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Clean Air Act - Health Effects

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## ACID RAIN HEALTH EFFECTS

- o EPA's concern over the health effects of acid rain causing pollutants are based on emerging health studies that suggest significant health risks of acid aerosols. While not conclusively resolving the nature of risk, the current information provides support for SOx reductions as a prudent public health measure.

- o Acid aerosols are very small (in the range of 1 micron or less) liquid or solid particles, that are easily respirable. Thus, when inhaled they penetrate deeply into the lung.

- o CRS Report for Congress (February 27, 1989) concludes:

"further controlling ozone and acidic aerosols would provide general public health benefits, while stricter controls on most other pollutants would confer benefits on relatively smaller groups--those who are especially sensitive or those who live adjacent to sources or in highly polluted areas."

- o Letter from Mark J. Utell, MD, Chairman, Acid Aerosol Subcommittee, to Dr. Roger McClellan, Chairman, Clean Air Scientific Advisory Committee, Science Advisory Board

"In the Subcommittee's view, the cumulative evidence provided by the available animal, controlled human exposure, and epidemiologic studies clearly suggests possible health effects associated with exposure to acid particles. The Subcommittee recognizes that the available data base is not complete but is concerned by the potential health risks resulting from exposures under typical ambient conditions."

- o Morton Lippman, Chairman, Clean Air Scientific Advisory Committee (CASAC)

"In summary, it is clearer than ever that sulfuric acid in ambient aerosols is a highly likely causal factor for effects on lung structure and function. Furthermore, evidence is rapidly accumulating that sulfuric acid and other ubiquitous air pollutants (O3, NOx, SO2) can potentiate each others effects...."

- o A recent Harvard Public Health School study indicates that these pollutants are responsible for significant morbidity (emphysema, bronchitis, asthma, etc.) and up to 40,000-80,000 premature deaths per year (i.e. 3

percent "excess mortality").

- o Even if the actual number is only 5,000 premature deaths (three-tenths of one percent excess mortality) that would be more than enough reason to justify our proposal.
- o Finally, to avoid any persistent misconceptions, NAPAP has not conducted any research on health effects of acid aerosols; they are not the experts in this area.



# SMOG OZONE (O3)

(a.k.a. "bad" or "tropospheric" ozone as opposed to "good" stratospheric ozone)

NAAQS: 0.12 ppm, 1-hour average with 1 expected exceedence/yr

## Major Health Effects:

- Acute lung function impairment, particularly with exercise; impairment persists for days in children in outdoor studies
- Symptoms (cough, chest pain, nausea, throat irritation)
- Potential chronic effects of greater concern, e.g. Increased susceptibility to respiratory infection, lung inflammation, possible lung structure damage
- CASAC: Possible need to tighten health standard

## Major Welfare Effects:

- \$Billions of damage to crops at current levels; damage to forest ecosystems of uncertain magnitude, materials damage
- CASAC: Need to strengthen standard (e.g. 0.06-0.1 ppm 1-hr)

Air Quality Status: 66 Areas (89 million people) violated 1985-87 (about 30 additional areas for 86-88)

Sources: Volatile Organic Chemicals (VOC) and Nitrogen Oxides (NOx)

| 1985 VOC Emissions   |                 | %Stationary                         | %Mobile |
|----------------------|-----------------|-------------------------------------|---------|
| Nonattainment Areas  | 10 million tons | 60%                                 | 40%     |
| Attainment Areas     | 12 million tons | 56%                                 | 44%     |
| Total                | 22 million tons | 58%                                 | 42%     |
| Mobile Sources       | 42%             | (more if running losses included)   |         |
| Organic Solvents     | 16%             | (80% of All Stationary Source       |         |
| Surface Coating      | 8%              | emissions come from sources smaller |         |
| Gasoline Marketing   | 7%              | than 50 tons/yr)                    |         |
| TSDF                 | 7%              |                                     |         |
| Petroleum Industry   | 5%              |                                     |         |
| Chemical Manufact.   | 3%              |                                     |         |
| Other Industries     | 7%              |                                     |         |
| Solid Waste Disposal | 3%              |                                     |         |
| Non-home Fuel Comb.  | 1%              |                                     |         |
| Miscellaneous        | 4%              |                                     |         |

