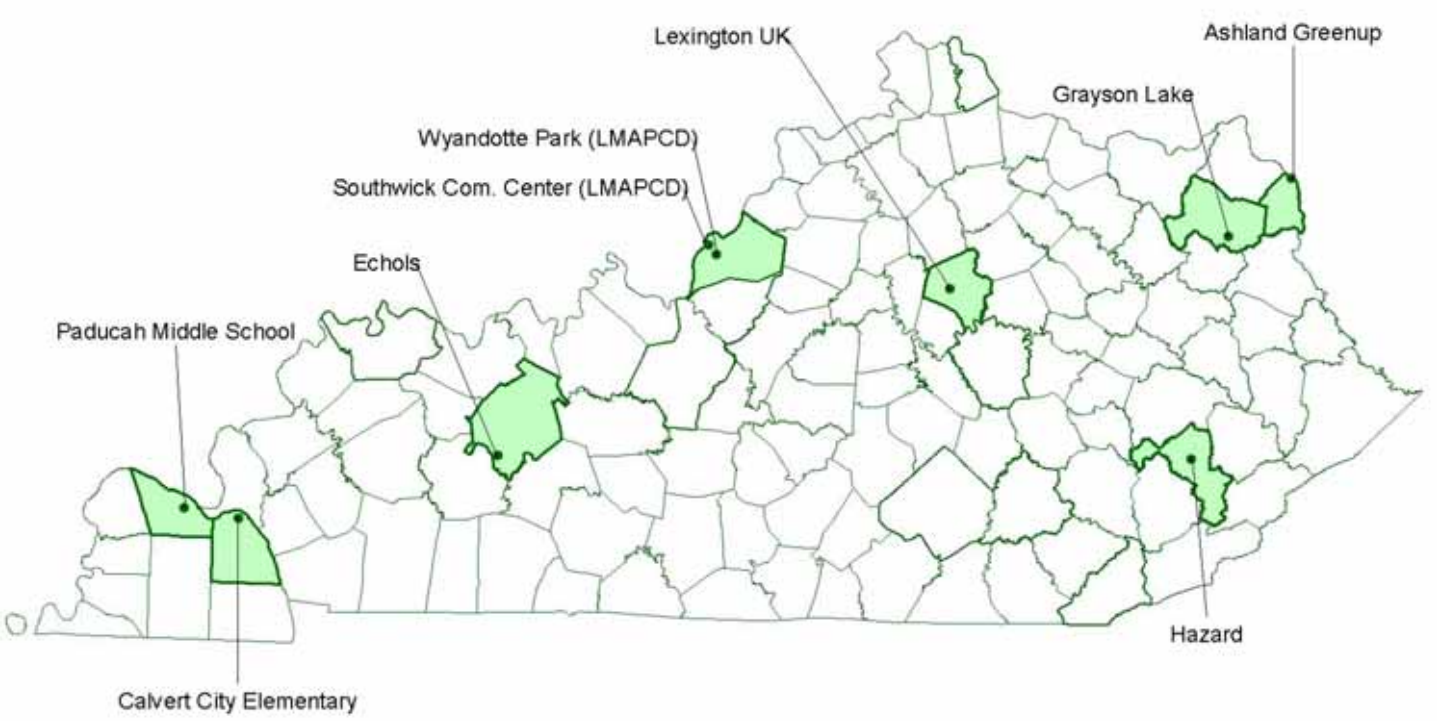


Figure 39: PM_{10} monitoring locations in Kentucky.

Particulate Matter of 10 microns or less in diameter (PM_{10}) is a mixture of solid particles and liquid droplets. Some common sources of PM_{10} are prescribed fires, construction activities, agricultural practices and smokestacks.

Environmental Impacts

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. PM_{10} damages vegetation by interfering with plant photosynthesis due to the formation of a film on leaves that reduces exposure to sunlight.

Particulate pollution can also produce haze, which diminishes visibility and the amount of sunlight reaching the earth.

How is PM_{10} monitored?

For PM_{10} NAAQS comparison, both intermittent and continuous monitor types may be used because they are FRM or FEM equivalent. Most PM_{10} samplers are the intermittent type that operates for 24 hours, every sixth day. These samplers operate by drawing a measured volume of air through 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 air stream 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 network also includes five continuously operating PM_{10} samplers that provide results daily. These samplers determine sample weights electronically and transmit results by telemetry into an automated data storage system. In 2008, the DAQ and the LMAPCD operated a combined network of ten PM_{10} samplers in Kentucky.

Results

There were no exceedances of the annual PM_{10} standard in 2008. The last PM_{10} exceedance occurred on January 7, 2000, at a Louisville site (21-111-0043) where a 24-hour sample measured 152 µg/m^3. The only other exceedance of a PM_{10} standard occurred on August 27, 1990, in Ashland, where a 24-hour value measured 182 µg/m^3.

All Kentucky counties are currently in attainment with the PM_{10} standard. Statewide and regional PM_{10} levels have shown declining trends. This downward trend is the result of controls on industrial sources for particulate matter.

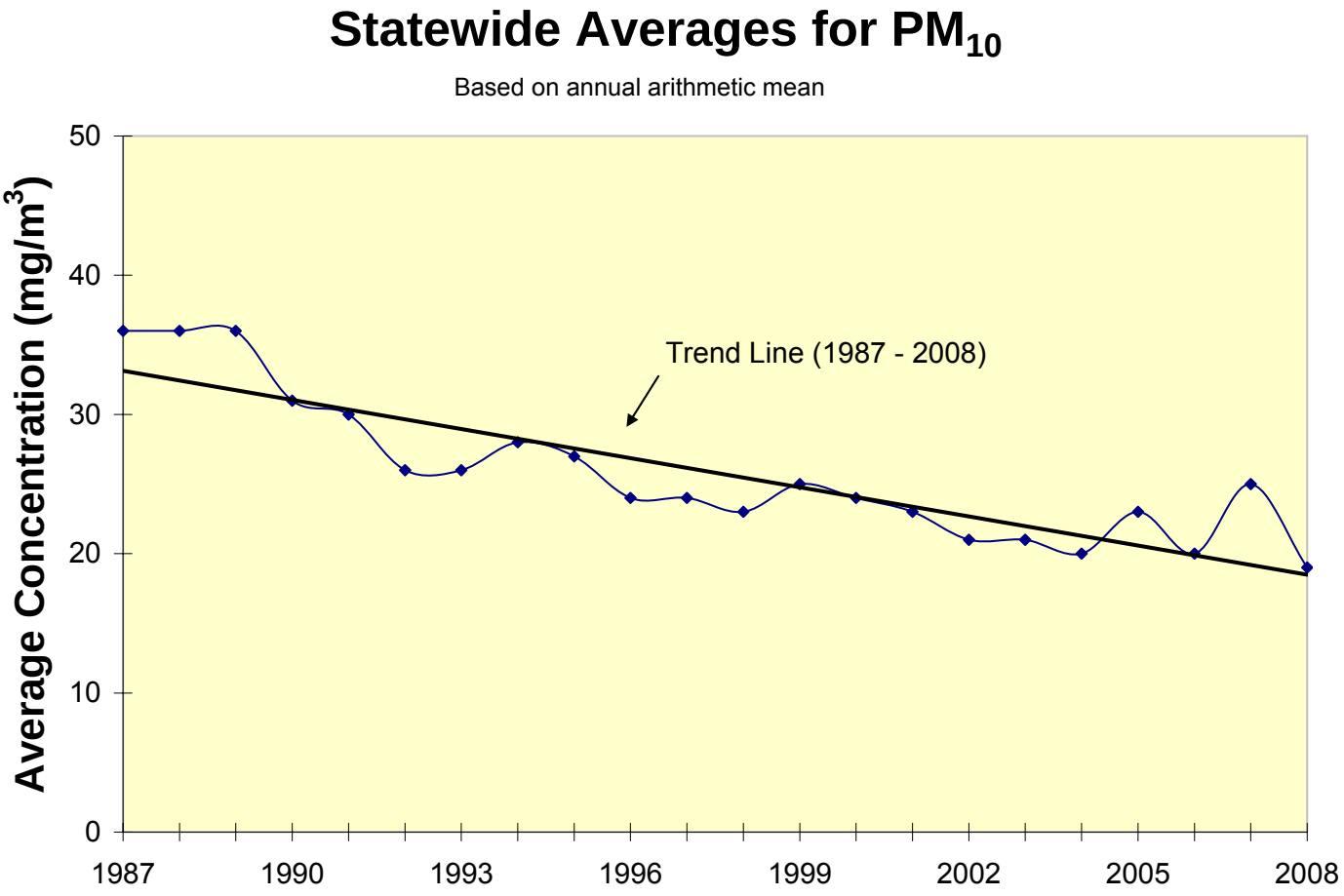


Figure 40: Statewide averages for PM_{10} monitoring indicate pollution reductions.

