Potential Addition to MATES-III:
Analysis of Organic Compounds within Collected $PM_{2.5}$ Samples for Source Apportionment

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Review:

- Utilize organic compound measurements, Elemental Carbon and elemental constituents to apportion sources in a Chemical Mass Balance Model.
- Organic Compound measurements would be made upon monthly composites.
  - -10 $PM_{2.5}$ samples collected per monitoring site every month would represent one composite sample.
  - - Minimum for organic analysis 0.5-1mg (27 to 200µg OC per filter).
  - - For MATES-III 120 total composite samples would be analyzed for organic compounds.
- Each monthly composite sample would be analyzed for at least 30 organic compounds that are relevant to sources under consideration.
- Estimated cost ≈ $1,400 per composite sample (120 samples ≈ $168,000)

Preliminary List of Sources:

- **Automobile Exhaust**
- **Diesel Exhaust**
- **Meat Charbroiling**
- **Road Dust**: tire wear particles, organometallic brake dust, fine paved road dust.
- **Wood Smoke**
- **Fuel Oil**

Preliminary Compound List:

- Develop a list of necessary compounds relevant to sources under consideration (Analysis will probably include additional compounds).
- Based upon sources previously mentioned and obtained from published source profiles.

Some Requirements

- Compounds having low volatility making them particulate bound
- Conserved in transport from source to sample
- Uniqueness in relation to a source

Preliminary Compound List:

Compound	Source
Alkanes	
n-docosane	Diesel, non-catalyst gasoline
n-tricosane	Diesel, non-catalyst gasoline
n-tetracosane	Diesel, non-catalyst gasoline
n-pentacosane	Diesel, non-catalyst gasoline
n-hexacosane	Diesel, non-catalyst gasoline
n-heptacosane	Diesel, non-catalyst gasoline
n-octacosane	Diesel, non-catalyst gasoline
n-nonacosane	Diesel, non-catalyst gasoline
hentriacontane	Road Dust
tritriacontane	Road Dust
Saturated Cycloalkanes	
Hexadecylcyclohexane	Diesel, non-catalyst gasoline
Heptadecylcyclohexane	Diesel, non-catalyst gasoline
Octadecylcyclohexane	Diesel, non-catalyst gasoline
Nonadecylcyclohexane	Diesel, non-catalyst gasoline
Hopanes	
17α(H),21ß(H)-29-Norhopane	Diesel, non-catalyst gasoline
17α(H),21ß(H)-Hopane	Diesel, non-catalyst gasoline

Compound	Source
Aromatic hydrocarbons	
Benzo[*ghi*]fluoranthene	Diesel, non-catalyst gasoline
Benz[a]anthracene	Diesel, non-catalyst gasoline
Chrysene	Diesel, non-catalyst gasoline
Pyrene	Diesel, non-catalyst gasoline
Benzo[ghi]fluoranthene	Vehicle Exhaust
Benzo[ghi]perylene	Vehicle exhaust
Dibenz[a,h]anthracene	Vehicle exhaust
Cholesterol	Meat cooking
Oleic acid	Meat cooking
Levoglucosan	Wood combustion
2,6-dimethoxyphenol	Hardwood combustion
2-methoxyphenol	Softwood combustion
Elemental Constituents	
Organic Carbon	Various
Elemental Carbon	Various
Si, Al	Road Dust
Vanadium	Fuel Oil

Modeling of Data:

- EPA's Chemical Mass Balance model 8.2
- Use updated published source profiles that are relevant to Southern California
- Modeling done at AQMD
- Analytical Data Publicly Available
- Application of other models to data?

Tentative Schedule:

September, 2004	Incorporate advisory groups comments. Prepare final list of sources and compounds and incorporate into finalized work plan. Obtain list of organizations capable of analysis.
October, 2004	Request approval for funding and RFP for work plan from Governing Board.
November, 2004	Proposal evaluation
December, 2004	Governing Board Award.
January, 2005	Contract execution. Composite April 2004 samples for organic speciation after EC/OC analysis is performed and checked.
February, 2005	Compile April 2004 data and source profiles needed for modeling. Begin CMB modeling upon April 2004 data. Composite May 2004 samples for organic speciation.
March-Dec., 2005	Proceed as in March 2005 until analysis and modeling is completed.
January, 2006	Draft report.

Next Steps:

- Technical Advisory Group Input
- Finalize list of sources and compounds.
- Obtain funding
- Integrate Wednesday and Sunday sampling?