

AIR POLLUTION GLOSSARY

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INTRODUCTION

This glossary is intended to help interested citizens understand the most commonly used air pollution terms. The glossary is divided into two sections:

- (1) **Governmental Section**
- (2) **Technical Section**

The governmental section gives an overview of the laws, regulations, and government agencies involved in assuring healthful air quality. The technical section explains some scientific terms used to describe pollutants, the processes that form them, and their effects.

GOVERNMENTAL SECTION

Introduction to The Regulatory System

Both the Federal and State governments have laws and agencies that control air pollution. At the federal level, the U.S. Environmental Protection Agency (**EPA**) is responsible for safeguarding the nation's air quality. Each state must meet the standards set by the **EPA**. Some states, including California, have passed standards that are more strict than those set by the **EPA**, so polluters must also comply with those standards. The **EPA** works with state and local agencies to make sure that air quality in the state at least meets federal standards. The state and local agencies monitor pollution and enforce both state and federal standards.

In California, the Air Resources Board (**ARB**) is the lead agency responsible for air quality. Local counties, overseen by the **ARB**, develop and implement local air quality management plans. The counties specifically regulate emissions made by local **stationary sources** (i.e., those that don't come from moving objects such as cars and trains; **mobile sources**). In addition to overseeing local regulatory efforts, **ARB** has direct authority over **mobile sources**.

Together, Federal, State, and local agencies, in coordination with the regulated and general public, are acting to bring the State into compliance with health and welfare based air quality standards. Under the current regulatory framework it is expected that California will meet this goal within the next two decades.

Governmental Terms:

AB 1807 (Tanner): A California State law (Health and Safety Code Section 39650 et seq.) which became effective in January of 1984 and established the framework for California's **toxic air contaminant (TAC)** identification and control program.

AB 2588 (Connelly) Air Toxics "Hot Spots" Information and Assessment Program: A California program (Health and Safety Code Section 44300 et seq.) which requires certain **stationary sources** to report the type and quantity of specific toxic substances they routinely release into the air. The program identifies high priority facilities and requires facilities posing significant risks to notify all exposed individuals.

Airborne Toxic Control Measure (ATCM): A type of control measure, adopted by the **ARB** (Health and Safety Code Section 39666 et seq.), which reduces emissions of **toxic air contaminant (TAC)** from non-vehicular sources.

APCD (Air Pollution Control District): A county agency with authority to regulate **stationary**, indirect, and **area-wide sources** of air pollution (e.g., power plants, highway construction, and housing developments) within a given county, and governed by an **air pollution control district** board composed of the elected county supervisors. (Compare **AQMD**).

AQMD (Air Quality Management District): A group of counties or portions of counties, or an individual county specified in law with authority to regulate **stationary**, indirect, and **area-wide sources** of air pollution within the region and governed by a regional air pollution control board comprised mostly of elected officials from within the region. (Compare **APCD**).

AQMP (Air Quality Management Plan): A plan prepared by an **APCD/AQMD**, for a county or region designated as a **non-attainment area**, for the purpose of bringing the area into compliance with the requirements of the **National** and/or **California Ambient Air Quality Standards (NAAQS/CAAQS)**. **AQMPs** are incorporated into the **State Implementation Plan (SIP)**.

ARB (California Air Resources Board): The State of California's lead air quality agency consisting of a nine-member Governor-appointed board. It is responsible for attainment and maintenance of the State and federal air quality standards, and is fully responsible for motor vehicle pollution control (**mobile sources**). It oversees county and regional air pollution management programs.

Attainment Area: A geographic area which is in compliance with the **National** and/or **California Ambient Air Quality Standards (NAAQS or CAAQS)**.

BACT (Best Available Control Technology): The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions (including economic, energy, and environmental considerations) for given regulated air pollutants and processes. **BACT** is a requirement of **NSR (New Source Review)** and **PSD (Prevention of Significant Deterioration)**.

BAR (Bureau of Automotive Repair): An agency of the California Department of Consumer Affairs that manages the implementation of the motor vehicle **Inspection and Maintenance Program**.

CAAQS (California Ambient Air Quality Standard): A legal limit that specifies the maximum level and time of exposure in the **ambient air** (outside) for a given **air pollutant** and which is protective of human health and public welfare (Health and Safety Code 39606b). **CAAQSs** are recommended by the California Office of Environmental Health Hazard Assessment and adopted into regulation by the Air Resources Board. **CAAQSs** are the standards which must be met per the requirements of the **California Clean Air Act**.

