

OZONE: The Good and Bad

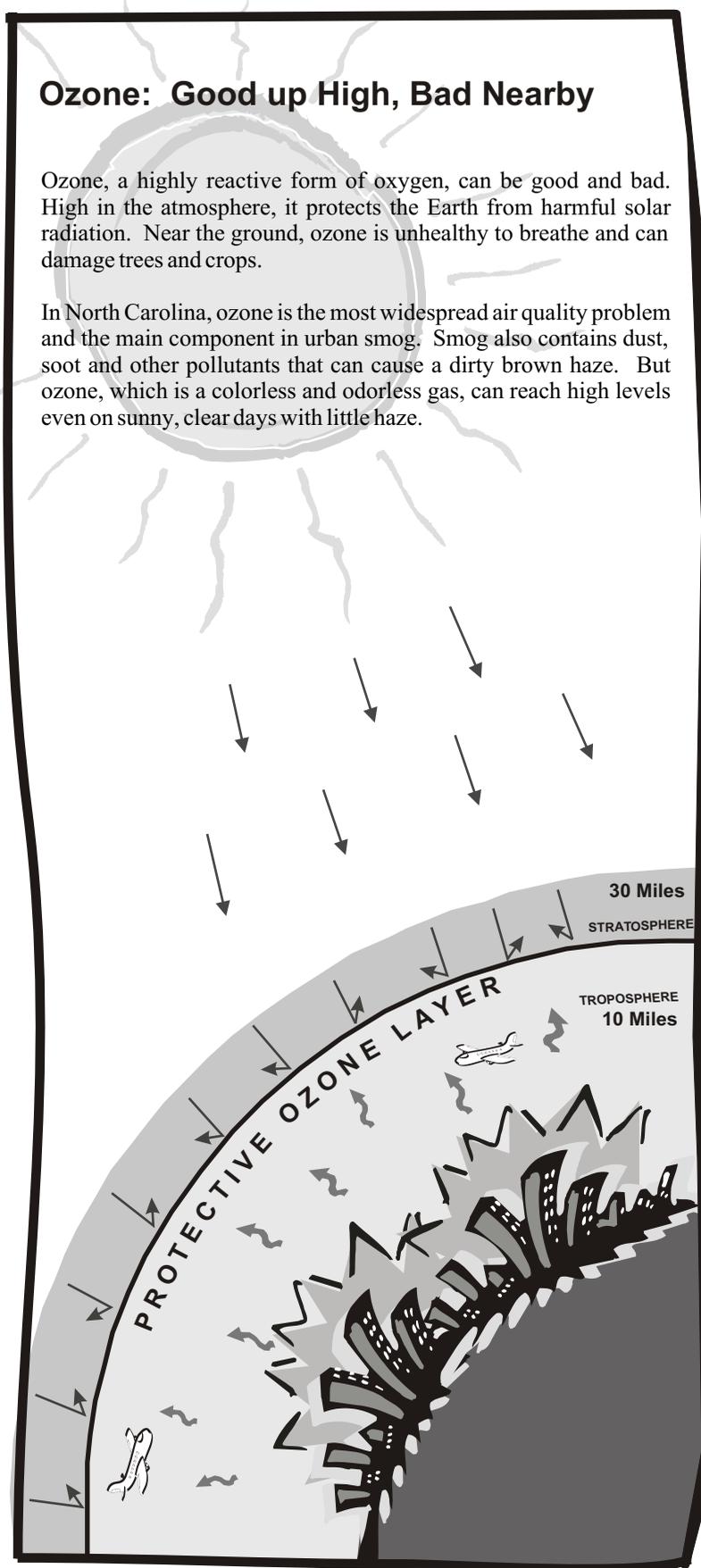


NC DENR
North Carolina Department of
Environment and Natural Resources
Division of Air Quality

Ozone: Good up High, Bad Nearby

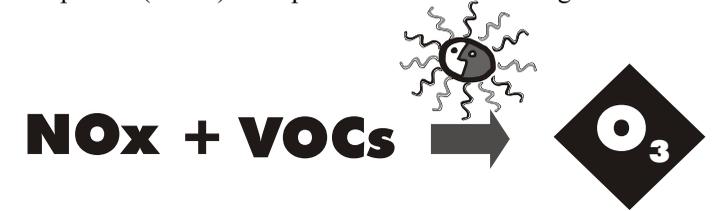
Ozone, a highly reactive form of oxygen, can be good and bad. High in the atmosphere, it protects the Earth from harmful solar radiation. Near the ground, ozone is unhealthy to breathe and can damage trees and crops.

In North Carolina, ozone is the most widespread air quality problem and the main component in urban smog. Smog also contains dust, soot and other pollutants that can cause a dirty brown haze. But ozone, which is a colorless and odorless gas, can reach high levels even on sunny, clear days with little haze.



