

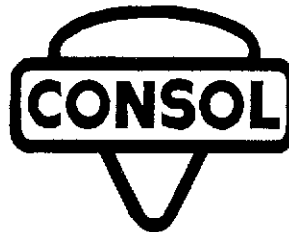
**Robert Statnick, CONSOL Inc.**

*“PM<sub>2.5</sub> Research Issues”*

# **PM<sub>2.5</sub> RESEARCH ISSUES**

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## **PM<sub>2.5</sub> CONCERNS**

- 1. PM<sub>2.5</sub> Sampling Issues**
- 2. PM<sub>2.5</sub> Research Needs: Ambient Air/Source Measurement**
- 3. PM<sub>2.5</sub> Chemical Speciation**
- 4. Background PM<sub>2.5</sub> Concentration**
- 5. Source Apportionment**

## PM<sub>2.5</sub> NETWORK

- Population-Oriented or Community Representative (CORE) Sites for Compliance (Initially 850)
- CORE Sites Co-Located with Special Purpose Monitoring Sites (Initially 50)
- Manual FRM Samples

## PM<sub>2.5</sub> SAMPLING ISSUES

- Changes in Inlet Cut-Point
- Evaporation of Volatile Species
- Vapor Adsorption on Filters
- Liquid Water Content
- Passive Deposition During Idle Periods
- Contamination of the Filter During Manufacturer and Handling
- Changes in Flow Rate and Filter Load

## PM RESEARCH NEEDS

### Ambient Air Measurements

- Simultaneously Monitor Precursor Gases (SO<sub>2</sub>, NO<sub>x</sub>), Meteorology and PM<sub>2.5</sub>.
- Organic Carbon Sampling/Analyses Artifacts in Different Environments.
- Determine Important Organic Particle and Precursor Compounds.
- Determine the Magnitude of Nitrate Volatilization
- Establish Sampling/Analysis Methods
- Develop and QA/QC Program
- Assess Source Zones of Influence and Spatial Variations

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## PM RESEARCH NEEDS

### Source Measurements

- Improve NH<sub>3</sub> and VOC Emission Inventories.
- Document Inorganic, Organic, and Single Particle Source Profiles.
- Establish Linkage Between Ambient Air Concentration of PM<sub>2.5</sub> and Sources.

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# PM<sub>2.5</sub> CHEMICAL SPECIATION



## EPA AVERAGE URBAN ENVIRONMENT

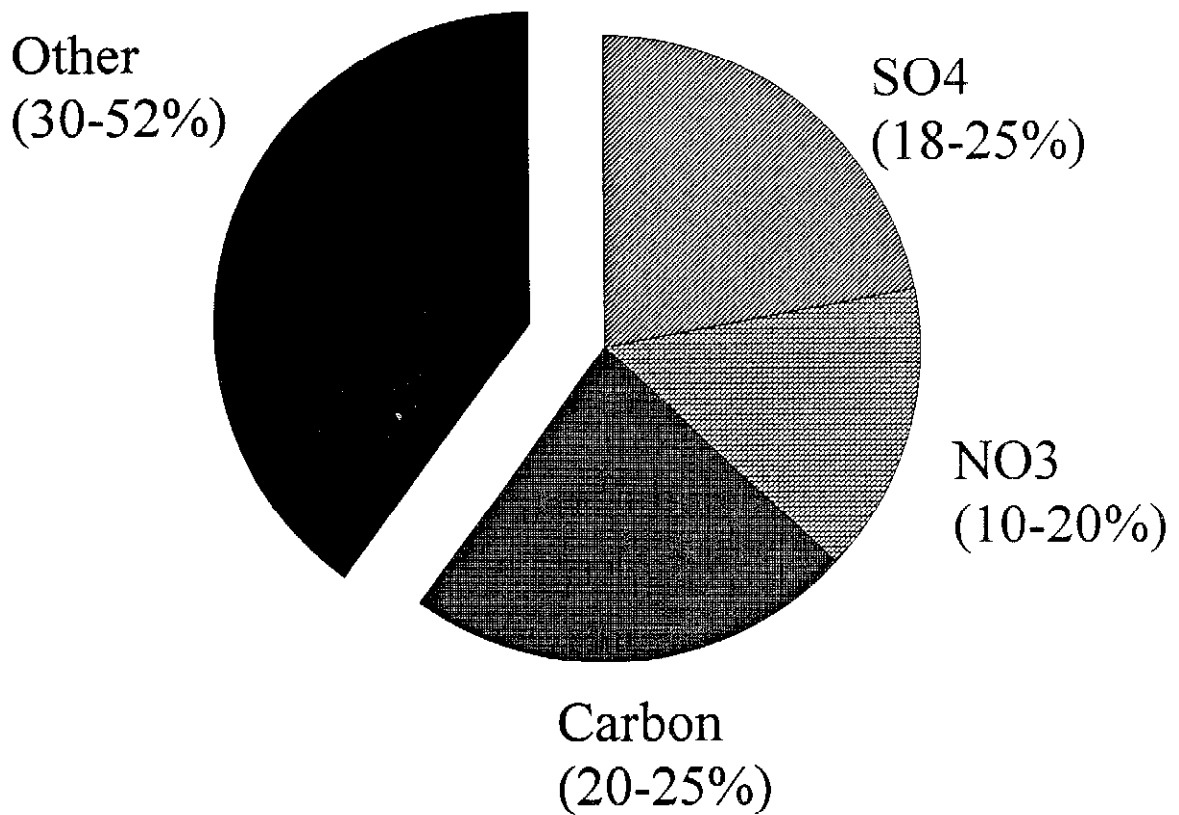
Carbon	34%
Nitrate Plus Sulfate	59%
Unknown	7%

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**AVERAGE PM<sub>2.5</sub> COMPOSITION  
LOOK ROCK, TENNESSEE**

Unknown	38%
Soil	8%
Carbon	14%
Nitrate Plus Sulfate	34%
Ammonium	<u>6%</u>
Total	100%

# CHARACTERIZATION OF PM<sub>2.5</sub> PARTICULATE



## **BACKGROUND PM<sub>2.5</sub> CONCENTRATION**

- **Background Concentration of PM<sub>2.5</sub> is Required to Determine Controllable Fraction.**
- **Environment Canada = 9-12 µg/m<sup>3</sup> PM<sub>2.5</sub> Background.**
- **U.S. Annual Average NAAQS is 15 µg/m<sup>3</sup>.**
- **Controllable Amount is 3 to 6 µg/m<sup>3</sup> for all Anthropogenic Activity.**

**BACKGROUND PM<sub>2.5</sub> IS KEY TO NAAQS COMPLIANCE**

## SOURCE APPORTIONMENT

- Portion of Population Exposed to Effect-Causing PM.
- What are Sources of Ambient Particles?
  - Relative Contribution from Mobile, Stationary, and Fugitive Sources.
  - Develop Models to Predict the Relative Contribution of Sources to PM<sub>2.5</sub> Concentration.
  - Effectiveness of Stationary Source Control Strategies on Elevated PM Levels on Urban and Regional Scales.

## PARTICLE FORMATION CHEMISTRY IS NON-LINEAR

% Change in Riverside Basin-Wide Emissions	% Change in Total	
	Nitrate	O <sub>3</sub>
-25 (NO <sub>x</sub> )	-8	-3
-50 (NO <sub>x</sub> )	-20	-7
-25 (VOC)	+21	-19
-50 (VOC)	+22	-34