National Ambient Air Quality Standards for Particulate Matter PM_{10}

Primary NAAQS: **Maximum 24-hour concentration of 150 mg/m^3. Average number of expected exceedances per year not to exceed 1 over last 3 years.**

Secondary NAAQS: **Same as Primary Standard.**

Criteria Pollutant Summary Report – 2008

Pollutant: **Particulate Matter PM_{10}**
Method: Gravimetric
Data Interval: 24-hour
Units: Micro-grams per cubic meter (µg/m^3) (25°C)

County	Site	AIRS-ID	# Obs	Mean	24-hour Average				
					Obs >150	1st max	2nd max	3rd max	4th max
Boyd	122 22nd Street Ashland	21-019-0002	61	30.6	0	117	87	79	76
Carter	Camp Webb Grayson Lake	21-043-0500	27	12.5	0	27	24	23	21
Fayette	533 South Limestone Lexington	21-067-0014	60	19.2	0	38	36	35	32
Jefferson[1]	37th & Southern Ave Louisville	21-111-0043	8161	20.6	0	50	47	47	46
Jefferson[1]	37th & Southern Ave Louisville	21-111-0043	8399	20.8	0	52	50	49	48
Jefferson[1]	1032 Beecher Avenue Louisville	21-111-0044	8670	20.3	0	56	55	49	48
McCracken	342 Lone Oak Road Paducah	21-145-1004	60	18.1	0	47	40	35	34
Marshall	24 Main Street Calvert City	21-157-0018	58	16.7	0	33	33	30	30
Ohio	Keytown Road Echols	21-183-0032	58	15.8	0	36	28	27	26
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	19.1	0	43	36	36	35

PM_{10} samplers located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

SULFUR DIOXIDE (SO_2)

Sulfur Dioxide Ambient Air Monitoring Network

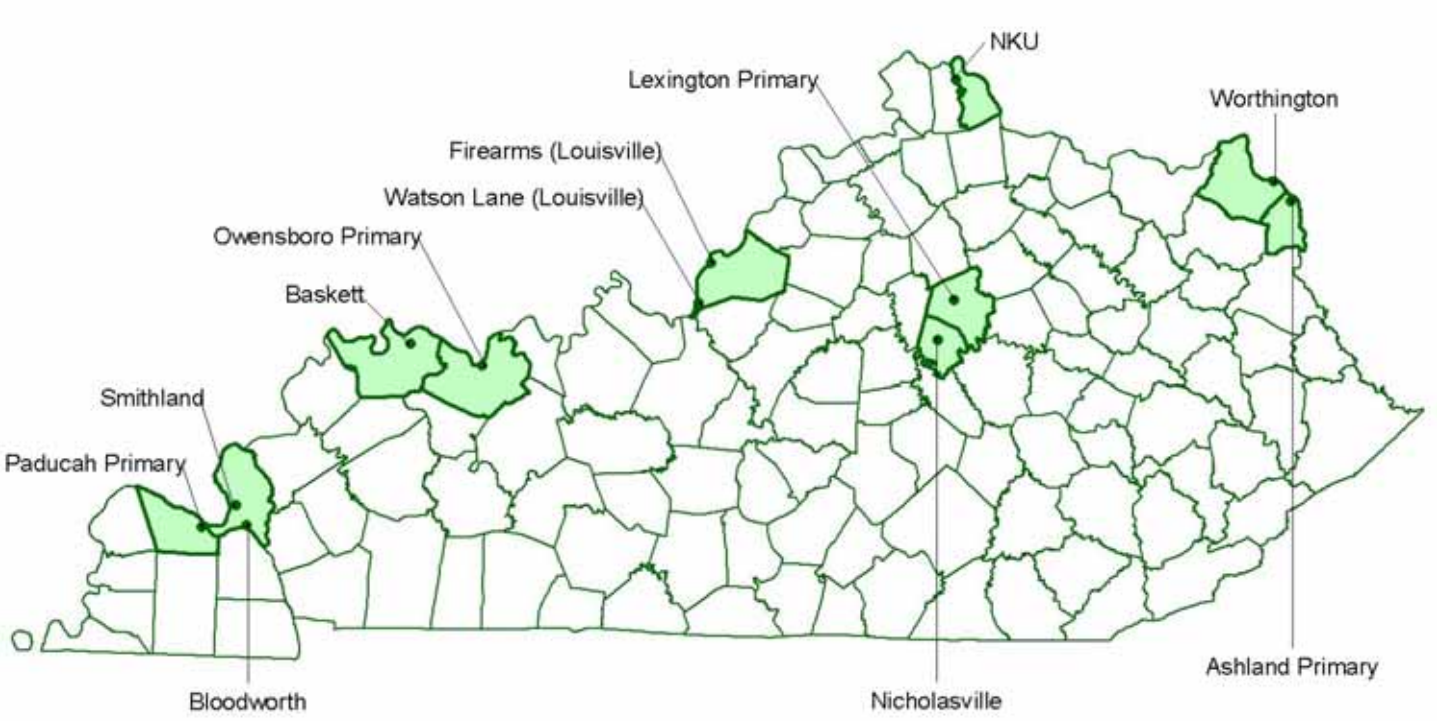


Figure 41: Sulfur dioxide monitoring locations in Kentucky

Sulfur dioxide (SO_2) is a colorless gas that has a pungent odor at concentrations exceeding 0.5 ppm. SO_2 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 SO_2. Other industrial sources include petroleum refineries and paper mills.

Environmental Impacts

The primary health effect of exposure to SO_2 is the aggravation of pre-existing respiratory, cardiovascular and pulmonary disease. Asthmatics, children and the elderly are especially susceptible to the effects of SO_2 pollution. SO_2 can also damage the foliage of trees and agricultural crops.

Moisture in the atmosphere combined with SO_2 form sulfuric acid (H_2SO_4), which is a component of acid precipitation. Acid precipitation causes acidification of soil and water that can deteriorate plant life, animal life and structural surfaces.

SO_2 may also be converted into sulfates. Sulfates are significant components of $PM_{2.5}$ and regional haze. Regional haze has been attributed to poor visibility at many of the vistas in our national parks, including Mammoth Cave National Park in Kentucky and the Great Smoky Mountains in Tennessee.

How is SO_2 monitored?

Analyzers continuously monitor SO_2 by using the ultraviolet (UV) fluorescence method. Fluorescent analyzers irradiate an ambient air sample with ultraviolet light. SO_2 molecules absorb a portion of

this energy and then re-emit the energy at a characteristic wavelength of light. The light energy emitted by the SO_2 molecules is proportional to the concentration of SO_2 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 into an automated data storage system. In 2008, the DAQ and the LMAPCD operated 12 SO_2 monitors in Kentucky.

Results

There were no exceedances of any of the SO_2 standards in 2008. The last exceedance of an SO_2 standard occurred in November 1981, when the monitor at a Louisville site (21-111-0032) recorded a 24-hour average of 0.159 ppm. Statewide and regional sulfur dioxide levels have declined over the past twenty years.

The SO_2 allowances component of the Acid Rain Program provides an opportunity for electrical utilities to participate in a market-based trade of SO_2 emissions. An electric utility, that is participating in the trading program, is required to continually monitor emissions for SO_2, NO_x and any other pollutants. The continuous monitoring of the emissions provides compliance data and credibility to the trading program. The trading allowances in the Acid Rain program have directly contributed to the decline in ambient SO_2 concentrations.

