

Pollutant Glossary

Learn about many of the air pollutants that affect the Bay Area.

Acid Deposition

Acid deposition is a general term for a mixture of wet and dry precipitation that is unusually acidic (such as acid rain, snow, fog, and mist). Considered to be a major environmental problem, acid deposition occurs when emissions of carbon dioxide, sulfur dioxide, and nitrogen oxides react with water molecules in the atmosphere to create acidic compounds.

In Canada and Scandinavia, acid rain has killed fish populations and other marine life in many small lakes, and acid smog was responsible for several thousand deaths in London in 1952. California has lower emissions of sulfur oxides than other parts of the world, so the primary source of acid rainfall here is nitric acid from motor vehicle emissions.

Carbon Monoxide (CO)

Carbon monoxide is an odorless, invisible, flammable gas that can be dangerous to human health in high concentrations, especially indoors with little ventilation.

Nearly 70 percent of the Bay Area's carbon monoxide comes from motor vehicles. A substantial amount also comes from burning wood in fireplaces and woodstoves. State and federal controls on new cars and seasonal wood burning have been established to prevent carbon monoxide from reaching harmful levels. The Bay Area has not exceeded the national or state standard for carbon monoxide in several years, and is formally recognized as a carbon monoxide attainment area.

Ground-Level Ozone (O₃)

Ground-level ozone (also known as smog) is created by chemical reactions between ozone precursors oxides of nitrogen and volatile organic compounds 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 these ozone precursors. Ozone is most likely to form in the summer and early fall on warm, windless, sunny days. Breathing ozone can aggravate asthma and other respiratory diseases, irritate the eyes, reduce visibility, and damage vegetation.

Motor vehicles are the greatest contributor to ozone in the Bay Area, accounting for more than 50 percent of ozone precursors in the region. California's motor vehicle emissions control program, along with the Air District's regulatory controls, has significantly reduced Bay Area ozone concentrations in the last few decades. For example, the national ozone standard was exceeded on 65 days in 1969, compared with just four days in 2011.

Hydrogen Sulfide (H₂S)

Hydrogen sulfide is a colorless, poisonous gas with a strong odor of rotten eggs that can be smelled at very low concentrations. This gas is produced primarily at sewage treatment plants and oil refineries as a byproduct of refining crude oil. It discolors paint, tarnishes many metals, and has a wide range of health effects. Air District regulations limit ground-level concentrations of hydrogen sulfide in the Bay Area.

Nitrogen Oxides (NO_x)

Nitrogen oxides are a group of gases that form when nitrogen reacts with oxygen during combustion, especially at high temperatures. These compounds (including nitric oxide and nitrogen dioxide), can contribute significantly to air pollution, especially in cities and areas with high motor vehicle traffic.

In the Bay Area, nitrogen dioxide appears as a brown haze. At higher concentrations, nitrogen dioxide can damage sensitive crops, such as beans and tomatoes, and aggravate respiratory problems. The U.S. Environmental Protection Agency, California Air Resources Board, and Air District have all adopted measures to reduce emissions of nitrogen oxides. The Air District places restrictions on pollutant sources such as power plants, boilers, stationary turbines, and stationary engines, and addresses motor vehicle sources by working to change people's driving habits.

Organic Compounds

Organic compounds, such as hydrocarbons, are released when fuels or organic waste material are burned. They are also emitted by consumer products, such as aerosol sprays, and by the evaporation of paints, inks, solvents, and gasoline. Some organic compounds are toxic, including benzene, formaldehyde, and acrolein. Exposure to these compounds poses significant health effects, including cancer risk; chronic diseases of the lungs, liver, and kidneys; and acute eye and respiratory irritation.

Organic compounds are significant air pollutants because they react with oxides of nitrogen in the presence of sunlight to form ozone (smog). The Air District has adopted more than 50 rules to control organic compound emissions from operations such as petroleum production and refining, coating operations, and semiconductor manufacturing. The Air District also established the [Community Air Risk Evaluation Program \(/en/community-health/community-health-protection-program/community-air-risk-evaluation-care-program\)](#) to identify locations with high levels of toxic emissions and sensitive populations, and is working to reduce emissions in those areas.

Particulate Matter (PM)

Particulate matter is a complex pollutant composed of an assortment of tiny airborne particles that vary in size and mass (ultrafine, fine, and coarse), physical state (solid or liquid), chemical composition, toxicity, and how they behave in the atmosphere. These particles originate from a variety of man-made and natural sources, including

fossil fuel combustion, refining crude oil, residential wood burning and cooking, wildfires, volcanoes, sea salt, and dust. Because they are so small, these particles can bypass the body's natural defenses and penetrate deep into the lungs, bloodstream, brain and other vital organs, and individual cells. Health studies have shown that exposure to PM can have a wide range of negative health effects, including asthma, chronic bronchitis, impaired lung development in children, heart attack, stroke, and premature death.

Residential wood burning is the largest source of PM in the Bay Area during the winter. While the Air District has made significant progress reducing overall PM levels through its Wood Burning Rule and other measures, it is still the most hazardous air pollutant in the Bay Area in terms of health impacts.

Sulfur Oxides (SOx)

Heating and burning fossil fuels (such as coal and oil) release the sulfur present in these materials. In areas where large quantities of fossil fuels are used, sulfur oxides can be a major air pollution problem.

The most common kind of sulfur oxide is sulfur dioxide. This substance can react with oxygen to form sulfur trioxide, which can form sulfuric acid mist in the presence of moisture. These contaminants can damage vegetation and negatively impact the health of both humans and animals.

In the past, sulfur oxides were a problem in the Bay Area, especially near the large oil refineries and chemical plants in Contra Costa County. However, the Air District has been controlling emissions from these sources since 1961, and no state or federal excesses of sulfur compound emissions have been recorded since 1976.

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