Rhode Island Department of Environmental Management
OFFICE OF AIR RESOURCES

Mobile Sources and Rhode Island

Air Pollutants from Vehicle Emissions

When a mobile source's engine is running, several different types of gases and particles are emitted. Not only do emissions come from the by-product of the combustion process (the exhaust) but also from evaporation of the fuel itself (evaporative emissions).

Credit: US Environmental Protection Agency

Carbon Monoxide (CO)

CO is a poisonous, colorless, odorless, and tasteless gas.

Mobile Sources of CO: CO is commonly emitted from vehicles due to the incomplete burning of natural gas and any materials containing carbons such as gasoline, oil, or propane.

CO & Your Health: CO is harmful when inhaled because it takes the place of oxygen in your bloodstream, and subsequently our bodies receive less oxygen if we breathe carbon monoxide. The health threat is most serious for children, the elderly, pregnant women, and those who suffer from heart disease. At higher levels of exposure, healthy individuals are also affected.

CO & the Environment: CO is a weak greenhouse gas (GHG) and its presence affects concentrations of other GHGs including methane, tropospheric ozone, and carbon dioxide.

Carbon Dioxide (CO2)

CO2 is a greenhouse gas and contributes to human-induced climate change.

Mobile Sources of CO2: CO2 is commonly emitted from vehicles due to the incomplete burning of fossil fuels.

CO2 & Your Health: Direct exposure to CO2 could result in headaches, dizziness, difficulty breathing, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions.

CO2 & the Environment: CO2 is constantly being exchanged among the atmosphere, ocean, and land surface as it is both produced and absorbed by the biosphere. Human activities are altering the carbon cycle by adding more CO2 to the atmosphere and by influencing the ability of natural sinks to capture and store CO2.

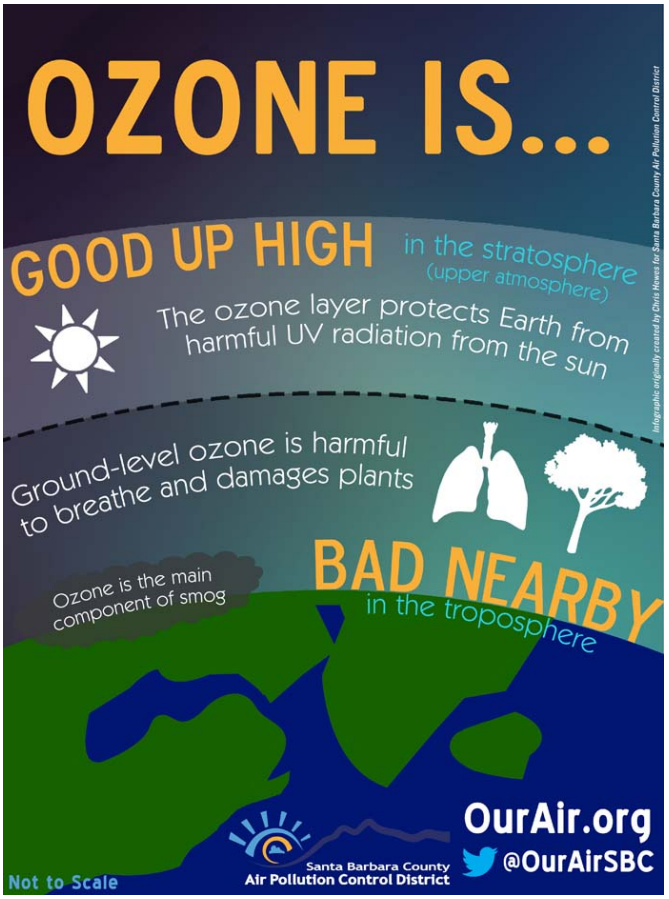
Hydrocarbons (HC)

HCs are organic compounds that are volatile enough to exist as a vapor under normal atmospheric conditions.

Mobile Sources of HC: HC is commonly emitted from vehicles due to the incomplete burning of fossil fuels and the evaporation of fossil fuels. Fuel evaporation increases as the temperature outside increases, when the engine remains hot after the car is turned off, and when the fuel tank is filled.

HC & Your Health: A number of HCs and VOCs are proven or suspected to cause cancer.

HC & the Environment: HCs mainly contribute to the formation of ground level ozone and to the depletion of stratospheric ozone.