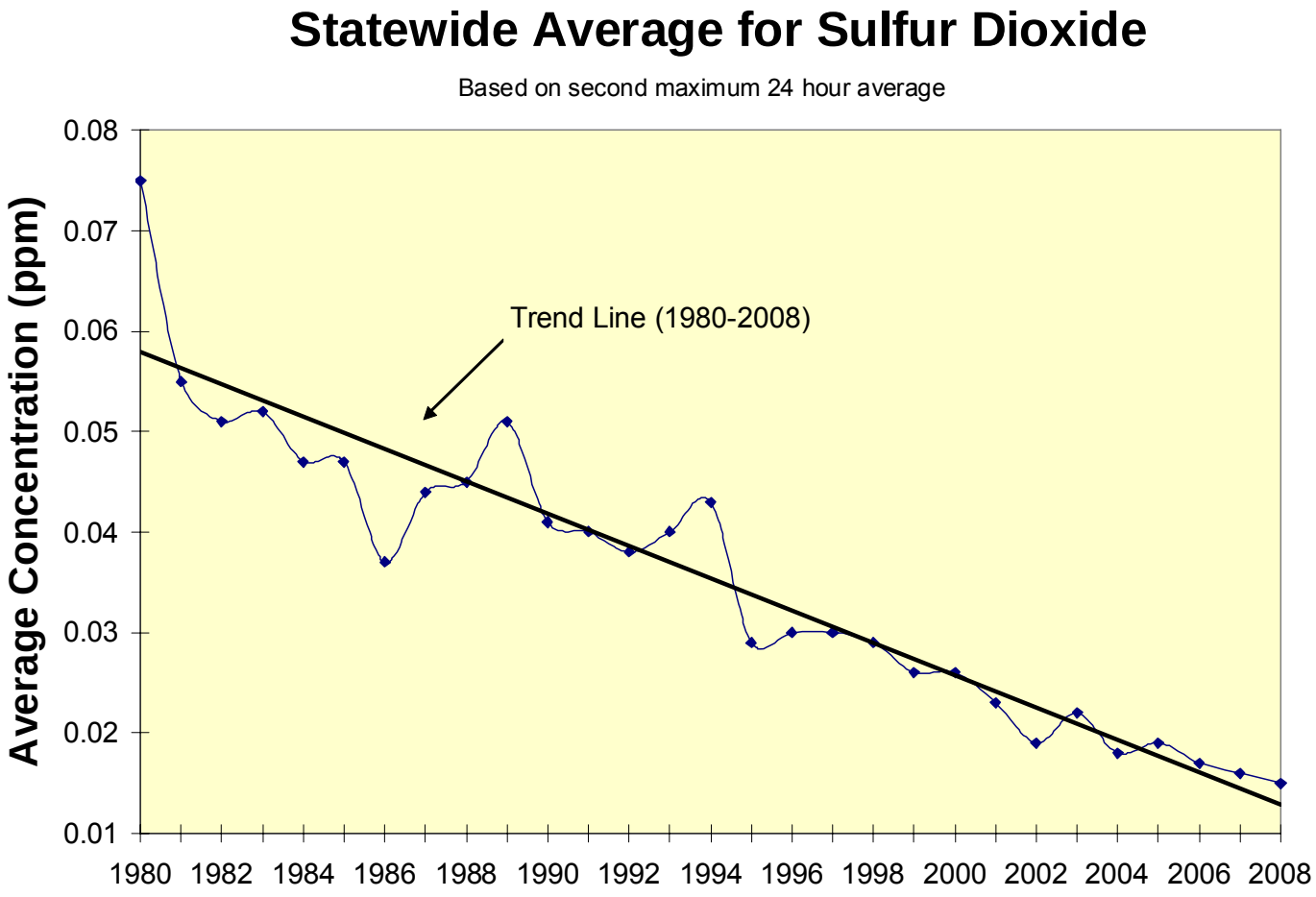


Figure 42: Statewide averages for SO_2 monitoring indicate pollution reductions.

National Ambient Air Quality Standards for Sulfur Dioxide

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.**

Criteria Pollutant Summary Report – 2008

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

County	Site Address	AQS-ID	# Obs	Annual Mean	24-Hr Average			3-Hr Average		
					1st max	2nd max	Obs >.14	1st max	2nd max	Obs > .50
Boyd	2924 Holt Street Ashland	21-019-0017	8657	.0031	.012	.011	0	.056	.031	0
Campbell	524A John Hill Rd Highland Heights	21-037-3002	8484	.0030	.017	.015	0	.048	.046	0
Daviess	US 60 and Pleasant Valley Rd, Owensboro	21-059-0005	7378	.0027	.013	.011	0	.048	.044	0
Fayette	650 Newtown Pike Lexington	21-067-0012	8562	.0026	.010	.009	0	.027	.023	0
Greenup	Scott & Center Streets Worthington	21-089-0007	8704	.0030	.014	.014	0	.055	.028	0
Henderson	Baskett Fire Dept Baskett	21-101-0014	8600	.0022	.019	.017	0	.074	.068	0
Jefferson[1]	7201 Watson Lane Louisville	21-111-0051	8294	.0035	.023	.020	0	.082	.074	0
Jefferson[1]	4201 Algonquin Pkwy Louisville	21-111-1041	8612	.0046	.021	.020	0	.071	.069	0
Jessamine	KYDOT, Etter Drive Nicholasville	21-113-0001	8606	.0045	.013	.011	0	.052	.030	0
Livingston	DOT Garage, US 60 Smithland	21-139-0003	6506	.0017	.006	.005	0	.018	.014	0
Livingston	763 Bloodworth Road off KY 453	21-139-0004	646	.0037	.009	.009	0	.026	.025	0
McCracken	2901 Powell Street Paducah	21-145-1024	8563	.0021	.008	.007	0	.025	.021	0

Sulfur dioxide monitors located in Jefferson County are operated by the Louisville Metro Air Pollution Control District.

Mercury (Ambient Air and Wet Deposition) Monitoring Network

Figure 43: Mercury monitoring locations in Kentucky.

Mercury (Hg) is a naturally occurring element that is found in air, water and soil. Mercury exists in several different forms: elemental, inorganic and organic. Elemental mercury is a shiny, silver-white metal that is in a liquid state at room temperature. Elemental mercury is used in thermometers, florescent lights and electrical switches. Exposed elemental mercury can become an invisible, odorless toxic gas at room temperature.

Inorganic Hg compounds are mercury salts with a white powder or crystal appearance except for mercuric sulfide (cinnabar), which is red. Inorganic Hg compounds are used in fungicides, antiseptics, disinfectants, skin lightening creams and traditional medicines.

Organic mercury compounds are formed when mercury combines with carbon. The most common organic mercury compound found in the environment is methyl-mercury, a highly toxic form that builds up in fish, shellfish and animals that eat fish. Methyl-mercury is formed when inorganic mercury, released into the air from the combustion of coal, settles into water or onto land where it can be washed into water and converted into organic mercury by microorganisms. Fish and shellfish are the main sources of methyl-mercury exposure to humans.

Environmental Impacts

Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. Research has shown that most fish consumption does not cause an exposure to high levels of mercury in adults. However, it has been demonstrated that high levels of methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system.

Kentucky is one of 31 states that have issued a statewide fish consumption advisory due to unsafe levels of mercury. The advisory is for women of childbearing age and children 6 years and younger.

How is Hg monitored?

Mercury is monitored in Kentucky by two different collection methods. The first collection method is wet deposition monitoring. Wet deposition 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 precipitation collector is used to collect the sample. 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 of mercury in the sample.

A second method of Hg collection is by the use of analyzers, which operate continuously, using Cold Vapor Atomic Fluorescence Spectrometry (CVAFS). The analyzer traps Hg vapor, from an air sample, into a cartridge containing an ultra-pure gold adsorbent. The amalgamated mercury is then thermally desorbed and detected using CVAFS.

