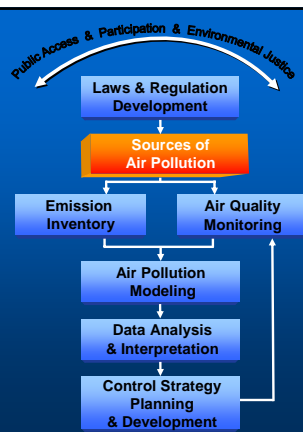


Chapter 3: Sources of Air Pollution

Chapter Overview

- Introduction
- Sources of Air Pollutants
 - Biogenic Sources (naturally occurring sources)
 - Anthropogenic Sources (man-made sources)
 - Mobile Sources
 - Stationary Sources
- Trends Associated with Major Pollutants and South Africa-Specific Information
- AQM Planning Tool Activity

Role of Sources of Air Pollution in an Air Quality Management Program.



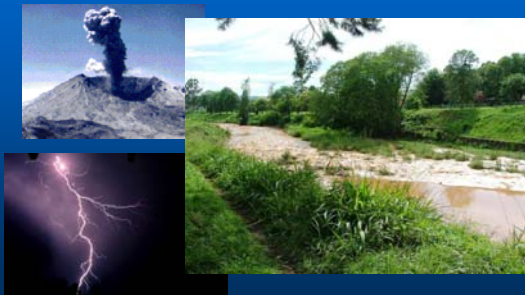
Pollutants in the Ambient Air

- Major Pollutants
 - Carbon Monoxide (CO)
 - Ozone (O₃)
 - Sulfur Dioxide (SO₂)
 - Particulate Matter
 - Nitrogen Oxides (NO_x)
 - Lead (Pb)
- Hazardous Air Pollutants
 - Benzene
 - Perchloroethylene
 - Methylene Chloride
 - Dioxin
 - Asbestos
 - Toluene
 - Cadmium
 - Mercury
 - Chromium
 - Many others

What Causes Air Pollution?

- Processes of nature that produce pollutants are classified as *biogenic* sources.
- Man's activities that produce air pollutants are classified as *anthropogenic* sources.

Biogenic (Naturally Occurring) Sources of Air Pollutants



Anthropogenic (Man-Made) Sources

- Mobile
- Stationary
 - Point
 - Area

Mobile Sources



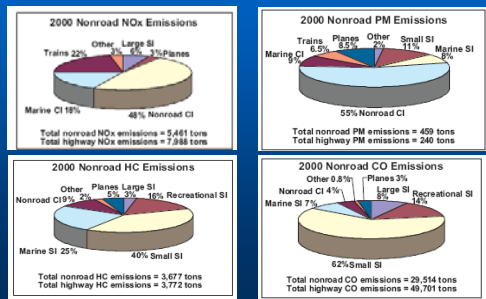
Onroad Mobile Sources

- Vehicles used on roads for transportation of passengers or freight, including:
 - light-duty vehicles (passenger cars),
 - heavy-duty vehicles, and
 - motorcycles.
- Typically fueled with:
 - gasoline,
 - diesel fuel, or
 - alternative fuels, such as alcohol or natural gas.

Nonroad Vehicles and Equipment Emissions

- Nonroad (also called off-road) includes:
 - Outdoor power equipment
 - Recreational vehicles
 - Farm and construction machinery
 - Lawn and garden equipment
 - Marine vessels
 - Locomotives

U.S. Nonroad Engine Emissions



Diesel Engines

- Diesel engines power many trucks, buses, trains, ships, and off-road machinery.
- Diesel exhaust is a mixture containing over 450 different components, including vapors and fine particles.
- For the same load and engine conditions, diesel engines spew out 100 times more particulates than gasoline engines.

Air Pollutants From Stationary Sources

Air pollutants from stationary sources are produced by activities such as:

- Combustion of fuel such as coal and oil at power generating facilities; and
- Industrial processes that release pollutants into the air

Air Pollutants From Stationary Sources (cont'd)

Stationary sources are classified as:

- Point Source
 - Fixed point such as a smokestack or storage tank.
- Area Source
 - Series of small sources that individually release small amounts of a given pollutant, but collectively can release significant amounts of a pollutant.

