Definitions

**AirToxics:** Chemicals in the air that are known or suspected to cause cancer or other serious health effects, such as reproductive problems or birth defects. Air toxics are also known as "hazardous air pollutants." Mobile sources emit a number of air toxics associated with both long-term and short-term health effects in people, including heart problems, asthma symptoms, eye and lung irritation, cancer, and premature death.

**Benzene:** A cancer-causing hydrocarbon (C6H6) derived from petroleum. Benzene is a component of gasoline. Benzene emissions occur in exhaust as a byproduct of fuel combustion and also occur when gasoline evaporates.

**Carbon Monoxide (CO):** A colorless, odorless gas that forms when carbon in fuel is not burned completely. Carbon monoxide is a component of exhaust from motor vehicles and engines. Carbon monoxide emissions increase when conditions are poor for combustion; thus, the highest carbon monoxide levels tend to occur when the weather is very cold or at high elevations where there is less oxygen in the air to burn the fuel.

**Catalytic Converter:** An anti-pollution device located between a vehicle's engine and tailpipe. Catalytic converters work by facilitating chemical reactions that convert exhaust pollutants such as carbon monoxide and nitrogen oxides to normal atmospheric gases such as nitrogen, carbon dioxide, and water.

**Combustion:** The process of burning. Motor vehicles and equipment typically burn fuel in an engine to create power. Gasoline and diesel fuels are mixtures of hydrocarbons, which are compounds that contain hydrogen and carbon atoms. In "perfect" combustion, oxygen in the air would combine with all the hydrogen in the fuel to form water and with all the carbon in the fuel to form carbon dioxide. Nitrogen in the air would remain unaffected. In reality, the combustion process is not "perfect," and engines emit several types of pollutants as combustion byproducts.

**Emissions:** Releases of pollutants into the air from a source, such as a motor vehicle or a factory.

**Emission Standards:** Rules and regulations that set limits on how much pollution can be emitted from a given source. Vehicle and equipment manufacturers have responded to many mobile source emission standards by redesigning vehicles and engines to reduce pollution.
Evaporation: The process by which a substance is converted from a liquid into a vapor. "Evaporative emissions" occur when a liquid fuel evaporates and fuel molecules escape into the atmosphere. A considerable amount of hydrocarbon pollution results from evaporative emissions that occur when gasoline leaks or spills, or when gasoline gets hot and evaporates from the fuel tank or engine.

Fossil Fuels: Fuels—such as coal, natural gas, and crude oil—that come from the compressed remains of ancient plants and animals. Gasoline and diesel are fossil fuels that can be burned in internal combustion engines to power everything from jet planes to automobiles to railroad locomotives.

Haze: Atmospheric particulate matter and gases that diminish visibility. Visibility is reduced when light encounters tiny pollution particles, such as soot and dust, and some gases (such as nitrogen dioxide) in the air. Some light is absorbed by the particles and gases and other light is scattered away before it reaches your eye. More pollutants mean more absorption and scattering of light, resulting in more haze. Some haze-causing pollutants are directly emitted to the atmosphere from vehicle emissions; others are formed indirectly when pollutants from mobile sources react with other elements and materials in the atmosphere.

Hydrocarbons (HC): Chemical compounds that contain hydrogen and carbon. Most motor vehicles and engines are powered by hydrocarbon-based fuels such as gasoline and diesel. Hydrocarbon pollution results when unburned or partially burned fuel is emitted from the engine as exhaust, and also when fuel evaporates directly into the atmosphere. Hydrocarbons include many toxic compounds that cause cancer and other adverse health effects. Hydrocarbons also react with nitrogen oxides in the presence of sunlight to form ozone. Hydrocarbons, which may take the form of gases, tiny particles, or droplets, come from a great variety of industrial and natural processes. In typical urban areas, a very significant fraction comes from cars, buses, trucks, and nonroad mobile sources such as construction vehicles and boats.

Mobile Sources: Motor vehicles, engines, and equipment that move, or can be moved, from place to place. Mobile sources include vehicles that operate on roads and highways ("on-road" or "highway" vehicles), as well as nonroad vehicles, engines, and equipment. Examples of mobile sources are cars, trucks, buses, earth-moving equipment, lawn and garden power tools, ships, railroad locomotives, and airplanes.

Nitrogen Oxides (NOx): A group of highly reactive gases that contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. The common pollutant nitrogen dioxide (NO_2) can often be seen combined with particles in the air as a reddish-brown layer over many urban areas. Nitrogen oxides are formed when the oxygen and nitrogen in the air react with each other during combustion. The formation of nitrogen oxides is favored by high temperatures and excess oxygen (more than is needed to burn the fuel). The primary sources of nitrogen oxides are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels.

Ozone: A gaseous molecule that contains three oxygen atoms (O_3).
Ozone can exist either high in the atmosphere, where it shields the Earth against harmful ultraviolet rays from the sun, or close to the ground, where it is the main component of smog. Ground-level ozone is a product of reactions involving hydrocarbons and nitrogen oxides in the presence of sunlight. Ozone is a potent irritant that causes lung damage and a variety of respiratory problems.

**Particulate Matter (PM):** Tiny particles or liquid droplets suspended in the air that can contain a variety of chemical components. Larger particles are visible as smoke or dust and settle out relatively rapidly. The tiniest particles can be suspended in the air for long periods of time and are the most harmful to human health because they can penetrate deep into the lungs. Some particles are directly emitted into the air. They come from a variety of sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and wood burning. Other particles are formed in the atmosphere by chemical reactions.

**Particulate Matter 2.5 (PM2.5):** Particles that are less than 2.5 microns in diameter. These particles are often referred to as "PM fine." PM fine particles are so small that they are not typically visible to the naked eye. In the atmosphere, however, they are significant contributors to haze. Smaller particles are generally more harmful to human health because they can penetrate more deeply into the lungs than larger particles. Virtually all particulate matter from mobile sources is PM2.5.

**Particulate Filter:** An anti-pollution device designed to trap particles in diesel exhaust before they can escape into the atmosphere.

**Pollutants (Pollution):** Unwanted chemicals or other materials found in the environment. Pollutants can harm human health, the environment, and property. Air pollutants occur as gases, liquid droplets, and solids. Once released into the environment, many pollutants can persist, travel long distances, and move from one environmental medium (e.g., air, water, land) to another.

**Smog:** A commonly used term for pollution caused by complex chemical reactions involving nitrogen oxides and hydrocarbons in the presence of sunlight. Ozone is a key component of smog. Smog-forming chemicals come from a wide variety of combustion sources and are also found in products such as paints and solvents. Smog can harm human health, damage the environment, and cause poor visibility. Major smog occurrences are often linked to heavy motor vehicle traffic.

**Source:** Any place or object from which pollutants are released, such as a power plant, factory, tractor, car, or other machines. Mobile sources move (e.g., cars and buses), while stationary sources do not (e.g., factories).

**Vapor Recovery System:** An anti-pollution system designed to capture gasoline vapors that would otherwise escape into the atmosphere from hot vehicle engines and fuel tanks.

**Vehicle Miles Traveled (VMT):** The total number of miles traveled in a given period of time (e.g., day, year) by a given vehicle or fleet of vehicles. VMT, combined with pollution rates per mile traveled,
provide an estimate of the total amount of vehicle pollution in a given
period of time.