Mercury is not a criteria pollutant—that is, DAQ is not currently required to monitor for mercury as part of the Clean Air Act. However, mercury is considered a Hazardous Air Pollutant, and out of concern for citizens of the commonwealth, DEP and DAQ are monitoring deposition levels.

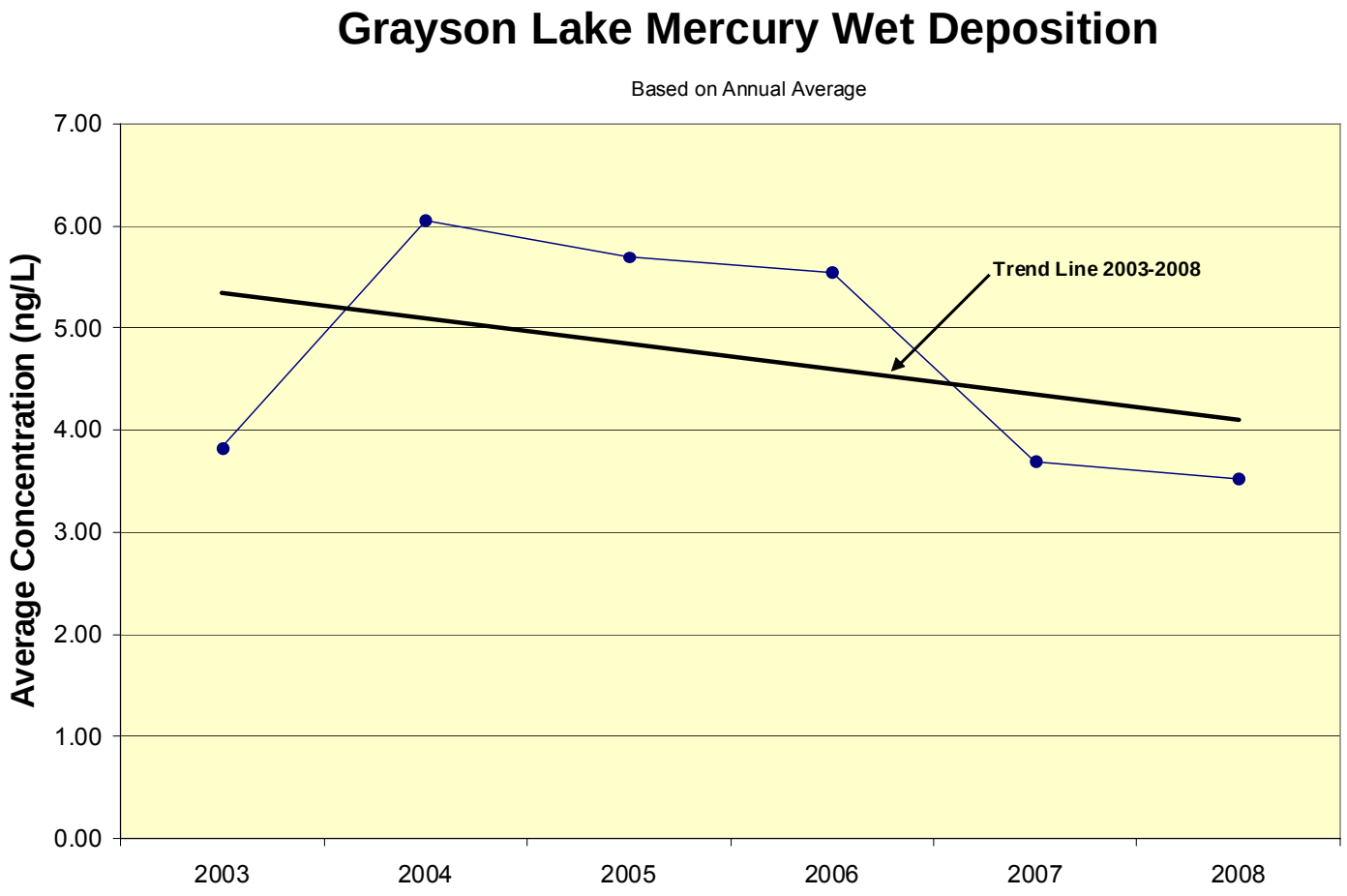


Figure 44: Grayson Lake averages for Hg monitoring indicate pollution reductions.

Results

Ambient air background levels of mercury range from 1-3 ng/m^3. CVAFS analyzer results do not indicate concentrations above background levels.

Wet deposition monitoring works in concert with ambient (CVFAS) monitoring. Although the National Atmospheric Deposition Program has collected wet deposition data at MCNP as part of its Mercury Deposition Network for years, DAQ has only been tracking wet deposition at the Grayson Lake monitoring station since 2003. Therefore trends analysis is only available for this site. The Nicholasville wet deposition site has its first full year of data in 2008.

As mentioned earlier in this section, there are no federally established standards for comparative analysis of statewide mercury levels. In the future, the division hopes to correlate wet deposition and ambient data with fish tissue samples from around the state.

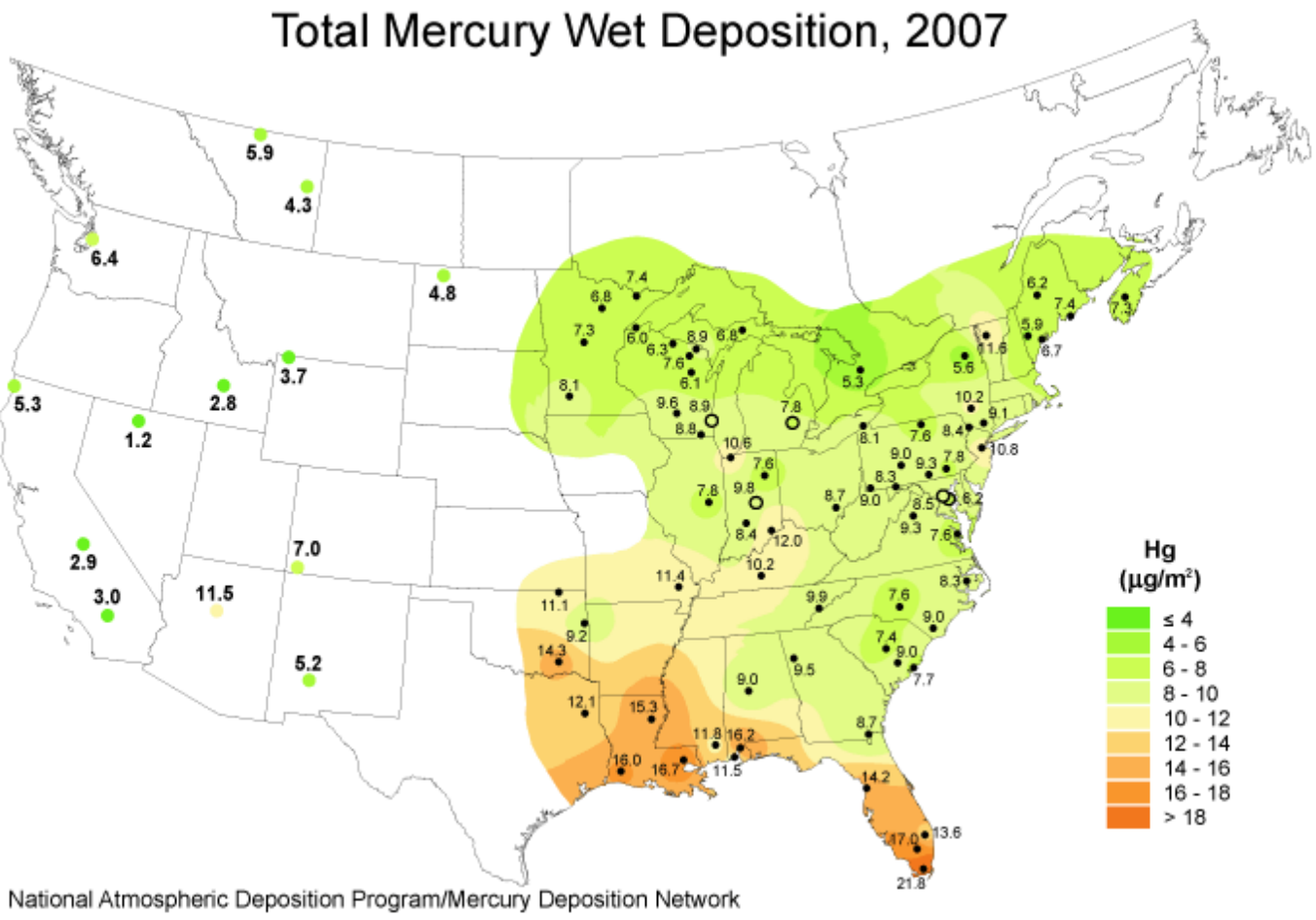


Figure 45: The mercury isopleth map indicates that mercury deposition concentrations in Kentucky are at moderate levels compared to the South and North East regions of the United States. *Map courtesy of the National Atmospheric Deposition Program.*

