

## AIR POLLUTION

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According to the *Kentucky Air Quality Control Regulations*, air pollution is the presence of contaminants in the air (1) in sufficient quantities, (2) of such characteristics, and (3) for sufficient duration to be dangerous to human health, safety, and welfare or harmful to animal life or property. The purpose of this report is to look at the causes, effect, and amount of air pollution in our community.

### SOURCES OF POLLUTION

The understanding of air pollutants and how they are emitted or formed has developed greatly over the last several years. In the past, it was considered that there were two main sources of air pollution: industry and motor vehicles. We now know that while those two categories remain major contributors of air pollutants, there are other sources of air pollutants that contribute greatly in some areas.

Area sources can also play an important part in air pollution. Area sources include small industries, businesses, and people activities such as open burning, painting, and agricultural activities. While these businesses and activities are small, when added together, they can contribute significant emissions in an area. Additionally, non-highway mobile sources, such as gasoline powered lawn and garden equipment, motor boats, and airplanes can also play an important part of air pollution in an area.

Industrial pollutants are primarily sulfur oxide from coal burning power plants, particulates from power plants and incinerators, and hydrocarbons from petroleum refineries.

Motor vehicles primarily emit carbon monoxide and hydrocarbons.

Other local sources such as stone quarries, grain and tobacco warehouses, earth moving projects, chemical and metallurgical processes, and coal mining emit suspension particles and dustfall.

### POLLUTANTS AND THEIR EFFECTS

The U.S. Environmental Protection Agency has issued primary and secondary air quality standards for six (6) criteria pollutants, which are known as the National Ambient Air Quality Standards (NAAQS). The primary standard is set at a level to provide an adequate margin of safety to protect the public health. Secondary standards are those levels of air quality that are judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Listed below are those pollutants, sources of each pollutant, and the health effects of each.

Additionally, the Environmental Protection Agency has or will issue several regulations to cover sources that emit 188 compounds and chemicals known as Hazardous Air Pollutants (HAPs). Hazardous air pollutants are those substances that are known or suspected of causing cancer, neurological, immunological, reproductive, and respiratory disorders.

### Particulates

Particulate matter can be separated into two categories. The first is larger particles that are typically emitted from industry, or construction activities that settle quickly and provide soiling of materials and sometimes corrosion where they land.

The second type of particulate matter is very small and can be either emitted directly or formed by other gases being emitted. These particulates can cause or aggravate existing respiratory illnesses such as asthma, emphysema, and chronic bronchitis. They can also aggravate existing pulmonary diseases. These particles are small enough to be inhaled into the body and remain there.

### Sulfur Dioxide

Sulfur dioxide inflames the respiratory system and aggravates existing respiratory and pulmonary conditions such as bronchitis and emphysema. It can also damage metals, fabrics and vegetation. Sulfur dioxide typically is emitted from power plants, coal-fired boilers, and other combustion processes.

### Nitrogen Oxides

Nitrogen oxides contribute to the aggravation of respiratory and pulmonary diseases. This pollutant is typically emitted from combustion processes including power plants, boiler operation, and motor vehicles. Nitrogen oxide emissions play a large part in the formation of ozone pollution.

### Lead

High concentrations can impair a person's IQ. It is especially harmful to children. Thanks primarily to the phase out of lead in gasoline, Kentucky has not had any exceedances of the lead standard for numerous years. In fact, Kentucky is no longer required to perform ambient air monitoring for lead.

### Ozone

Ozone, sometimes referred to as smog, is not emitted, but rather is formed. When emissions of nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) react with sunlight, heat, and humidity, they can form ozone. Ozone can irritate mucous membranes and can aggravate existing respiratory diseases such as bronchitis, asthma, and emphysema. Ozone can also affect people with pulmonary disorders. Most recently, the air quality standard for ozone has been revised to provide for an adequate margin of safety.

## AIR POLLUTION CONTROL

### State Control of Air Quality

The 1970 Clean Air Act requires that each state have an air pollution program. To fulfill this requirement, the Kentucky Air Pollution Control Commission adopted a program on February 15, 1972 in the form of statewide air quality regulations. Today, the Division for Air Quality within the Natural Resources and Environmental Protection Cabinet is continuing to implement the latest version of the Clean Air Act that was adopted in 1990.

The State of Kentucky is broken into nine (9) air quality control regions. The Division for Air Quality has jurisdiction over eight of those regions. Louisville has its own Air Pollution Control District that covers air quality monitoring and planning for Jefferson County. These regions all contain regional offices to monitor air pollution, inspect sources, and respond to complaints within each region.

Daviess County is in the western section of the Evansville (Indiana) - Henderson (KY) region. Each of the regions were ranked and given a priority number with respect to a number of different air pollutants (Exhibit 782-T1). Regions with a priority number of "I" have more of an air pollution problem than do those with a number "III". As the exhibit shows, our area has problems with particulates and sulfur oxides.

When violations of air quality standards are monitored, the Division for Air Quality is required to make plans to bring the area back into compliance with the standards and to maintain those standards once they have been reached. If Kentucky does not plan for and implement appropriate controls, the U.S. Environmental Protection Agency has the authority to issue sanctions on the area. This can include very restricted industrial growth, reductions or complete denial of federal highway funds, and restrictions on federal sewer monies. Additionally, the federal government can come in and implement an FIP (Federal Implementation Plan) to bring the area back into compliance.