CCAA (California Clean Air Act): A California law passed in 1988 which provides the basis for air quality planning and regulation independent of federal regulations. A major element of the Act is the requirement that any local **APCD/AQMD** in violation of the **CAAQS** must prepare attainment plans which identify air quality problems, causes, trends, and actions to be taken to attain and maintain California's air quality standards by the earliest practicable date.

CEQA (California Environmental Quality Act): A California law which sets forth a process for public agencies to make informed decisions on discretionary project approvals. The process aids decision makers to determine whether any environmental impacts are associated with a proposed project. It requires environmental impacts associated with a proposed project to be eliminated or reduced, and that air quality mitigation measures have been implemented.

Congestion Management Program: A state mandated program (Government Code Section 65089a) that requires each county to prepare a plan to relieve **mobile source** congestion and reduce air pollution.

Emission Offset (also known as an emission-trade-off): A rule-making concept whereby approval of a new or modified **stationary source** of air pollution is conditional on the reduction of emissions from other existing **stationary sources** of air pollution. These reductions are required in addition to reductions required by **BACT**.

Emission Standard: The maximum amount of a pollutant that is allowed to be discharged from a polluting source such as an automobile exhaust or smoke stack.

EPA (U.S. Environmental Protection Agency): The Federal agency charged with setting policy and guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.

FCAA (Federal Clean Air Act): A Federal law originally passed in 1955, and amended several times since (including major revisions in 1970, 1977 and 1990), which forms the basis for the national air pollution control effort. Basic elements of the Act include **national ambient air quality standards** for **criteria air pollutants, air toxics/hazardous air pollutant standards, acid rain** control measures, and enforcement provisions.

FIP (Federal Implementation Plan): In the absence of an approved **State Implementation Plan (SIP)**, a plan prepared by the **EPA** which provides measures that **non-attainment areas** must take to meet the requirements of the **Federal Clean Air Act**.

Growth Management Plan: A plan for a given geographical region containing demographic projections (i.e., housing units, employment, and population) through some specified point in time, and which provides recommendations for local governments to better manage growth and reduce projected environmental impacts.

Inspection and Maintenance Program: A motor vehicle (**mobile source**) inspection program implemented by the **BAR**. It is designed to identify vehicles in need of maintenance and to assure the effectiveness of their emission control systems on a biennial basis. Enacted in 1979 and strengthened in 1990. (Also known as the "**Smog Check**" program).

Indirect Source: Any facility, building, structure, or installation, or combination thereof, which generates or attracts **mobile source** activity that results in emissions of any pollutant (or precursor) for which there is a **ambient air quality standard**. Examples of **indirect sources** include employment sites, shopping centers, sports facilities, housing developments, airports, commercial and industrial development, and parking lots and garages.

Indirect Source Control Program: Rules, regulations, local ordinances and land use controls, and other regulatory strategies of **air pollution control districts** or local governments used to control or reduce emissions associated with new and existing **indirect sources**. **Indirect source control programs** include regulatory strategies such as transportation control measures (e.g., South Coast's Regulation XV for employer-based trip reduction); parking charges; land use controls that reduce the need for vehicle travel and increase transit, bicycle, and pedestrian access; and source-specific regulations such as truck idling and travel schedule requirements.

Indirect Source Review: A major component of an **indirect source control program** which applies to new and modified **indirect sources**. Strategies for **indirect source review** include permit programs, review and comment on new and modified **indirect source** projects through the **California Environmental Quality Act (CEQA)** process, and coordination of air quality, transportation and land use policies through local government general plans. **Indirect source review** reduces emissions from new and modified sources through best available mitigation measures and additional offsite mitigation such as offsets and mitigation fees.

NAAQS (National Ambient Air Quality Standards): Standards set by the Federal **EPA** for the maximum levels of air pollutants which can exist in the outdoor air without unacceptable effects on human health (primary standards) or the public welfare (secondary standards).

NSR (New Source Review): A program used in development of permits for new or modified industrial facilities which may emit **criteria air pollutants**. The two major requirements of **NSR** are **Best Available Control Technology** and **Emission Offset** evaluations.

Non-Attainment Area: A geographic area identified by the **EPA** and/or **ARB** as not meeting either the **NAAQS** or **CAAQS** standards for a given pollutant.

OEHHA (Office of Environmental Health Hazard Assessment): A department within the California Environmental Protection Agency that is responsible for evaluating chemicals for adverse health impacts and establishing safe exposure levels. **OEHHA** also assists in performing **health risk assessments** and developing **risk assessment** procedures for air quality management purposes.