Wet Deposition Total Mercury Pollutant Summary Report 2008

Pollutant: **Mercury**
Method: Wet Deposition
Data Interval: Weekly
Units: Nano-grams per liter (ng/L)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Carter	Camp Webb Grayson Lake	21-043-0500	41	3.53	10.30	8.67	7.43	6.85
Jessamine	KYDOT, Etter Drive Nicholasville	21-113-0001	45	4.48	14.70	10.80	10.00	8.62

Continuous Total Mercury Pollutant Summary Report 2008

Pollutant: **Mercury**
Method: Cold Vapor Atomic Fluorescence Spectrometry
Data Interval: Hourly
Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Campbell	524A John Hill Highland Heights	21-037-3002	7404	1.1	6.2	4.2	3.1	3.0
Carter	Camp Webb Grayson Lake	21-043-0500	7821	1.0	2.0	1.8	1.8	1.7
Edmonson	Alfred Cook Road Mammoth Cave	21-059-0005	7768	1.2	2.0	1.8	1.8	1.7
Jessamine	KYDOT, Etter Drive Nicholasville	21-113-0001	8573	1.2	3.3	3.0	3.0	2.9
Livingston	DOT Garage, US 60 Smithland	21-139-0003	4605	1.1	7.1	4.1	3.5	3.4
Ohio	Keytown Road Echols	21-183-0032	5370	1.3	3.6	3.1	3.0	3.0

WET DEPOSITION (ACID RAIN)

Wet deposition (sometimes referred to as “acid rain”) is a classification of pollutants that are precipitation borne. Snow, sleet, hail, rain or fog can combine with pollutants in the atmosphere and fall to earth as harmful acidic compounds. Acidified rainwater may contain 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 acidic precipitation. 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; therefore, birds and mammals that depend on insects for food may suffer abnormally high mortality rates.

Acidic precipitation 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 precipitation may also damage agricultural crops and has been blamed for deterioration of monuments and building surfaces.

Wet deposition 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, acidity, sulfates, nitrates, phosphates, ammonia and metal ions.

In 2008, the DAQ operated one acid rain site at Grayson Lake State Park. The NPS at Mammoth Cave also operated a wet deposition sampler in 2008.

Results

Annual pH averages for both sites have shown modest upward trends since 1986 meaning that rainfall is gradually becoming less acidic. This improvement is due at least in part to successful efforts of power plants to curb sulfur dioxide and nitrogen dioxide emissions.

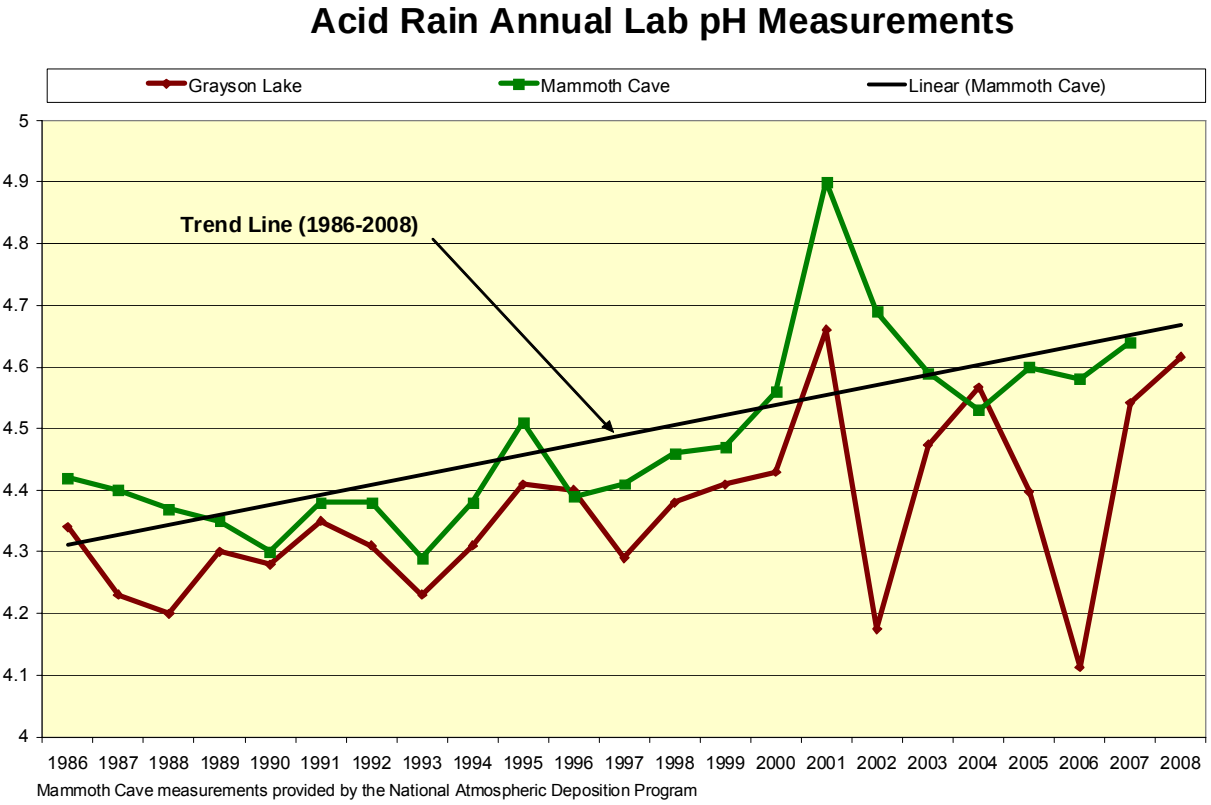


Figure 46: Grayson Lake and Mammoth Cave annual averages for pH monitoring indicate less acidic rain fall.