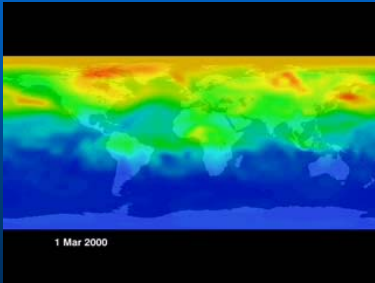
Fugitive Sources

Fugitive emissions are emissions which could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening.

Examples include:

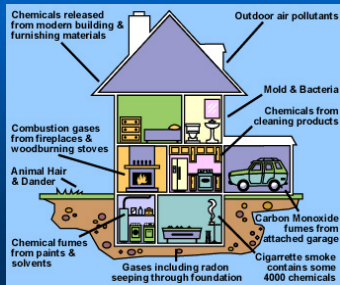
- Open land masses
- Chemical storage piles
- Open vats and chemical containers
- Road-side dust
- Agriculture and farming
- Natural emissions

Long Range Transport of Air Pollution



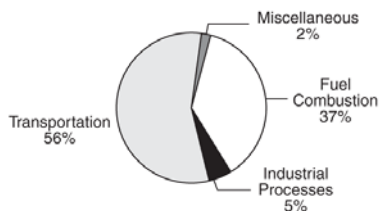
Indoor Air Pollution

The levels of pollutants in the air inside homes, schools, and other buildings can be higher than the level of pollutants in the outdoor air.



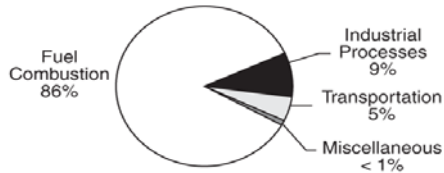
U.S. NO_x Emission Trends by Source Category

U.S. NO_x Emissions by Source Category, 2002



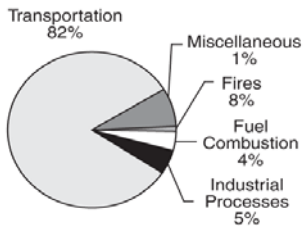
U.S. SO₂ Emission Trends by Source Category

U.S. SO₂ Emissions by Source Category, 2002



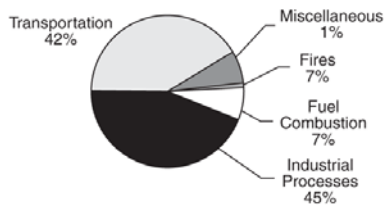
U.S. CO Emissions by Source Category, 2002

U.S. CO Emissions by Source Category, 2002

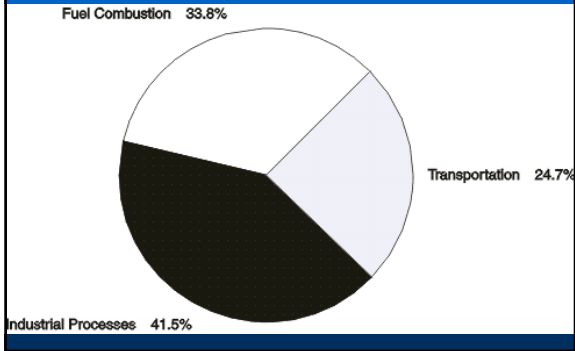


U.S. Anthropogenic VOC Emissions by Source Category, 2002

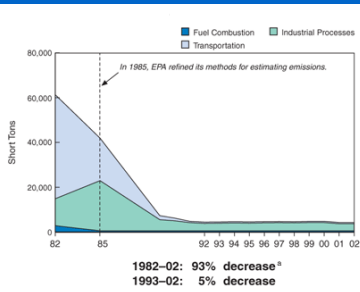
U.S. VOC Emissions by Source Category, 2002



U.S. PM₁₀ Emission Trends



U.S. Lead Emission Trends



What are the Major Pollutants of Interest to South Africa's Air Program?

What are the Major Sources of Pollution in South Africa?

South Africa's Stationary Sources



South Africa's Area Sources



South Africa's Hot Spots For:

- Stationary
- Mobile

Sources



Chapter Review

- Major pollutants of concern
- Sources of air pollution
 - Natural vs. man-made
 - Mobile vs. stationary

AQM Planning Tool Activity