Ozone Formation

Cars, trucks, power plants and other industrial sources emit air pollutants that combine to form ozone. Ground-level ozone forms when nitrogen oxides (NOx) react with volatile organic compounds (VOCs) in the presence of heat and sunlight.



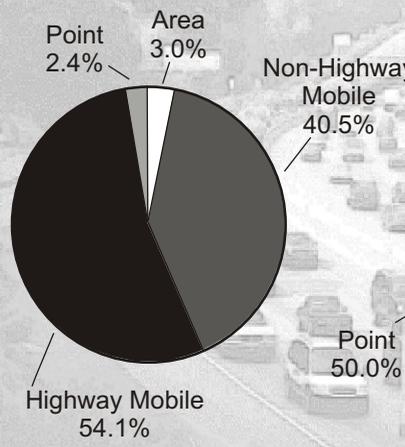
VOCs, or hydrocarbons, come from man-made sources such as cars, service stations, dry cleaners and factories, as well as trees and other natural sources. NOx comes from motor vehicles, power plants, industrial boilers, lawn-care equipment and other sources that burn fuel.

Efforts to control ozone focus on NOx because most of it comes from man-made sources. Reducing VOCs is less effective because pines, oaks and other trees that are so abundant in the South emit large amounts of hydrocarbons.

Ozone levels generally are higher in urban areas, which contain more cars, industry and other emissions sources. However, winds can carry ozone from cities to surrounding rural areas and even to other states. Much of the ozone pollution at high elevations in Western North Carolina is transported by winds from other states. In mountain valleys, however, ozone-forming pollution can come from both local and out-of-state sources.

Triangle Area

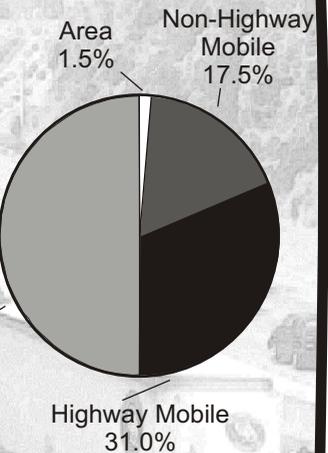
1995 Summer Weekday
NOx Emissions



Total NOx =
127.3 Tons per day

Statewide

1995 Summer Weekday
NOx Emissions



Total NOx =
2,515.6 Tons per day

Note: Point sources include power plants and other facilities with fixed smokestacks; Area sources include gas stations, dry cleaners and other facilities without smokestacks; Non-Highway Mobile sources include construction equipment, airplanes, trains, lawnmowers and other off-road vehicles; Highway Mobile sources include cars and trucks.

Health and Environmental Concerns

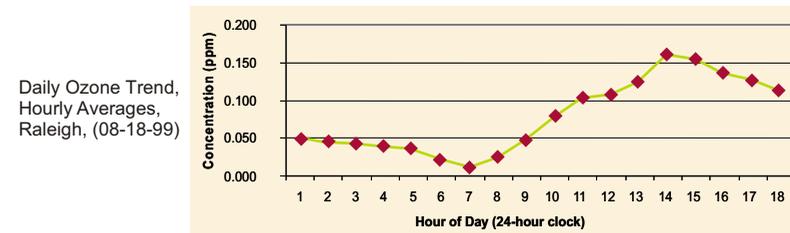
Ozone is unhealthy to breathe, particularly among sensitive groups: children; people with asthma and other respiratory ailments; and people who work or exercise vigorously outdoors. Symptoms of ozone exposure can include coughing, throat irritation, chest pain, rapid and shallow breathing, and asthma attacks. Emergency room visits for asthma have increased as much as 36 percent on high ozone days, according to some studies.

High ozone levels can damage leaves on trees and crops, reducing growth rates and crop yields. In 1995, ground-level ozone caused \$2.7 billion in crop damage nationwide, according to the U.S. EPA. Ozone also can prematurely degrade rubber, paints and other materials.



Ozone is primarily a problem during the summer months, when heat and sunlight are more intense. Ozone levels also vary on a daily basis. In most areas, ozone levels peak in the afternoon, when temperatures are higher, and then drop at night. In the mountains, however, ozone levels can remain high throughout the day and night at altitudes above 4,000 feet.

You can prevent unhealthy ozone exposure by limiting outdoor work and exercise in the afternoons on high ozone days. Ozone levels generally are much lower in the mornings, so limit exposure by working and exercising outdoors before noon. Ozone generally is not a problem indoors because it is filtered out by air conditioners and household furnishings.



