

Ozone: The Facts

Sound science and targeted regulations have greatly reduced ozone in Texas cities and across the nation.

The TCEQ uses scientific research to reduce ozone and Texas has devoted millions of dollars to air quality research during the past decade, including two major field studies—the Texas Air Quality Study 2000 and Texas Air Quality Study II.

As a result, ozone concentrations have decreased statewide—by 24 percent from 2000 to 2013. By comparison, the rest of the nation averaged only a 12 percent decrease over the same period.

The TCEQ's goal is sensible regulation, based on sound science that addresses real environmental risks while complying with state and federal statutes.

What is ozone?

Ozone is a gas that is formed in the atmosphere when three atoms of oxygen combine. Ozone is found high in the Earth's upper atmosphere and at ground level. Ozone has the same chemical structure wherever it occurs.

Stratospheric Ozone: Ozone occurs naturally in the Earth's upper atmosphere—6 to 30 miles above the Earth's surface—where it forms a protective layer that shields us from the sun's harmful ultraviolet rays.

Ground-Level Ozone: Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOCs. In addition, biogenic sources (living organisms or biological processes) also release VOCs that can contribute to ground-level ozone.

What are the health effects of ground-level ozone?

Breathing relatively high levels of ground-level ozone can cause acute respiratory problems such as coughing and respiratory irritation and can aggravate the symptoms of asthma.

What are the conditions that lead to elevated ground-level ozone?

Ozone, sometimes referred to as smog, mainly forms the highest concentrations on sunny days with slow wind

speeds, which allow pollutants to accumulate. Summer days in Texas can be conducive for ozone formation as high-pressure systems dominate our local weather patterns, giving us clear skies and stagnant winds.

What about indoor air quality?

The U.S. Environmental Protection Agency has identified and characterized significant risks to public health from indoor environmental contaminants that are commonly found in homes, schools, offices, and other buildings where on average, Texans are spending about 90 percent or more of their time, a significant increase over 20 years ago. Indoor levels of air pollution may be up to two to five times higher, and occasionally 100 times higher, than outdoor levels—according to the Texas Department of State Health Services.

Common indoor air contaminants include radon, tobacco smoke, mold, irritant and allergenic asthma triggers, combustion by-products and VOCs. Indoor contaminants:

- may be of natural origin, for example, radon, allergens and molds;
- may derive from products used indoors, such as finishes, upholstery, and cleaning products; or
- may result from indoor processes and behaviors, such as smoking, use of unvented combustion sources, or cleaning, operation, and maintenance procedures.

Building systems (for example, heating, ventilating, and air conditioning) also have a direct influence on the type and amount of exposure occupants may experience from environmental contaminants indoors.

For more information on indoor air quality visit:

- U.S. EPA, Indoor Air Quality—<epa.gov/iaq/>
- Texas Department of State Health Services—<dshs.state.tx.us/iaq/>

Should I limit exercise and stay indoors because of ozone concentrations?

The World Health Organization ranks physical inactivity as a major risk factor for heart disease, breast cancer, colon cancer, and diabetes. The Centers for Disease Control and Prevention found that 26.6 percent of Texans were inactive in 2010. For children, the risks of obesity are well documented.

Given that physical exercise is important to adults and children for prevention of disease and obesity (see <cdc.gov/healthyweight/physical_activity/>), individuals must consider those benefits when making choices about

following the EPA's recommendations to limit exercise outdoors and stay indoors because of concentrations of ozone in ambient air.

A personal decision to limit outdoor activities should consider weather conditions more than ozone levels. Exercise during high heat and humidity can lead to health risks, so temperature matters when making personal choices about exercising.

For more information visit:

- Childhood Obesity Facts—cdc.gov/healthyyouth/obesity/facts.htm
- Physical Activity for a Healthy Weight— cdc.gov/healthyweight/physical_activity/.

What is background ozone and why is it important?

The study of background ozone is important in order to understand how much ozone is contributed to an airshed locally. (An airshed is a geographic area that experiences similar conditions, such as channeling of air or presence of pollutants.)

“Background ozone” can be described as the amount of ozone due to distant sources entering an airshed, plus ozone occurring naturally in an airshed. This definition can help to differentiate between the natural and transported ozone, and the ozone produced locally. This concept is important when understanding the contribution of a local area as opposed to the background contribution of ozone in considering control strategies.

What is an ozone forecast?

Ozone forecasts are made daily during the ozone season for each of nine metropolitan areas in Texas listed below. Each forecast predicts whether ozone levels in each area will reach or exceed the U.S. EPA's Air Quality Index Level Orange category, which is defined in federal rule as an eight-hour average of 76 parts per billion or a one-hour average of 125 ppb.

TCEQ meteorologists use a set of criteria from historic meteorological data, ozone measurements, and ozone-prediction models to make these predictions. When they

forecast an Ozone Action Day, the meteorologists contact the National Weather Service, which then broadcasts the information across its “weather wire.” The agency also contacts officials in affected areas so that local community clean-air coalitions can notify media, government, business, and industry. The forecasts are made, in most cases, by 2 p.m. local time and are valid for the next day.

The ozone forecast seasons are based on when each region is likely to experience elevated ozone concentrations. Each day during ozone forecast season (roughly March through November in Texas), the TCEQ forecasts ozone levels for nine participating metropolitan areas (see table below).

What is the Air Quality Index?

The EPA has a scale called the Air Quality Index for rating air quality. The AQI scale is based on the National Ambient Air Quality Standards and is described in Title 40, Code of Federal Regulations, Part 58, Appendix G.