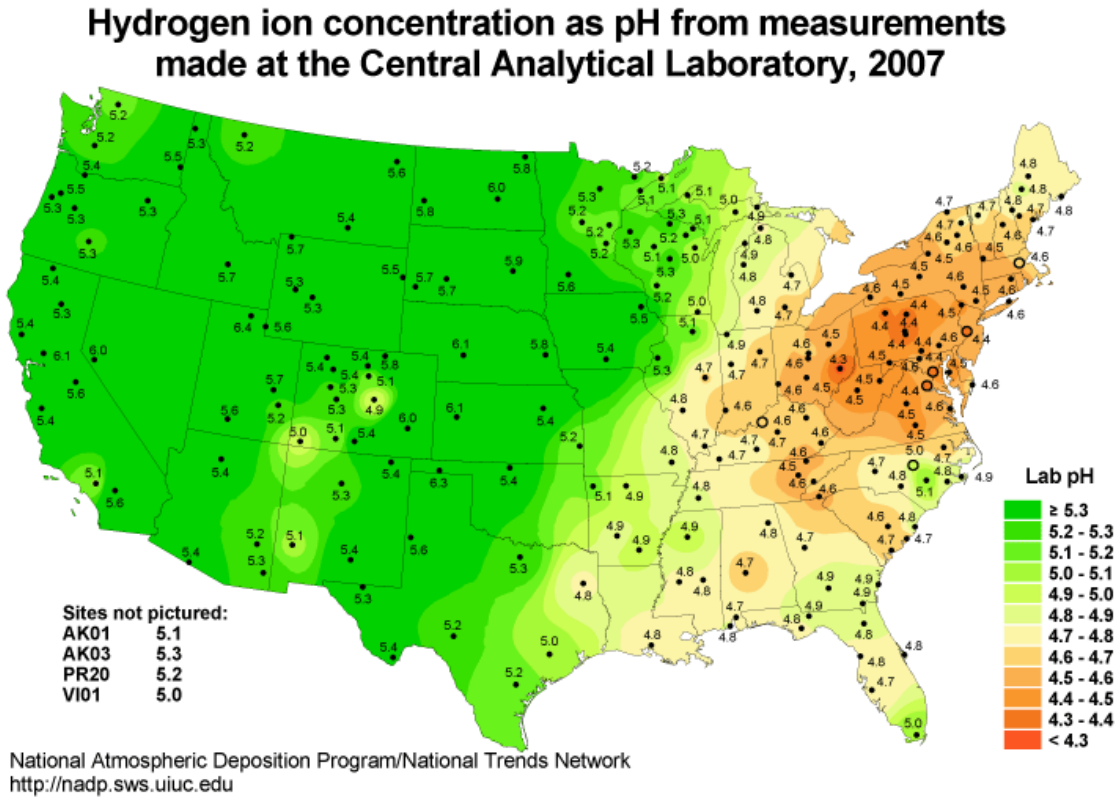
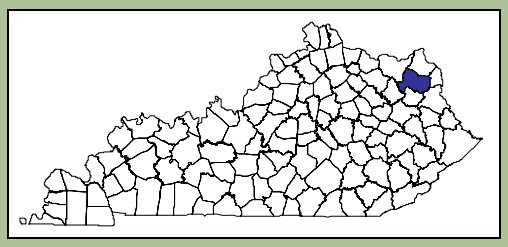


Figure 47: The pH isopleth map indicates that rainfall is more acidic in the East and Northeast regions of the United States, but monitoring has shown a decrease in acidity levels over time due to reductions in sulfur dioxide and nitrogen oxides. *Map courtesy of the National Atmospheric Deposition Program.*

Kentucky Division for Air Quality
Wet Deposition Pollutants Summary Report - 2008

Location: **Grayson Lake, KY** – Camp Webb
Site Id: 21-043-0500
County: Carter
Method: Wet/Dry Collector, Laboratory Analytical



Parameter	Units	# Obs	Arithmetic Mean	1st Max	2nd Max	3rd Max	4th Max
Acidity	Mg/L	10	6.16	11.20	6.93	5.68	5.62
Ammonium	Mg/L	37	.25	.75	.66	.65	.59
Calcium	Mg/L	34	.22	.63	.58	.48	.36
Chloride	Mg/L	24	.26	.72	.45	.38	.36
Conductivity	US/cm	36	12.13	26.70	19.34	17.47	16.81
Magnesium	Mg/L	28	.065	.59	.23	.12	.11
Nitrate	Mg/L	38	.823	1.86	1.59	1.55	1.54
Potassium	Mg/L	20	.088	.24	.18	.16	.16
Sodium	Mg/L	34	.14	.41	.38	.29	.25
Sulfate	Mg/L	38	1.52	3.33	2.76	2.65	2.60

Hazardous Air Pollutant Monitoring Network

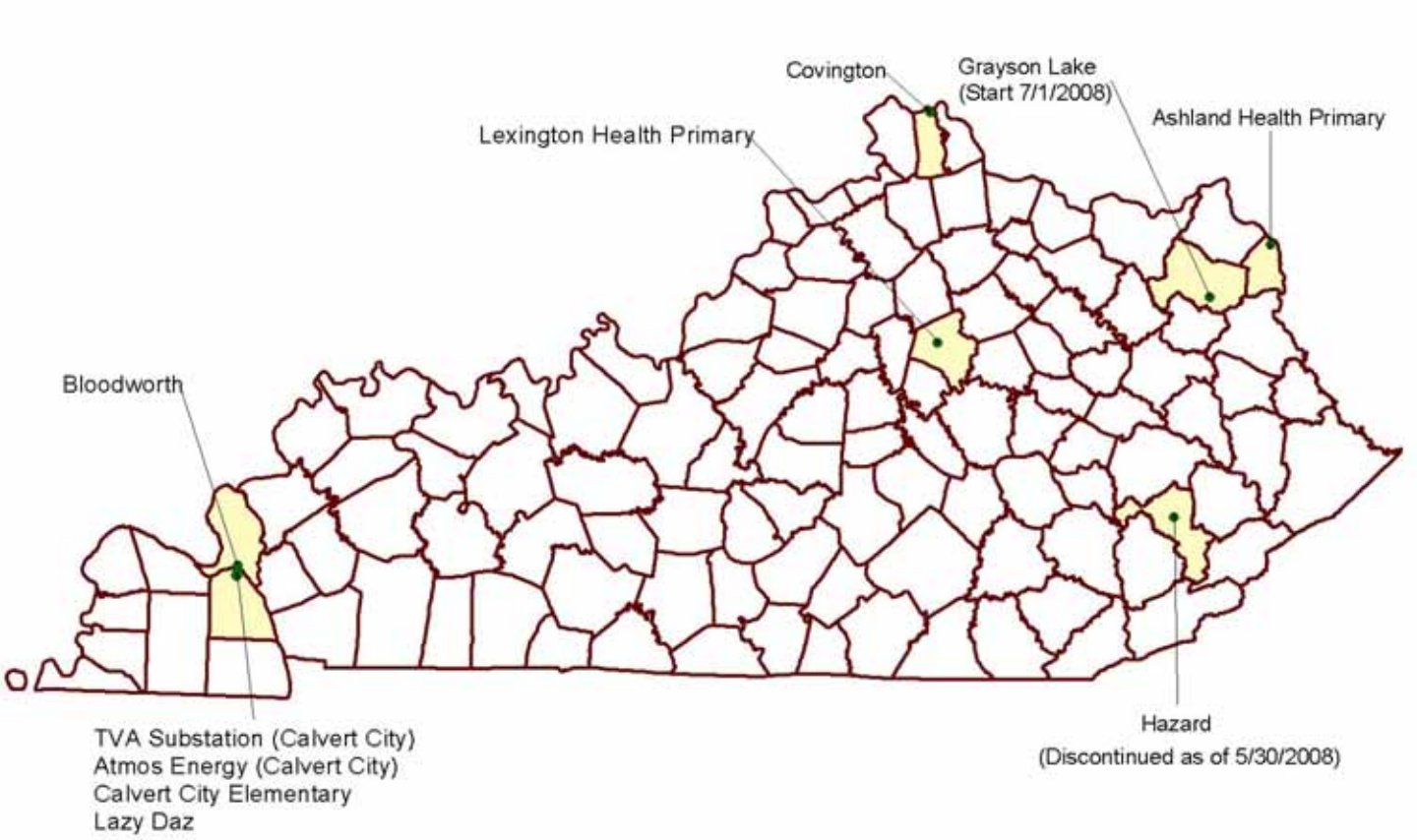


Figure 48: Hazardous air pollutant monitoring locations in Kentucky.

Hazardous air pollutants (HAPs) include 188 substances known or suspected to cause neurological, immunological, reproductive and respiratory disorders, as well as known or suspected human carcinogens. The ultimate goal of the U.S. EPA is to eliminate unacceptable risks of cancer, other significant health problems from exposures to air toxics emissions and to substantially reduce or eliminate adverse effects on our natural environment. To provide a basis for decision-making with respect to these matters, the U.S. EPA developed the National Air Toxics Trends Stations (NATTS) monitoring network.

In 2003, the U.S. EPA designated the Division for Air Quality's Hazard air monitoring site part of that network. The Hazard site is in the Rural Trends Network, and along with its Urban Trends counterpart, has been established to provide toxics trends data on a national basis. Data generated by these monitors are needed to understand the behavior of air toxics in the atmosphere and to develop control strategies.

In June 2008 the Hazard NATTS monitoring station was discontinued and moved to Carter County, Kentucky. The new NATTS site is located at the division's Grayson Lake site. Grayson Lake is rural setting and meets the criteria for a rural NATTS location.