Permit: Written authorization from a government agency (e.g., an **air quality management district**) that allows for the construction and/or operation of an emissions generating facility or its equipment within certain specified limits.

PSD (Prevention of Significant Deterioration): A program used in development of permits for new or modified industrial facilities (**stationary sources**) in an area that is in attainment of the applicable **ambient air quality standards**. The intent is to limit the amount of additional air quality degradation below baseline (background) conditions, therefore preventing an **attainment area** from becoming a **non-attainment area**. This program (part of **NSR**), can require **BACT** and, if an **AAQS** is projected to be exceeded, **Emission Offsets**.

Public Workshop: A workshop held by a public agency for the purpose of informing the public and obtaining its input on the development of a regulatory action or control measure by that agency.

SCM (Suggested Control Measure): A technique recommended for local districts to use to control the emissions from certain **stationary sources** of air pollution.

SIP (State Implementation Plan): A document prepared by each state describing existing air quality conditions and measures which will be taken to attain and maintain **national ambient air quality standards** (see **AQMP**).

Smog Check Program: (see **Inspection and Maintenance Program**).

TAC (Toxic Air Contaminant): An air pollutant, identified in regulation by the **ARB**, which may cause or contribute to an increase in deaths or in serious illness, or which may pose a present or potential hazard to human health. **TACs** are considered under a different regulatory process (California Health and Safety Code Section 39650 et seq.) than pollutants subject to **CAAQSs**. Health effects due to **TACs** may occur at extremely low levels, and it is typically difficult to identify levels of exposure which do not produce adverse health effects.

Transportation Control Measure (TCM): Any control measure to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle (**mobile source**) emissions. **TCMs** can include encouraging the use of car pools and mass transit.

TECHNICAL SECTION

Introduction to Technical Terms

Air quality management and regulations are dependent on information gathered from a number of technical disciplines. These include the study of the health and environmental effects of pollutants, air quality sampling and pollutant measurement, data management and analysis, and control technology development. This section of the glossary is intended to provide a general understanding of the air-related terms most commonly used in these disciplines.

Technical Terms:

Acid Deposition: A comprehensive term for the ways that acidic compounds deposit from the atmosphere to the earth's surface. It can include: 1) wet deposition by means of **acid rain**, fog, and snow; and 2) dry deposition of acidic particles (**aerosols**).

Acid Rain: Rain which is especially acidic ($\text{pH} < 5.2$). Principal components of **acid rain** typically include nitric and sulfuric acid. These may be formed by the combination of nitrogen and sulfur oxides with water vapor in the atmosphere.

Acute Health Effect: An adverse health effect which occurs over a relatively short period of time (e.g., minutes or hours).

Aerosol: Particles of solid or liquid matter that can remain suspended in air for long periods of time because of extremely small size and light weight.

Air Pollutants: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects on humans, animals, vegetation, and/or materials.

Air Quality Simulation Model: A mathematical relationship between emissions and air quality which simulates the transport, dispersion, and transformation of compounds emitted into the air (also referred to as a Air Pollutant Dispersion Model).

Air Toxics: A generic term referring to a particularly harmful chemical compound (or group of compounds) in the air. Typically, substances that are especially harmful to health, such as those considered under EPA's **hazardous air pollutant (HAP)** program or California's AB 1807 **toxic air contaminant (TAC)** program, are considered to be **air toxics**. Technically, any compound that is in the air and has the potential to produce adverse health effects is an **air toxic**.

Alternative Fuels: Fuels such as methanol, ethanol, natural gas, and liquid propane gas that are cleaner burning and help to meet **ARB's mobile** and **stationary source** emission standards.

Ambient Air: The air occurring at a particular time and place outside of structures, particularly accessible to the public. Often used interchangeably with outdoor air.

AAQS (Ambient Air Quality Standards): Health (primary) and welfare (secondary) based standards for clean outdoor air which identify the maximum acceptable average air pollutant concentrations during a specified period of time (See also **NAAQS**, **CAAQS** and **criteria air pollutant**).

Area-wide Sources (also known as "area" sources): **Stationary sources** of pollution (e.g., water heaters, gas furnaces, fireplaces, and woodstoves) that are typically associated with homes and non-industrial sources. The **CCAA** requires **AQMDs** to include area sources in the development and implementation of the **AQMPs**.

Atmosphere: The gaseous mass or envelope surrounding the earth, approximately 60 to 80 km in height. The lower reaches of the **atmosphere** (up to 8 to 16 km) is called the troposphere; the upper reaches of the **atmosphere** (from 8-16 to 60-80 km) is called the stratosphere.