Each NAAQS pollutant has a separate AQI scale; an AQI rating of 100 corresponds to the concentration of the federal standard for that pollutant.

Additional information about the AQI and how it can be used is available from the EPA.

What can I do to limit ozone formation?

- Limit driving and idling; instead, carpool, combine errands, use public transportation, bike, or walk.
- Don't top off the tank when refueling your vehicle.
- Keep your vehicle maintained, including proper tire pressure.
- Maintain your yard equipment, including changing the oil and replacing air filters regularly. Also consider using tools without motors. Hand tools such as shears, edgers, and push reel mowers are lightweight, quiet, and easy to use, and do not generate emissions.
- Don't burn yard waste.
- Use paint and cleaning products with less or zero VOCs.
- Refuel in late afternoon or evening.

Metropolitan Area	Ozone Forecast Season Begins	Ozone Forecast Season Ends
Austin–Round Rock	April 1	Oct. 31
Beaumont–Port Arthur	May 1	Oct. 31
Corpus Christi	April 1	Oct. 31
Dallas–Fort Worth	March 1	Oct. 31
El Paso	May 1	Oct. 31
Houston-Galveston-Brazoria	March 1	Nov. 30
San Antonio	April 1	Oct. 31
Tyler-Longview	May 1	Sept. 30
Victoria	May 1	Sept. 30

How can I sign up to receive e-mail and text alerts?

You can subscribe to e-mail alerts about the TCEQ's Air Quality Forecast, and text or e-mail alerts about other topics at <tceq.texas.gov/goto/updates>.

You can also sign up to receive e-mail alerts through EPA's EnviroFlash website at <enviroflash.info/>.

Related Web Pages

- Take Care of Texas encourages all Texans to help keep our air and water clean, conserve water and energy, and reduce waste—<TakeCareOfTexas.org>.
- Sign up for *Take Care of Texas News You Can Use*—a free monthly e-newsletter—at <TakeCareOfTexas.org/archive>.

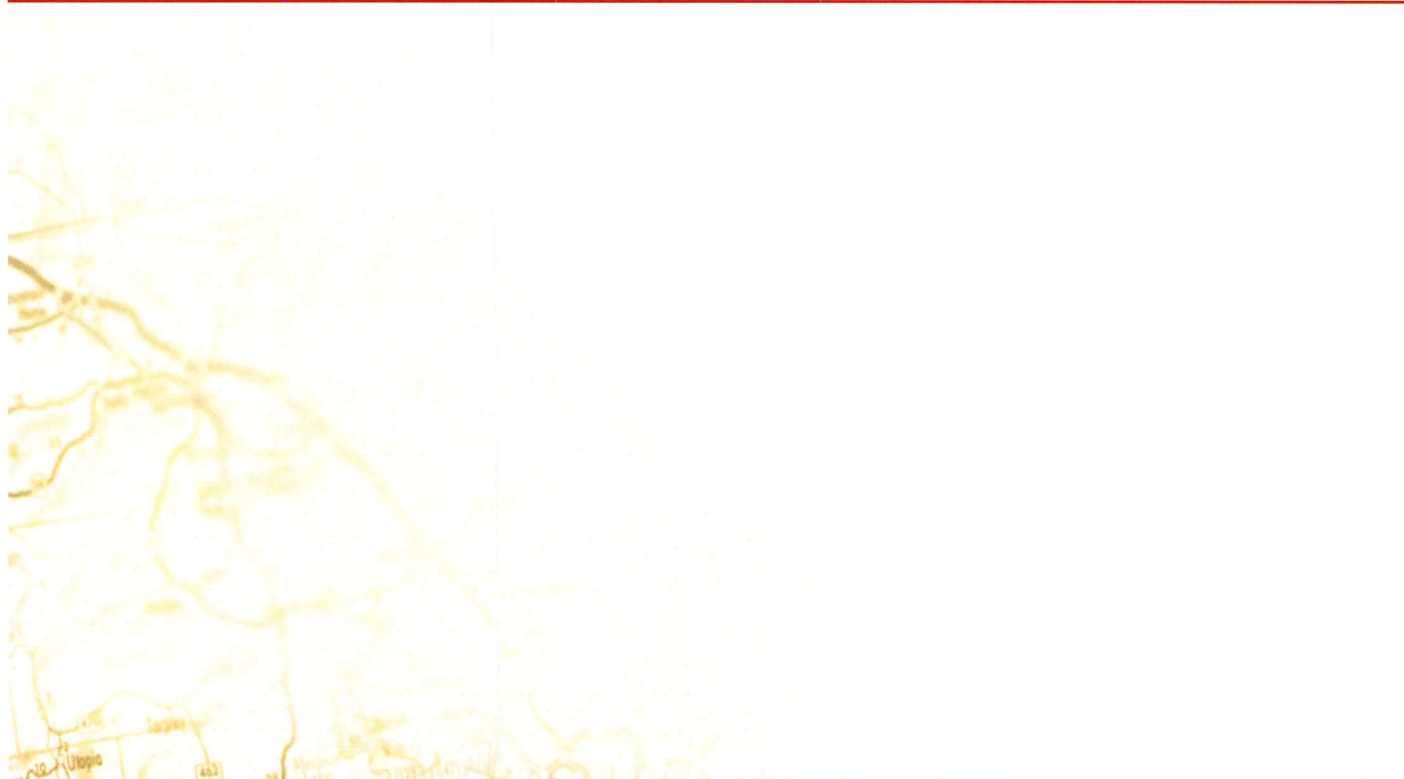
For More Information:

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