Ozone Forecasts



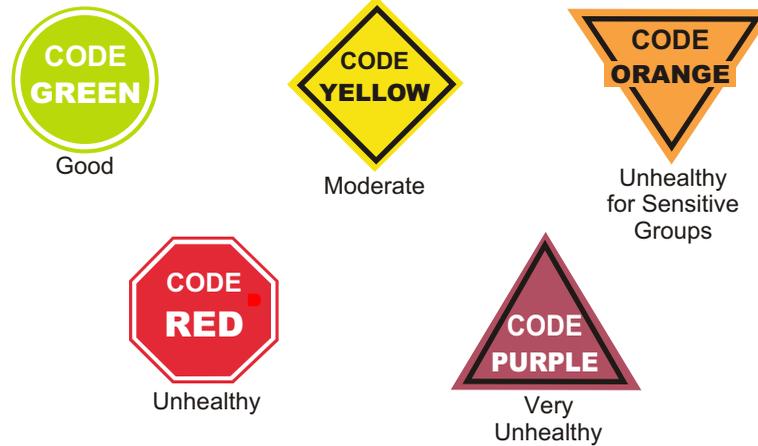
The N.C. Division of Air Quality (DAQ) and the Forsyth County Environmental Affairs Department issue daily ozone forecasts from May through September. These forecasts enable citizens to limit their exposure on high-ozone days and take actions that help reduce ozone-forming pollution. Forecasters use a color-coded system to advise the public about ozone exposure.

Ozone forecasts currently are available in the following metropolitan areas: Asheville, Charlotte, Fayetteville, Hickory, the Triad and the Triangle.

Many television news shows and newspapers publicize ozone forecasts in their weather reports. Citizens also can obtain forecasts by:

- Calling this toll-free number: 1-888-784-6224 (1-888-RU4NCAIR);
- Visiting this Internet web site: <http://daq.state.nc.us/>;
- Subscribing to receive fax or e-mail notices by contacting this address: air.awareness@ncmail.net.

Ozone Color Codes



Ozone forecasts are a key part of the N.C. Air Awareness Program, which educates and informs the public about air pollution, its causes and effects, and ways to prevent it. The Air Awareness Program also sponsors:

- Educational activities for children, including games, videos, publications and puppet shows;
- Training workshops for teachers and classroom visits;
- Air quality coalitions with businesses, local government agencies, and other employers;
- Exhibits and other public outreach efforts at conferences, festivals and other events.

Frequently Asked Questions

What are ozone action days?

Ozone action days occur when ozone levels are Code Orange, Red or Purple. On these days, ozone levels exceed the standard, which is 0.08 parts per million averaged over an 8-hour period. (Parts per million, or ppm, is a unit expressing the concentration of a compound in air or water.) Ozone levels above the standard are considered unhealthy to breathe, particularly among sensitive groups. Most ozone action days occur during the warmer months, from May through September.

Is it safe to go outside and exercise on ozone action days?

People can safely go outside on ozone action days, but they should avoid vigorous outdoor exercise or labor in the afternoons. Even on Code Orange or Red days, ozone levels generally do not reach unhealthy levels until the afternoons when temperatures are the hottest. Morning is the best time for outdoor activities on high ozone days. At high elevations in the mountains, ozone levels can remain high throughout the day and night during bad air events — so people should limit outdoor activities if they notice signs of adverse ozone reactions, such as coughing and breathing difficulty.

Are some people more sensitive to ozone?

Yes. Groups that are more sensitive to ozone include children, people with asthma and other respiratory ailments, adults who work or exercise vigorously outdoors, and some healthy individuals with unusual susceptibility. Children are most at risk because they breathe more air per pound of body weight, their lungs are still developing, and they are more likely to have asthma and other respiratory illnesses.

What is North Carolina doing to reduce ozone pollution?

North Carolina is taking actions to reduce ozone-forming emissions from cars and trucks, power plants and other industries. In 1999, the N.C. General Assembly enacted legislation that will require cleaner gasoline statewide and expand the motor vehicle emissions testing program to nearly half the state by 2006. In 2001, the N.C. Environmental Management Commission adopted new rules to require substantial reductions in NOx emissions from power plants and other large industrial sources.



How can individuals help reduce ozone pollution?

Anything you can do to cut energy consumption can help reduce ozone-forming pollution. Examples include: carpooling or other efforts to drive less; riding the bus, train or mass transit; riding a bicycle or walking; setting thermostats higher on air conditioners; keeping cars tuned up and tires properly inflated; obeying speed limits; and turning off appliances and lights when not in use.



For More Information

Statewide: N.C. Air Awareness Program, Division of Air Quality, toll-free phone 1-888-RU4NCAIR (1-888-784-6224), <http://daq.state.nc.us>
Charlotte Area: Mecklenburg County Department of Environmental Protection, phone (704) 336-5500, <http://www.co.mecklenburg.nc.us/coenv/>
Triad Area: Forsyth County Environmental Affairs Department, phone (336) 727-8064, <http://www.co.forsyth.nc.us/EnvAffairs/>
Asheville Area: Western North Carolina Air Pollution Control Agency, phone (828) 255-5655, <http://www.wncair.org/>
Health and Ozone: N.C. Division of Public Health, Occupational and Environmental Epidemiology, phone (919) 733-3410, <http://www.dhhs.state.nc.us/ozone.htm>

