

AP Environmental Science

Review of Common Ambient Air Pollutants



Name	Criteria	1° / 2°	Source & Impact
1. Carbon monoxide (CO)	Yes	1°	<p>Sources: Incomplete combustion of fuel, combustion of waste.</p> <p>Impact: Out competes O₂ for hemoglobin, potentially suffocating.</p>
2. Lead (Pb)	Yes	1°	<p>Sources: Exhaust fumes from leaded gasoline, metal smelting.</p> <p>Impact: A heavy metal that is toxic to nerve cells.</p>
3. Nitrogen dioxide (NO ₂)	Yes	1° + 2°	<p>Sources: Transportation (cars, trucks, trains, boats & planes), electrical utilities and some factories. N₂ + O₂ → NO₂</p> <p>Impact: A component of photochemical smog and acid deposition.</p>
4. Particulate matter (suspended particulate matter / SPM)	Yes	1° + 2°	<p>Sources: Soot and SO₂ from coal combustion, dust from human activities, natural dust sources</p> <p>Impact: Inhalation causes respiratory diseases, ranging from asthma to respiratory distress and lung cancer</p>
5. Sulfur dioxide (SO ₂)	Yes	1°	<p>Sources: Combustion of coal and petroleum.</p> <p>Impact: Reacts in atmosphere to form SO₃ and H₂SO₄, components of acid deposition. (see reactions sheet)</p>
6. Tropospheric ozone (O ₃) (aka: ground level ozone)	Yes	2°	<p>Sources: Reaction of NO from motor vehicles with sunlight, heat and O₂</p> <p>Impact: Damage to plants and respiratory system, traps heat, and contributes to thermal inversion</p>
7. Carbon dioxide (CO ₂)	No	1°	<p>Sources: Combustion of any organic material. Gasoline, petroleum, coal, natural gas, biomass. Also respiration.</p> <p>Impact: A greenhouse gas, CO₂ absorbs thermal radiation and re-emits it at lower wavelengths.</p>
8. Mercury (Hg)	No	1°	<p>Sources: Combustion of coal.</p> <p>Impact: A heavy metal that is toxic to nerve cells. Capable of bioaccumulation and biomagnification.</p>
9. Nitric Oxide (NO)	No	1°	<p>Sources: Transportation (cars, trucks, trains, boats & planes). High heat of engine causes O₂ + N₂ → NO</p> <p>Impact: Poisonous. Reacts with O₂ to form NO₂, leading to ground-level ozone production.</p>
10. Nitric Acid (HNO ₃)	No	2°	<p>Source: Transportation (cars, trucks, trains, boats and planes). NO₂ + H₂O → NO + HNO₃</p> <p>Impact: Contributes to acid deposition. Harms respiratory system.</p>
11. Peroxacyl nitrates (PANs)	No	2°	<p>Source: Transportation (cars, trucks, trains, boats and planes). NO₂ + hydrocarbons ("HC") → PANs</p> <p>Impact: A strong respiratory and eye irritant. Potentially mutagenic. Can damage vegetation.</p>
12. Sulfur trioxide (SO ₃)	No	2°	<p>Sources: Combustion of coal and petroleum. Coal has variable quantities of sulfur.</p> <p>Impact: Reacts with water in the atmosphere to form sulfuric acid (H₂SO₄). Contributes to acid deposition.</p>
13. Sulfuric acid (H ₂ SO ₄)	No	2°	<p>Sources: Combustion of coal and petroleum. Coal has variable quantities of sulfur.</p> <p>Impact: Contributes to acid deposition. Harms respiratory system.</p>
14. Volatile Organic Compounds (VOCs)	No	1° + 2°	<p>Sources: Automobile exhaust, solvents, industrial processes, household chemicals.</p> <p>Impact: Contribute to climate change & ground level O₃. Some are carcinogenic, some harm respiratory system</p>

*Note: The category labeled "1° + 2°" indicates whether the pollutant is a "primary air pollutant", a "secondary air pollutant" or both. This list was compiled and edited by J. Rodewald, Shaker High School, Latham, NY 12110. Forward any edits or comments to: rodewald@ncleanair.org. April 10, 2011.