Air Quality In Utah

Presentation to the Utah State Legislature

February 7, 2008

Prepared by the Office of Legislative Research and General Counsel
Outline

- State and Federal Regulation
- Air Pollution - Types, Sources, Health Hazards
- Pollution Control Strategies
State and Federal Regulation

Clean Air Act → EPA

- Sets national ambient air quality standards for six criteria air pollutants
- Identifies hazardous air pollutants and regulates by the source category
- Delegates or revokes primacy to a state
- Approves state implementation plans
- Penalizes states for failing to meet pollution limits
State and Federal Regulation

- Prohibited by statute from making rules more stringent than federal regulation
- Monitors and measures air pollutants
- Issues construction and operating permits to pollution sources
- Develops a state implementation plan
- Enforces the plan

Air Conservation Act → DAQ
Air Pollution - Types, Sources, Health Hazards

EPA “Criteria” Pollutants

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO₂)
- Sulfur Dioxide (SO₂)
- Ozone (O₃)
- Particulate Matter (PM₁₀ & PM₂.5)
Air Pollution - Types, Sources, Health Hazards

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Air Pollution - Types, Sources, Health Hazards

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Air Pollution - Types, Sources, Health Hazards

Sources

- **Point**
  - Larger stationary industrial or commercial facilities (power plants, steel mills, etc.)
  - Accounted for on a facility basis

- **Area**
  - Smaller stationary sources (home heating, agricultural burning and harvesting, construction, wildfires, etc.)
  - Accounted for by class

- **Mobile**
  - On-road (cars and trucks)
  - Off-road (construction equipment, lawn mowers, trains, aircraft, etc.)
Carbon Monoxide (CO)

- Colorless, odorless, gas
- Sources - burning gasoline, wood, natural gas, etc.
- Health hazard - reduces ability of blood to transport oxygen and is particularly hazardous to those with heart, circulatory, and lung problems
Lead (Pb)

- Exists primarily as particulate matter
- Sources - paint, smelters, lead storage batteries, (burning gasoline prior to unleaded gasoline mandate)
- Health hazard - damages nervous system and digestive system
Nitrogen Dioxide (NO$_2$)

- One component of NO$_x$ (smog forming chemical)
- Sources - burning gasoline, natural gas, coal, oil, other fuels.
- Health hazard - lung/respiratory system damage
- Ingredient of acid rain
NO\textsubscript{x} Emissions Inventory

- **Point Source**: 40%
- **Biogenics**: 0%
- **Non-Road Mobile**: 12%
- **On-Road Mobile**: 44%
- **Area Source**: 4%
Nitrogen Dioxide (NO₂)

Nitrogen Dioxide Annual Averages

- Standard (.053)
- Bountiful
- Provo
- Salt Lake City

[Graph showing annual average NO₂ concentrations from 1993 to 2006 for different locations]
Sulfur Dioxide (SO$_2$)

- **Sources** - industrial processes, burning of coal, oil, diesel, gasoline
- **Health hazard** - lung and respiratory problems
- **Ingredient in acid rain**
**So\textsubscript{x} Emissions Inventory**

- Point Source: 90%
- Non-Road Mobile: 3%
- On-Road Mobile: 3%
- Area Source: 4%
- Biogenics: 0%
Sulfur Dioxide (SO$_2$)

Sulfur Dioxide 2nd Highest 24-hr Values

- **Standard (0.14)**
- **Magna**
- **Bountiful**
- **Salt Lake City**
Ground level ozone is the principle component of smog

Sources - chemical reaction of volatile organic compounds (VOCs) and NO$_x$

Health hazard - reduced lung function, asthma, irritated eyes and nose, reduced resistance to illness, aging of lung tissue
Biogenics - naturally occurring from living organisms, vegetation, etc.

Released from vehicle, gasoline vapors, solvents, industrial chemicals, etc.
VOC Emissions Inventory

- Biogenics: 85%
- Area Source: 7%
- Non-Road Mobile: 3%
- On-Road Mobile: 4%
- Point Source: 1%
How is Ozone is Formed

VOC + NO$_x$  Presence of Sunlight 
& Heat > 95 degrees  Ozone
Ozone

4th Highest 8-Hour Ozone Average
1992-2006

Proposed 2008 Standard
Particulate Matter (PM $\text{PM}_{10}$ & PM $\text{PM}_{2.5}$)

- **Source** - dust, smoke, soot
- **Health hazard** - cause nose and throat irritation, lung damage, bronchitis
- **Main source of haze that reduces visibility**
PM$_{2.5}$ Emissions Inventory

- Area Source: 57%
- Point Source: 17%
- Non-Road Mobile: 6%
- On-Road Mobile: 20%
- Biogenics: 0%
How PM$_{2.5}$ is Formed

$(\text{SO}_x) \text{ or } (\text{NO}_x) + \text{Ammonia } (\text{NH}_3) = \text{PM}_{2.5}$

- Wintertime temperature inversions trap gasses in valleys, facilitating this reaction.
How PM$_{2.5}$ is Formed

\[(SO_x) \text{ or } (NO_x) + \text{Ammonia } (NH_3) = \text{PM }_{2.5}\]

- Wintertime temperature inversions trap gasses in valleys, facilitating this reaction.
Particulate Matter
(< 2.5 micrometers in diameter)

24 Hour Standard is 35 ug/m3
Pollution Control Efforts

State Solutions

- Reduce Mobile On-road Emissions
- Reduce Point Source Emissions
- Address Hazardous Air Pollutants