### 1985 NOx Emissions Summary

20 Million Tons/yr  
56% Stationary, 44% Mobile  
(50/50 in Nonattainment Areas)

## AIR TOXICS

### I. Magnitude of the Problem

- o During 1987, U. S. industries estimated releases of 2.4 billion pounds of toxic air pollutants to the air.
- o The cancer portion of the air toxic problem is currently estimated as 1,600 - 3,000 cases per year with individual lifetime risks in urban areas averaging as high as 1 in 1,000 (10<sup>-3</sup>)
- o The estimated magnitude of the air toxics problem equals or exceeds the estimate for most other EPA programs. It was ranked third behind radon and pesticide use on foods and ahead of such things as stratospheric ozone, drinking water, and global warming.
- o Potential health effects range from eye irritation to serious, irreversible illness to death:
  - Eye or respiratory irritation
  - Neurotoxicity (central nervous system depression)
  - Developmental toxicity (birth defects)
  - Pulmonary edema (fluid in the lungs)
- o Air toxic pollutants have been measured at concentrations in the air that are above the levels where they cause health effects discussed above.



## PM-10 (Particulate Matter)

- NAAQS:** Revised 1987 from "TSP;" primary and secondary equal  
"PM-10" includes particles smaller than 10 micrometers  
(a tenth thickness of human hair) that penetrate the lung
- 150 ug/m3 (micrograms per cubic meter) 24 hr, 1 expected exceedence per year
  - 50 ug/m3 annual arithmetic mean

### MAJOR HEALTH EFFECTS

- Premature mortality in elderly and ill persons
- Long term decrease in lung function
- Increased respiratory illness and symptoms
- Short term reductions in lung functions in children
- Effects of toxic particle components, e.g. metals, carcinogens

### MAJOR WELFARE EFFECTS

- Soiling and Nuisance (dust, dirt, grime)
- Visibility Impairment by fine particles

### AIR QUALITY STATUS

- Based on estimates from old TSP data and recent PM-10, 58 areas are classified as "Group I" and are highly likely to exceed the standards. An additional 113 "Group II" areas have a moderate (30 to 95%) chance of being in violation. About 60 million people live in counties with a 50% or greater chance of violation.

### SOURCES

- Traditional point sources e.g. Steel, Utilities remain important in a number of areas, but most are well controlled
- "Nontraditional" area sources are most significant
  - Fugitive Dust from Roads, Construction, Farming
  - Wood Stoves and Fireplaces
  - Open burning in forestry and agriculture
  - "Secondary" particles, e.g. sulfate from SO<sub>2</sub> and Nitrate from NO<sub>x</sub> transformation. Major issue in L.A.
- National emissions totals (e.g. 7 million tons in 1985) exclude much of the nontraditional contribution

## CARBON MONOXIDE (CO)

NAAQS: 9 ppm (8-hr) and 35 ppm (1-hr) with 1 exceedence/yr

### MAJOR HEALTH EFFECTS:

- Reduced time to onset of Angina
- Fatigue, Nausea, Impaired Vigilance, reduced work capacity
- Possible fetal effects
- Issues: May Impair learning ability in children  
Many Indoor Sources of Exposure  
School bus/Auto exposure of children can be high
- No major welfare effects

### AIR QUALITY STATUS

- 50 areas violate the standard (8-hr); 29 million residents live in the central counties of these areas.
- Unlike ozone, 1988 data should show improvement over 87.
- CO often a "hot spot" problem, monitor placement critical

### SOURCES

- Mobile Sources Dominant, FMVCP trends downward
- Stationary Sources sometimes contribute (woodstoves, industrial combustion and process [steel])
- 1985 Total, 63 Million Tons (70% Transportation)