The division also operates 16 hazardous air pollutant monitors through out the commonwealth using the NATTS monitoring objectives. The 16 monitors are not included in the NATTS network. The U.S. EPA has identified six required hazardous air pollutants that are to be monitored in the National

Air Toxics Trends study.

In addition to the six required by U.S. EPA, the agency monitors an extra 17, for a total of 23 monitored hazardous air pollutants at all of the air toxic monitoring sites. These pollutants can be subdivided into three monitoring groups: carbonyls, metals and VOCs. The compounds are sampled using carbonyl samplers with DNPH cartridges, low-volume PM_{10} samplers and passivated summa canisters. The samplers operate for 24-hours on every sixth day, after which the samples are collected and sent to the Division of Environmental Program Support laboratory in Frankfort for analysis.

Results

The division is currently establishing a baseline for future trends analysis of HAPs. The data indicates that several of the monitored twenty-three hazardous air pollutants are present in Kentucky's ambient air.

Potential sources may be large industrial sources in the immediate area, mobile emissions (cars, trucks and school buses), and small local source emissions such as those from fueling stations, body shops/painting, dry cleaners, asphalt plants, etc.

For more information about air toxics in Kentucky, see the Permit Review Branch section of this report.

Carbonyl

Air Toxics Summary Report - 2008

Pollutant: Acetaldehyde

Method: TO-11A; Carbonyl sampler with DPNH cartridges

Data Interval: 24-hour

Units: Micro-grams per cubic meter (µg/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	60	1.385	4.21	3.60	2.48	2.38
Carter	Camp Webb Grayson Lake	21-143-0500	27	.719	1.47	1.17	1.16	1.10
Fayette	650 Newtown Pike Lexington	21-067-0012	59	1.4	3.89	3.03	2.57	2.39
Kenton	1401 Dixie Highway Covington	21-117-0007	60	1.08	2.60	2.48	1.74	1.67
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	1.00	2.68	2.30	2.04	1.42

Air Toxics Summary Report - 2008

Pollutant: Formaldehyde

Method: TO-11A; Carbonyl sampler with DPNH cartridges

Data Interval: 24-hour

Units: Micro-grams per cubic meter (µg/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	60	3.20	8.33	6.92	6.09	5.30
Carter	Camp Webb Grayson Lake	21-143-0500	27	1.96	4.82	3.88	3.86	3.59
Fayette	650 Newtown Pike Lexington	21-067-0012	59	4.1	14.9	10.5	9.65	9.33
Kenton	1401 Dixie Highway Covington	21-117-0007	60	2.32	6.86	6.38	5.79	5.62
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	1.75	3.57	2.61	2.58	2.48

Air Toxics Summary Report - 2008

Pollutant: Antimony

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Carter	Camp Webb Grayson Lake	21-043-0500	27	.773	6.64	1.88	1.34	1.23
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	1.9	8.34	6.84	4.50	4.05

Air Toxics Summary Report - 2008

Pollutant: Arsenic

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	60	1.5	8.73	7.02	5.88	4.08
Carter	Camp Webb Grayson Lake	21-143-0500	27	.116	1.40	.869	.852	ND
Fayette	533 South Limestone Lexington	21-067-0014	59	1.27	12.2	3.27	3.02	2.95
Marshall	24 Main St Calvert City	21-157-0018	58	.300	2.44	1.66	1.41	1.33
Ohio	Keytown Road Echols	21-183-0032	57	.500	2.08	1.87	1.73	1.54
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	1.10	5.46	4.43	3.12	2.44

Air Toxics Summary Report - 2008

Pollutant: Beryllium

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-143-0500	27	ND	ND	ND	ND	ND
Fayette	533 South Limestone Lexington	21-067-0014	59	ND	.958	.522	ND	ND
Marshall	24 Main St Calvert City	21-157-0018	58	ND	ND	ND	ND	ND
Ohio	Keytown Road Echols	21-183-0032	57	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	ND	ND	ND	ND	ND

Air Toxics Summary Report - 2008

Pollutant: Cadmium

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	60	.400	2.98	2.38	1.53	1.39
Carter	Camp Webb Grayson Lake	21-143-0500	27	ND	ND	ND	ND	ND
Fayette	533 South Limestone Lexington	21-067-0014	59	ND	.475	ND	ND	ND
Marshall	24 Main St Calvert City	21-157-0018	58	ND	1.33	.480	.438	.417
Ohio	Keytown Road Echols	21-183-0032	57	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	.100	2.19	.441	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Chromium

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	61	1.67	7.05	5.43	5.13	5.05
Carter	Camp Webb Grayson Lake	21-143-0500	27	.263	.949	.770	.577	.555
Fayette	533 South Limestone Lexington	21-067-0014	59	1.01	12.6	5.09	2.36	1.91
Marshall	24 Main St Calvert City	21-157-0018	58	.451	1.71	1.41	1.27	1.19
Ohio	Keytown Road Echols	21-183-0032	57	.400	3.10	.945	.943	.926
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	.759	3.84	2.94	1.19	1.06

Air Toxics Summary Report - 2008

Pollutant: Lead

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	61	13.47	49.2	48.3	42.6	38.0
Carter	Camp Webb Grayson Lake	21-143-0500	27	2.69	13.7	5.7	4.1	4.0
Fayette	533 South Limestone Lexington	21-067-0014	59	4.76	35.7	12.8	10.4	9.9
Marshall	24 Main St Calvert City	21-157-0018	58	3.35	15.8	13.5	12.9	10.2
Ohio	Keytown Road Echols	21-183-0032	57	2.18	6.5	5.0	4.4	4.2
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	4.09	10.6	9.4	7.6	6.3

Air Toxics Summary Report - 2008

Pollutant: Manganese

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	61	23.83	110.0	98.5	84.5	76.5
Carter	Camp Webb Grayson Lake	21-143-0500	27	1.51	10.9	4.21	3.38	3.18
Fayette	533 South Limestone Lexington	21-067-0014	59	7.07	42.0	41.6	31.7	23.9
Marshall	24 Main St Calvert City	21-157-0018	58	4.96	17.4	16.9	15.0	14.4
Ohio	Keytown Road Echols	21-183-0032	57	3.11	20.3	16.2	9.6	9.3
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	4.85	15.1	14.7	14.7	10.3

Air Toxics Summary Report - 2008

Pollutant: Nickel

Method: IO-3.5; Metals low volume PM_{10} monitor

Data Interval: 24-hour

Units: Nano-grams per cubic meter (ng/m^3)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	21st & Greenup Ashland	21-019-0002	61	1.32	5.8	4.5	4.5	3.8
Carter	Camp Webb Grayson Lake	21-143-0500	27	ND	.219	ND	ND	ND
Fayette	533 South Limestone Lexington	21-067-0014	59	.95	13.4	4.1	3.6	3.3
Marshall	24 Main St Calvert City	21-157-0018	58	.300	13.1	1.6	.7	.5
Ohio	Keytown Road Echols	21-183-0032	57	.900	47.1	.536	.459	.421
Perry	Perry Co. Horse Park Hazard	21-193-0003	25	.100	1.38	.614	.587	.35

ND=Non detect

Volatile Organic Compounds

Air Toxics Summary Report - 2008

Pollutant: Acrolein

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Carter	Camp Webb Grayson Lake	21-143-0500	28	ND	3.53	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

Air Toxics Summary Report - 2008

Pollutant: Benzene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	1.4	4.73	4.18	3.38	3.26
Carter	Camp Webb Grayson Lake	21-043-0500	28	.200	3.77	.932	.849	.760
Fayette	650 Newtown Pike Lexington	21-067-0012	55	.400	2.62	2.47	1.28	1.23
Kenton	1401 Dixie Highway Covington	21-117-0007	61	.300	1.75	1.56	1.28	1.18
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	.300	2.31	2.23	1.90	1.64
Marshall	TVA Substation Calvert City	21-157-0014	111	1.4	17.0	11.0	8.69	8.40
Marshall	Atmos Energy Calvert City	21-157-0016	102	1.2	77.6	3.23	2.50	1.78
Marshall	24 Main Street Calvert City	21-157-0018	105	.400	3.48	2.81	2.77	2.64
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.700	5.30	5.11	5.01	4.85
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	.600	1.59	1.58	1.43	1.22