Credit: Santa Barbara County APCD

Nitrogen Oxides (NOx)

NOx are a group of gases comprised of nitrogen monoxide (NO) and nitrogen dioxide (NO2). NO accounts for most NOx emissions.

Mobile Sources of NOx: NOx is emitted during fuel combustion.

NOx & Your Health: NOx exposure could result in respiratory irritation, headaches, pulmonary emphysema, impairment of lung defenses, eye irritation, and loss of appetite. The health threat is most serious for children, asthmatics, and individuals with chronic bronchitis or emphysema.

NOx & the Environment: When in the presence of volatile organic compounds (VOCs), NOx can form ground-level ozone in the lower atmosphere. NOx also contributes to the formation of acid rain, eutrophication of soil and water, and haze.

Example of a clear day in Boston
Credit: CAMNET/MANE-VU

Example of a hazy/polluted day in Boston
Credit: CAMNET/MANE-VU

Sulfur Dioxide (SO2)

SO2 is a colorless gas or liquid with a strong, chocking odor.

Mobile Sources of SO2: SO2 is emitted during fuel combustion, especially from diesel engines.

SO2 & Your Health: High SO2 exposure can cause a burning sensation in the nose and throat and difficulty breathing, especially for people who have heart disease or asthma.

SO2 & the Environment: Excess SO2 released into the environment can form acid rain.

Particulate Matter (PM)

PM is either directly emitted or forms in the atmosphere via emissions of SO2, NOx, NH3, and non-methane volatile organic compounds.

- **PM 2.5:** Particles less than 2.5 micrometers in diameter.
- **PM 10:** Particles between 2.5 and 10 micrometers in diameter.

Mobile Sources of PM: PM is directly emitted from any mobile source that uses a combustible fuel.

PM & Your Health: Particles smaller than 10 micrometers can enter the bloodstream and aggravate existing health problems. Children, people with heart or lung disease, and the elderly are most susceptible.

PM & the Environment: Some PM compounds react with other particles to form reaction products, including ground-level ozone. PM also contributes to acid deposition and reduces visibility.

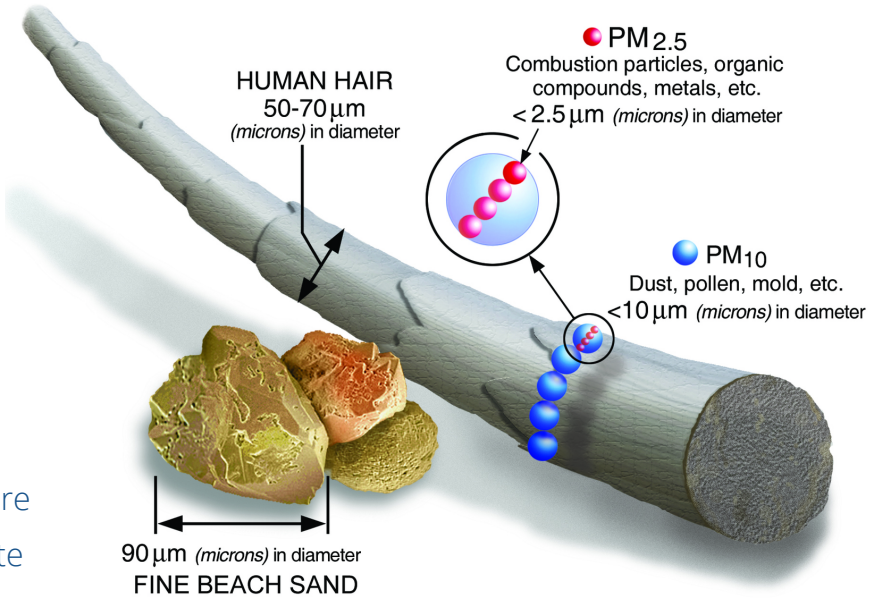
Hazardous Air Pollutants (HAPS)

HAPS are chemicals that are known (or suspected) to cause cancer or other serious health problems.

Mobile Sources of HAPS: Examples include benzene, formaldehyde, and diesel PM.

HAPS & Your Health: The threat is most serious for children and people with heart problems, emphysema, or other respiratory ailments.

HAPS & the Environment: Mobile sources are responsible for direct emissions and contribute to precursor emissions, which react to form secondary pollutants (such as ozone and PM).



Credit: US Environmental Protection Agency

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