



# Fact Sheet

Commonwealth of Pennsylvania • Department of Environmental Protection

## OZONE: THE GOOD, THE BAD, THE SMOGGY

### What Is Ozone?

Ozone is a colorless, odorless gas that forms in the atmosphere when three atoms of oxygen are combined ( $O_3$ ). It can be either good or bad, depending on where it is found in the atmosphere.

When ozone is located in the stratosphere – the upper atmospheric layer, about 10 to 30 miles above the earth's surface – it is called the “ozone layer” and is considered “good” ozone. This ozone filters the sun's harmful ultra-violet (UV) rays and decreases our chances of sunburn and skin cancer. The ozone layer is produced when solar radiation splits oxygen molecules, which then combine with other oxygen molecules to form ozone.

When ozone is located in the troposphere – the lowest 10 miles of the atmosphere – it is called “ground-level” ozone and is considered “bad” ozone. This type of ozone is produced when nitrogen oxides ( $NO_x$ ) and volatile organic compounds (VOCs) combine under intense sunlight. Ground-level ozone causes various health problems for humans and damages much of our crops and ocean life. High concentrations of ground-level ozone occur during hot, sunny days, when the flow of air is limited or stagnant and a mixture of VOCs and  $NO_x$  is present.  $NO_x$  and VOCs can come from many pollution sources, including industry, vehicles, households and power plants.

### What Are the Effects of the Depletion of the “Good” Ozone?

Some of the stratospheric ozone layer has been depleted due to the use of chlorofluorocarbons (CFCs) – man-made compounds that were introduced in the late 1920s. CFCs are broken down by the UV rays in the stratosphere, allowing the chlorine or bromine molecules of these chemicals to be set free to attack the protective ozone blanket.

As the ozone layer is depleted, people are at greater risk of getting skin cancer and cataracts. Many of our essential crops, such as corn, wheat and soybeans, may become damaged, decreasing their market value. Phytoplankton, a plant in the ocean, also is affected. Depletion of this important link in the marine food chain

could reduce the number of fish in the ocean. It also can increase the level of carbon dioxide in the atmosphere because phytoplanktons absorb carbon dioxide in their food- and energy-making processes.

### What Are the Effects of “Ground-Level” Ozone?

When ozone forms at ground level, in the air we breathe, it can be harmful to our health. Children, the elderly and individuals with pre-existing respiratory problems are most at risk. This ozone can aggravate bronchitis, emphysema and asthma. Healthy adults can experience health problems on high ozone days, especially while exercising or working outdoors. When high concentrations of this type of ozone are present, people might experience chest pain, coughing, nausea, throat irritation and congestion. Prolonged exposure to high concentrations of ground-level ozone can lead to lung damage.

### What Is Being Done About Our Ozone Problem?

#### *I. Preventing Further Depletion of the Ozone Layer*

The U.S. Environmental Protection Agency (EPA) established the Clean Air Act of 1990. Under this act, EPA continues to phase out CFCs and other ozone-depleting substances. Laws were enacted to make the release of CFC refrigerants (found in air conditioners and appliances) illegal.

#### *II. Reducing Ground-level Ozone*

The Pennsylvania Department of Environmental Protection (DEP) implements and enforces a wide variety of programs to control and reduce levels of VOCs and  $NO_x$ . Power plants, manufacturers and automobiles are just a few examples of sources where reductions of VOC and  $NO_x$  are being required. DEP is also working with industry, small businesses and local air-quality agencies to implement pollution-prevention programs. To help reduce the amount of air pollution entering Pennsylvania from out-of-state, the Commonwealth has joined other Northeastern states in asking EPA to require emissions reductions from Midwest power plants.

## Pa.'s Ozone Action Partnerships

DEP has been a national leader in establishing Ozone Action Partnerships. These private-public partnerships are aimed at educating the public about the dangers of ground-level ozone and ways people can reduce their contributions to ozone-forming pollution. There are four Ozone Action Partnerships in Pennsylvania.

- ◆ The Southwest PA Ozone Action Partnership was established in 1995 and encompasses seven counties in Southwestern PA: Allegheny, Armstrong, Beaver, Butler, Fayette, Westmoreland, and Washington. Hotline: 1-800-333-7688.
- ◆ The Southeast, or Multi-State, Ozone Action Partnership was established in 1996 and is based in Philadelphia. It consists of five counties in Southeast Pennsylvania (Bucks, Chester, Delaware, Montgomery and Philadelphia) and parts of New Jersey, Delaware and Maryland. Hotline: 1-800-872-7261, Option #4.
- ◆ The Susquehanna Valley Ozone Action Partnership was established in 1998 and covers Cumberland, Dauphin, Lancaster, Lebanon and York counties. Hotline: 1-888-772-1306.
- ◆ The Lehigh Valley Ozone Action Partnership was formed in 2000 and covers Berks, Lehigh and Northampton counties. Hotline: 1-877-517-2969.

The ozone season spans May through September, when the sun is at its hottest and temperatures can be expected to reach 90 degrees or more. DEP's meteorologists track the weather and forecast days when the ozone concentrations are expected to exceed federal health-based standards. The Ozone Action Partnerships then declare an "Ozone Action Day" or a "Code Red" day and give businesses and the media the ozone forecast to provide to the public. On these high ozone days, individuals and businesses are encouraged to take simple actions to reduce their contributions to ozone-forming pollution.

## What You Can Do On High Ground-Level Ozone Days

- Limit daytime driving and combine errands;
- Use mass transit or carpool to work;
- Walk or ride a bicycle for short trips;
- Refuel your vehicle in the evening and do not top off your gas tank;
- While driving, avoid prolonged idling and jackrabbit starts;
- Avoid driving during congested periods for travel;
- Maintain your vehicle's emission-control equipment;
- Postpone the use of gasoline-powered mowers until evening;
- Avoid lighting your charcoal grill with lighter fluid, or use a propane-gas or electric grill;
- Use latex rather than oil-based paint; and
- Refrain from strenuous outdoor activity.

## Good Up High, Bad Nearby

High in the upper atmosphere, the ozone layer protects humans from the sun's harmful UV rays. However, at ground-level, ozone is a key component of smog (a noxious mix of fog and smoke) and can make it hard for some people to breathe. It is important to recognize the difference between these two types of ozone, and learn how to protect the "good" ozone and reduce the "bad" ozone. Do your share for cleaner air.

## For more information, contact:

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For more information, visit DEP's website at [www.state.pa.us](http://www.state.pa.us), Keyword: "DEP Air Quality."