Burn Day: A day officially determined by meteorologists and air pollution specialists to have favorable weather conditions for good dispersal of **smoke** from the burning of agricultural and wildlands refuse.

Cancer: A group of diseases characterized by uncontrolled growth of body cells leading to the formation of malignant tumors that tend to grow rapidly and spread (metastasize).

Catalytic Converter: A motor vehicle pollution control device designed to reduce emissions such as oxides of nitrogen, hydrocarbons, and carbon monoxide. Catalytic converters have been required equipment on all new motor vehicles sold in California since 1976.

CFCs (Chlorofluorocarbons): A wide variety of chemical compounds consisting of chlorine, fluorine, and carbon. **CFCs** are used for refrigeration and air conditioning, foam packaging, solvents, and propellants. They are proven to cause depletion of the **atmosphere's** (stratospheric) ozone layer.

Chronic Health Effect: An adverse health effect which occurs over a relatively long period of time (e.g., months or years).

CO (carbon monoxide): A colorless, odorless gas resulting from the incomplete combustion of fossil fuels. Over 80% of the **CO** emitted in urban areas is contributed by motor vehicles (**mobile sources**). **CO** interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. **CO** is a **criteria air pollutant**.

CO₂ (carbon dioxide): A colorless, odorless, gas that occurs naturally in the earth's **atmosphere**. Significant quantities are also emitted into the air by fossil fuel combustion. Emissions of **CO₂** have been implicated with increasing the **greenhouse effect**.

Consumer Products: Products such as detergents, cleaning compounds, polishes, lawn and garden products, personal care products, and automotive specialty products which are part of our everyday lives and, through consumer use, may produce air emissions which contribute to air pollution.

Criteria Air Pollutant: An air pollutant for which acceptable levels of exposure have been determined and documented (in a criteria document), and for which an **ambient air quality standard** has been set. Examples include: **ozone**, **carbon monoxide (CO)**, nitrogen dioxide, **sulfur dioxide (SO₂)**, lead and **PM-10** (see individual pollutant definitions).

Electric Motor Vehicle: A motor vehicle which uses a battery-powered electric motor as the basis of its operation. Such vehicles have virtually no direct sources of air pollutants. Hybrid electric motor vehicles may operate using both electric and gasoline powered motors. Emissions from hybrid electric motor vehicles are also substantially lower than conventionally powered motor vehicles.

Emission Inventory: An estimate of the amount of pollutants emitted from **mobile** and **stationary sources** into the **atmosphere** over a specific period such as a day or a year.

Epidemiology: The study of the occurrence and distribution of disease within a population.

Fugitive Dust: Dust particles which are introduced into the air through certain activities such as soil cultivation, off-road vehicles, or any vehicles operating on open fields or dirt roadways.

Greenhouse Effect: The warming effect by the earth's **atmosphere** on the earth's surface. Light energy from the sun which passes through the earth's **atmosphere** is absorbed by the earth's surface and re-radiated into the atmosphere as heat energy. The heat energy is then trapped by the **atmosphere**, creating a situation similar to that which occurs in a greenhouse or a car with its windows rolled up. Many scientists believe that the emission of **CO₂** and other gases into the **atmosphere** may increase the **greenhouse effect** and contribute to global warming.

Hazardous Air Pollutant (HAP): An air pollutant considered by **EPA** to be particularly hazardous to human health. Emission sources of **hazardous air pollutants** are identified by **EPA**, and **emission standards** are set accordingly.

Hydrocarbon: A wide variety of chemical compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air as a result of fossil fuel combustion, fuel volatilization, and solvent use, and are a major contributor to **smog**. (Also see **ROG**).

Indoor Air Pollution: Air pollutants that occur within buildings or other enclosed spaces, as opposed to those occurring in outdoor, or **ambient air**. Some examples of **indoor air pollutants** are tobacco smoke, asbestos, formaldehyde, and radon.

Inversion: A layer of warm air in the **atmosphere** that lies over a layer of cooler air, trapping air pollutants in the lower layer.

LEV (Low Emission Vehicle): A vehicle which is certified to meet the **ARB 1994 emission standards** for **low emission vehicles**.

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes. (Contrast with **stationary sources**).

Monitoring: The periodic or continuous sampling and analysis of air pollutants in **ambient air** or from individual pollutant emission sources.

Nitrogen Oxides (Oxides of Nitrogen, NO_x): A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO₂), and other oxides of nitrogen. **Nitrogen oxides** are typically created during combustion processes, and are major contributors to **smog** formation and **acid deposition**. NO₂ is a **criteria air pollutant**, and may result in numerous adverse health effects.

