Review of Studies to Characterize Diesel

South Coast Air Quality Management District
December 9th, 2003

Background

• Complex Nature of Diesel Exhaust

• Use of Elementary Carbon

• No Unique Laboratory Method
**Diesel Exhaust Emissions Studies**

**Laboratory**
- Engine Type
- Load
- Temperature
- Fuel
- Lubricating Oil

**Exhaust Measurements**
- Particulate Matter
  - Size Distribution
  - Density
  - Structure
  - Chemical
  - Molecular Composition

**Tunnel Studies**

**Diesel Exhaust Characteristics**

**Gases**
- Nitrogen, oxygen, carbon dioxide, water vapor, carbon monoxide, sulfur oxides, nitrogen oxides, volatile hydrocarbons, and polycyclic aromatic hydrocarbons (PAH’s)

**Particulates**
- Bimodal overlapping size distribution

**Organic Fraction**
- Consists of aldehydes, large alkanes/alkenes, high molecular weight PAH’s and PAH derivatives.

**Inorganic Fraction**
- Elemental Carbon, metals
Literature Search


- Source Apportionment of Fine Particulate Matter by Clustering Single-Particle Data:
  - Tests of Receptor Model Accuracy, (Bhave et al, *Environ. Sci. Tehnol.*, 2001)

- Sources of Polycyclic Aromatic Compounds in Diesel Engine Emissions - Rhead and Hardy, *Fuel*, 2003

(Kittleson, 1998)
Composition of Particle Emissions <2.5µm from Major Southern California Sources

Laboratory Methods

- Particulate Matter Total Mass
- Organic Carbon (OC) and Elemental Carbon (EC)
- Polycyclic Aromatic Hydrocarbons
- Trace Metals
- Other Compounds?
Literature Search


Proposed Next Steps

- Continue literature review
- Input from Advisory Group
  - Form sub-group
- AQMD staff in-house work on methods evaluation