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: 1,3-Butadiene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	.719	.612	.597	.573
Marshall	TVA Substation Calvert City	21-157-0014	111	.300	4.00	2.81	2.45	2.13
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	1.99	1.29	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	1.01	.467	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.100	1.59	1.27	1.26	1.05
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Carbon tetrachloride

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	.200	4.40	4.08	2.25	2.25
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.100	4.66	1.78	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Chloroform

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	.400	15.5	6.15	5.42	2.51
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	2.62	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.100	5.66	1.99	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: 1,2 dichloropropane

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	1.73	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	.100	12.5	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: cis-1,3 dichloropropene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	ND	.975	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: trans-1,3 dichloropropene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	1.12	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road ND	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	ND	ND	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	3.33	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Ethylene dibromide

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	ND	ND	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Ethylene dichloride

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	NND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	NND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	1.1	17.0	11.3	6.88	6.80
Marshall	TVA Substation Calvert City	21-157-0014	111	9.0	110.0	98.7	98.3	89.0
Marshall	Atmos Energy Calvert City	21-157-0016	102	.500	6.11	5.14	3.58	3.32
Marshall	24 Main Street Calvert City	21-157-0018	105	.800	16.1	9.06	5.66	3.69
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	1.7	20.5	14.6	13.7	11.4
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	.100	2.33	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Methylene chloride

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	.300	2.17	1.65	1.46	1.26
Carter	Camp Webb Grayson Lake	21-043-0500	28	5.1	28.7	18.1	14.9	11.0
Fayette	650 Newtown Pike Lexington	21-067-0012	56	1.1	24.2	15.4	13.2	2.43
Kenton	1401 Dixie Highway Covington	21-117-0007	61	.700	16.7	11.9	2.7	1.80
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	.100	3.37	1.90	1.44	1.22
Marshall	TVA Substation Calvert City	21-157-0014	111	.100	4.58	3.61	1.18	1.13
Marshall	Atmos Energy Calvert City	21-157-0016	102	.200	4.48	2.31	1.42	1.41
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	2.24	1.12	.969	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.100	2.72	1.67	.903	.857
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	.100	3.54	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Tetrachloroethene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	2.20	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	.100	1.99	1.84	1.78	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	.100	2.09	1.82	1.74	ND
Marshall	24 Main Street ND	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	MD	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	.100	.100	2.08	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: 1,1,2,2 tetrachloroethene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	55	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	ND	ND	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Trichloroethene

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	ND	ND	ND	ND	ND
Marshall	TVA Substation Calvert City	21-157-0014	111	ND	ND	ND	ND	ND
Marshall	Atmos Energy Calvert City	21-157-0016	102	ND	ND	ND	ND	ND
Marshall	24 Main Street Calvert City	21-157-0018	105	ND	ND	ND	ND	ND
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	ND	ND	ND	ND	ND
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

Air Toxics Summary Report - 2008

Pollutant: Vinyl chloride

Method: TO-15; Passivated SUMMA Canister

Data Interval: 24-hour

Units: Micro-grams per cubic meter ($\mu g/m^3$)

County	Site	AQS-ID	# Obs	Annual Mean	1st max	2nd max	3rd max	4th max
Boyd	2924 Holt Street Ashland	21-019-0017	61	ND	ND	ND	ND	ND
Carter	Camp Webb Grayson Lake	21-043-0500	28	ND	ND	ND	ND	ND
Fayette	650 Newtown Pike Lexington	21-067-0012	56	ND	ND	ND	ND	ND
Kenton	1401 Dixie Highway Covington	21-117-0007	61	ND	ND	ND	ND	ND
Livingston	763 Bloodworth Road off KY 453	21-139-0004	107	.200	2.05	1.89	1.47	1.45
Marshall	TVA Substation Calvert City	21-157-0014	111	.900	22.0	7.03	6.18	5.77
Marshall	Atmos Energy Calvert City	21-157-0016	102	1.7	15.7	14.3	11.2	8.97
Marshall	24 Main Street Calvert City	21-157-0018	105	.100	2.86	1.75	1.48	.948
Marshall	4237 Gilbertsville Hwy Calvert City	21-157-0019	109	.300	6.39	3.04	2.78	1.90
Perry	Perry Co. Horse Park Hazard	21-193-0003	24	ND	ND	ND	ND	ND

ND=Non detect

GLOSSARY OF TERMS

Asbestos Hazard Emergency Response Act AHERA requires schools to inventory their asbestos materials and document strategies for dealing with these materials.

Air Toxics See Toxic Air Pollutant.

Ambient air quality The level of pollution present in the air outside.

Attainment When an area meets the national air quality standard set by the federal EPA for a particular pollutant.

Clean Air Act Federal clean air program established by Congress in 1963.

Class I Area Areas of special natural, scenic, or historic importance are known as "Class 1 Areas," and are protected to maintain long distance, panoramic views.

Criteria Pollutant A regulated air pollutant. Currently, there are six criteria pollutants under the Clean Air Act. They are carbon monoxide, lead, ozone, particulate matter, nitrogen oxides and sulfur dioxide.

Emissions Inventory A list of sources of air contaminants, containing for each source the amount of each contaminant emitted.

Hazardous Air Pollutant Any pollutant listed in Subsection B of Section 112 of the Clean Air Act.

Inspection A *scheduled* determination of compliance with an existing regulation.

Investigation A *complaint driven* determination of compliance with an existing regulation.

National Emissions Standards for Hazardous Air Pollutants NESHAP, with respect to asbestos, governs renovation and demolition activities and requires safe handling, removal (when applicable), and disposal of asbestos from facilities (everything except for single private homes).

Nonattainment When an area does not meet the national air quality standard set by the federal EPA for a particular pollutant.

Notification Required reporting by facilities of regulated activities. For example, facilities are required to notify DAQ of certain air emission releases or upcoming asbestos disturbance (removal/demolition activities).

Synthetic Minor A facility that has the PTE that could exceed major Title V thresholds, but they have agreed to control emissions below major threshold. Synthetic minors includes conditional major facilities.

Title V Any source that has the PTE of greater than 100 Tons of criteria pollutants or 10/25 TPY of a single HAP or any combined HAP.

Toxic Air Pollutant A subset of the pollutants listed as Hazardous Air Pollutants by the U.S. EPA.

GLOSSARY OF ABBREVIATIONS

AHERA Asbestos Hazard Emergency Response Act

BACT Best Available Control Technology

CO Carbon Monoxide

CPT Cost per Ton

DAQ Division for Air Quality

DEP Department for Environmental Protection

DERA Diesel Emissions Reduction Act

EEC Energy and Environment Cabinet

EGU Electric Generating Unit

EPA Environmental Protection Agency

GHG Green House Gas

HAP Hazardous Air Pollutant

HPV High Priority Violation

LOW Letter of Warning

MACT Maximum Achievable Control Technology

NAAQS National Ambient Air Quality Standard

NESHAP National Emission Standard for Hazardous Air Pollutants

NO_x Nitrogen Oxides

NOV Notice of Violation

O_3 Ozone

Pb Lead

PM_{10} Particulate Matter, also known as course particles, measure between 2.5-10 microns in diameter

$PM_{2.5}$ Fine Particulate Matter, also known as fine particles, measure 2.5 microns in diameter

PTE Potential to Emit

SEDC Southeast Diesel Collaborative

SIP State Implementation Plan

SO_2 Sulfur Dioxide

TEMPO Tools for Environmental Management and Protection Organizations

TRI Toxics Release Inventory

VISTAS Visibility Improvement State and Tribal Association of the Southeast

VOC Volatile Organic Compound

ACKNOWLEDGMENTS

Governor Steven L. Beshear **Secretary Leonard K. Peters**

This Annual Report is intended to provide a concise set of facts and measurements to support environmental decision-making. We welcome your questions and comments to the contacts below:

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