Ozone: A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy. **Ozone** exists in the upper **atmosphere** (stratosphere) as well as at the earth's surface. **Ozone** at the earth's surface causes numerous adverse health effects and is a **criteria air pollutant**. It is a major component of **smog**.

Ozone Layer: A layer of stratospheric **ozone** 12 to 15 miles above the earth's surface which helps to filter out harmful ultraviolet rays from the sun. It may be contrasted with ground-level (tropospheric) **ozone**, which exists at the earth's surface and is a harmful component of photochemical **smog**. A primary concern is that compounds such as **chlorofluorocarbons (CFCs)**, used in air conditioning systems, are depleting the **ozone** layer. Stringent Federal requirements will phase out U.S. production of **chlorofluorocarbons** by the year 2000.

Ozone Precursors: Chemicals such as **hydrocarbons** and **oxides of nitrogen**, occurring either naturally or as a result of human activities, which contribute to the formation of **ozone**, a major component of **smog**.

PM-10 (Particulate Matter): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, **smoke**, fumes, and mists (also known as inhalable particulate matter). The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter deep into the lungs where they may be deposited to result in adverse health effects. **PM-10** also contributes to **visibility** reduction and is a **criteria air pollutant**.

Photochemical Reaction: A term referring to chemical reactions brought about by the light energy of the sun. The reaction of **nitrogen oxides** with oxygen in the presence of sunlight to form **ozone** is an example of a photochemical reaction.

Pollution Prevention: The use of materials, processes, or practices to reduce, minimize, or eliminate the creation of pollutants or wastes. It includes practices that reduce the use of toxic or hazardous materials, energy, water, and/or other resources.

Pollutant Standards Index (PSI): A numerical index used for reporting severity of air pollution. The higher the index, the higher the level of pollutants and the greater likelihood of health effects.

Risk Assessment: An evaluation of risk which estimates the relationship between exposure to a harmful substance and the likelihood that harm will result from that exposure. Risk assessments are generally expressed as the estimated chance per million that a person, exposed over some period of time (e.g., a 70 year lifetime) and some specified concentration of exposure, will experience a certain effect.

Risk Management: An evaluation of the need for and feasibility of reducing risk. It includes consideration of magnitude of risk, available control technologies, and economic feasibility.

ROG (Reactive Organic Gas): A reactive chemical gas, composed primarily of non-methane **hydrocarbon** compounds.

Sensitive Groups: Identifiable subsets of the general population that are at greater risk than the general population to the effects of a specific air pollutant (e.g., infants, asthmatics, elderly).

Smog: A combination of **smoke**, **ozone**, **hydrocarbons**, **nitrogen oxides**, and other chemically reactive compounds which, under certain conditions of weather and sunlight, may result in a murky brown haze that causes adverse health effects. The primary source of **smog** in California is motor vehicles (**mobile sources**).

Smoke: A form of air pollution consisting primarily of particulate matter (i.e., particles). Other components of **smoke** include gaseous air pollutants such as **hydrocarbons**, **nitrogen oxides**, and **carbon monoxide**. Sources of **smoke** may include fossil fuel combustion, agricultural burning, and other combustion processes.

SO₂ (sulfur dioxide): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of **SO₂**. **SO₂** and other sulfur oxides contribute to the problem of **acid deposition**. **SO₂** is a **criteria air pollutant**.

Stationary Sources: Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants. (Contrast with **mobile sources**).

Toxic Hot Spot: An area where the concentration of **air toxics** is at a level where individuals may be exposed to an elevated risk of adverse health effects. **Air toxic hot spots** may include sources such as landfills, sewage treatment plants, and metal plating operations.

Vapor Recovery Systems: Mechanical systems that collect and recover chemical vapors resulting from transfer of gasoline from operations such as tank-to-truck systems at refineries, tanker-to-pipeline systems at offshore oil operations, and pump-to-vehicle systems at gasoline stations.

Visibility: The clarity of the **atmosphere**, typically reported as the longest distance that atmospheric conditions allow a person to see (at a given time and location). **Visibility** reduction from air pollution is often due to the presence of **nitrogen oxides**, **sulfur dioxide (SO₂)**, and **PM-10 (particulate matter)**.

VOCs (Volatile Organic Compounds): **Hydrocarbon** compounds which exist in the **ambient air**. **VOCs** contribute to the formation of **smog**, and may themselves be **air toxics**. **VOCs** often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.