**Air Quality Standards**

Primary and secondary air quality standards have been established by the State for six air pollutants, as set forth in Exhibit 782-T2. According to the *Kentucky Air Quality Control Regulations*, primary ambient air quality standards are those levels of air quality that are judged to be necessary, with an adequate margin of safety, to protect the public health. Secondary ambient air quality standards are those levels of air quality that are judged to be necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

**QUALITY OF AIR IN DAVIESS COUNTY**

The quality of air in Daviess County is currently monitored at two sites. Additional air monitoring sites are located in counties surrounding Daviess County to monitor the air coming into the county, as well as air exiting the metropolitan area. None of

these sites currently experience consistently high values of pollutants, with the exception of the 8-hour ozone standard. Exhibit 783-T1 provides information on each pollutant, maximum level recorded at that site, and the number of times a site has exceeded the standard.

**Exhibit 782-T2: Kentucky Ambient Air Quality Standards**

Pollutant	Primary Standards	Secondary Standards
<b>Carbon Monoxide</b>		
1-hour average	35 ppm	35 ppm
8-hour average	9 ppm	9 ppm
<b>Sulfur Oxides</b>		
3-hour average		0.5 ppm
24-hour average	0.14 ppm	
Annual average	0.03 ppm	
<b>Lead</b>		
Calendar quarter average	1.5 ug/m <sup>3</sup>	1.5 ug/m <sup>3</sup>
<b>Nitrogen Oxides</b>		
Annual average	0.05 ppm	0.05 ppm
<b>Particulate Matter (PM10)</b>		
24-hour average	150 ug/m <sup>3</sup>	150 ug/m <sup>3</sup>
Annual average	50 ug/m <sup>3</sup>	50 ug/m <sup>3</sup>
<b>Particulate Matter (PM2.5)</b>		
24-hour average	65 ug/m <sup>3</sup>	65 ug/m <sup>3</sup>
Annual average	15 ug/m <sup>3</sup>	15 ug/m <sup>3</sup>
ppm - parts per million		

Source: 1998 KY Ambient Air Quality Report

Daviess County has met many of the air quality challenges presented to the area since the early 1970s. The two air quality problems facing the area today and for the next few years will be the 8-hour ozone standard and the latest PM2.5 standard. Since monitoring on the PM2.5 standard began in 1999, it will be the end of 2001 before areas will know if they are meeting this standard, or are having air quality problems. Monitoring to date has not shown any widespread problems with the PM2.5 standard. However, 10 exceedences of the 8-hour ozone standard were recorded for Daviess County in 1999.

As previously stated, at the writing of this plan, Daviess County is in violation of the 8-hour ozone standard. Designations of these areas as either meeting or not meeting the standard will occur some time in 2000. At that time, it will become necessary to begin looking at air quality patterns, both inside Owensboro, and in the balance of Daviess County. Discussions on whether Daviess County is receiving "transported" pollutants from

**Exhibit 782-T1: Priorities for Kentucky Air Quality Control Regions**

Region Name	Particulate Matter	Sulfur Oxides	Carbon Monoxide	Nitrogen Dioxide	Photochemical Oxidants Hydrocarbons
Louisville	I	I	III	III	I
Cincinnati	I	II	III	III	I
Paducah-Cairo	I	II	III	III	III
Huntington-Ashland	I	III	III	III	III
Evansville-Henderson	I	II	III	III	III
Bluegrass	II	III	III	III	III
Appalachian	II	III	III	III	III
North Central	II	III	III	III	III
South Central	III	III	III	III	III

Note: I – high priority, II - medium priority, III - low priority

Source: 1999 KY Air Quality Control Regulations

another area, or if emissions from Daviess County are impacting other communities “downwind,” will have to take place.

Whatever the outcomes, plans to address air quality, both on a local and regional level, will become beneficial tools in determining where controls need to be implemented to improve air quality in Daviess County.

Efforts to locate industry with high-pollution potential in the northeast and northwest quadrants of the Owensboro Urban Service Area permits utilization of the prevailing winds. This would help keep industrial pollutants away from the city core and its residential areas.

High levels of pollution occasionally occur as a direct result of auto emissions. One of the most effective means local government can utilize is to provide a comfortable public transit system, thereby limiting motor vehicle emissions. Federal auto emission controls aid in the elimination of a majority of the carbon monoxide pollution.

**Exhibit 783-T1: Daviess County Air Quality Readings (1998)**

Site	Contaminant	Standard	Max. Reading	Times Standard Exceeded
US 60 E & Pleasant Valley Road	Ozone	1-hour 0.12 ppm	0.127 ppm	1
		8-hour 0.08 ppm	0.109 ppm	5
	Carbon monoxide	1-hour 35 ppm	2.3 ppm	0
		8-hour 9 ppm	1.2 ppm	0
	Sulfur dioxide	24-hour 0.14 ppm	0.027 ppm	0
		Annual 0.03 ppm	0.007 ppm	0
	Particulate matter (PM10)	24-hour 150 ug/m <sup>3</sup>	57 ug/m <sup>3</sup>	0
		Annual 50 ug/m <sup>3</sup>	23 ug/m <sup>3</sup>	0
	Nitrogen dioxide	Annual 0.05 ppm	0.013 ppm	0
	Green River District Health Department (1600 Breckenridge St)	Particulate matter (PM10)	24-hour 150 ug/m <sup>3</sup>	46 ug/m <sup>3</sup>
Annual 50 ug/m <sup>3</sup>			25 ug/m <sup>3</sup>	0

ppm - parts per million

Source: 1998 KY Ambient Air Quality Report