

Fact Sheet for Teachers about Ozone in San Juan County

Tripper, Bear, and the Air is an activity book intended to help your students learn about ozone air pollution in San Juan County. This fact sheet can help you with planning lessons and other activities for your students.

What is Ozone?

Ozone is an odorless, colorless gas composed of three atoms of oxygen. Ozone in the upper layers of the atmosphere (the stratosphere) is essential to screen and absorb the sun's radiation. However, ozone in the lower atmosphere (the troposphere) can cause harmful health effects. Harmful ozone is formed at ground level when industrial emissions, automobile emissions and residential emissions of nitrogen oxides and volatile organic compounds (VOC) mix together in the presence of heat and sunlight.

Ozone concentrations vary seasonally; highest concentrations generally occur during the summer months. For most areas, ozone concentrations are generally lowest in the early morning hours and peak during the afternoon.

Ozone and Health

Ozone can affect a wide range of people, particularly the elderly, young children and those with asthma or other respiratory ailments. Some symptoms associated with ozone include stinging eyes and throats, chest pains, coughing and breathing difficulty. Children are more sensitive to high levels of ozone because their respiratory systems are not fully developed and they tend to breathe more per body weight than adults. People with respiratory diseases, such as asthma, generally experience the effects of ozone earlier and at lower ozone concentrations than less sensitive individuals.

In addition to affecting human health, ozone pollution can cause damage to plants and crops. Ozone can kill or damage leaves so they become spotted or brown. This type of damage can significantly decrease the natural beauty of areas such as national parks and recreation areas. Long-term exposure of ozone pollution on plants and crops adds up over many years, so that whole forests and ecosystems can be affected.

Ozone in San Juan County

The New Mexico Environment Department Air Quality Bureau (AQB) monitors ambient ozone levels at various locations within New Mexico. In the San Juan County area ozone is monitored at two sites: one west of Farmington near the PNM Substation and one north of Bloomfield near the Bloomfield Gas Corridor.

To protect public health, the United States Environmental Protection Agency (EPA) implements a National Ambient Air Quality Standard (NAAQS) for ozone pollution. Areas that exceed the ozone NAAQS must follow mandated guidelines and are subject to penalties.

For several years, the AQB has recorded high concentrations of ozone in San Juan County that approach the ozone NAAQS. In light of the fact that these measured concentrations of ozone pollution were higher than ozone concentrations in other parts of the state (including Albuquerque) and near the NAAQS, the AQB formed a task force of local citizens and started researching the issue to determine what is causing the high concentrations of ozone in San Juan County.

Ozone Vocabulary List

Atmosphere

The whole mass of air surrounding the earth.

Carbon Dioxide

Colorless, odorless gas formed during respiration and by the decomposition of organic substances.

Environmental Protection Agency

A federal agency charged with developing and enforcing regulations that implement environmental laws enacted by Congress.

Haze

Atmospheric moisture or air pollution that causes reduced visibility.

National Ambient Air Quality Standards

Health standards that were established by EPA to protect the public from exposure to harmful amounts of pollutants.

Nitrogen Oxides

Pollutants that are formed from burning fuels. Sources included power plants that produce electricity, and automobiles.

Oxygen

Colorless, odorless gas that makes up about 20 percent of the air we breathe.

Ozone

Ozone is a powerful pollutant that can cause lung damage.

Part Per Million

One part of something in one million parts of something else - like a grain of salt in a million grains of sugar.

Pollution

The undesirable condition of the natural environment being polluted with harmful substances as a result of human actions.

Solvents

A liquid substance that is capable of dissolving or dispersing one or more other substances.

Volatile Organic Compounds

A group of chemicals that reacts in the atmosphere with nitrogen oxides in the presence of heat and sunlight to form ozone. Sources include oil and gas production and house hold products such as paints, solvents and cleaners.

Ultraviolet

Radiation from the sun in the invisible portion of the spectrum; can be useful or potentially harmful.

Suggested student activities:

1. Web activity. Have students use the New Mexico Environment Department website to find out more information on ozone in San Juan County.
2. List sources of nitrogen oxides and volatile organic compounds in San Juan County. Students can list sources of ozone-forming air pollutants that they see on a regular basis.
3. Ozone Action Items. Have the students keep a journal for a month on the ozone action steps that the students and their families take to help reduce ozone pollution in San Juan County.
4. Design Posters. Have the students design their own posters about how to reduce ozone in San Juan County. Posters can be placed around the county in local and county government offices.