Fine PM Source Test Method



Ron Myers/Tom Logan
Emissions Measurement Center





Project Goals

- Quantify Course & Fine PM
 - Use Dilution Sampling to Mimic Atmospheric Physics
 - Operationally Simple
 - Minimal Sample Location Limitations
 - Speciation of Particulate
 - Minimize Pseudo Particulate Formation

Description

- In Stack Particle Sizing
 - Large Cyclone Separates PM >10μM
 - Smaller Cyclone Separates PM >2.5μM
- Air Dilution Condenses Vaporous PM
 - Air is Filtered & Dehumidified
 - Sample is Diluted up to 40 to 1
- PM2.5 is collected on multiple filters

Competing Methodologies

- U.S. EPA Test Methods
 - Preliminary Method 004 (M201A +2.5)
 - Method 202
- State Test Methods
 - More Than Four Variants
 - Similar to Method 202
- Research Methods
 - More Than Six Variants
 - All Based on Dilution Sampling

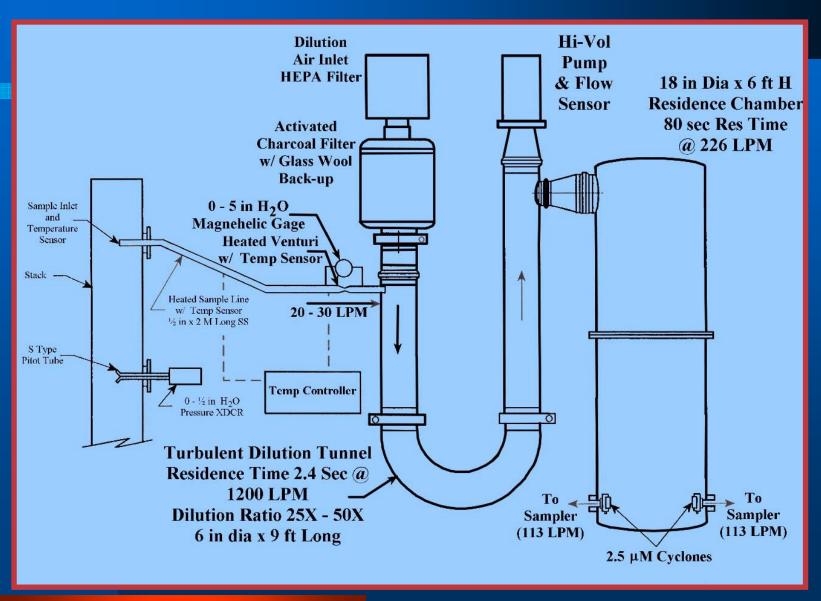
EPA Reference Methods

- EPA Pre Method 4 & Method 202
- Strengths
 - Compact
 - Uses Existing Sampling Systems
 - Applicable to Almost All Sources
- Weaknesses
 - Optional Procedures Allowed
 - Potential Biases

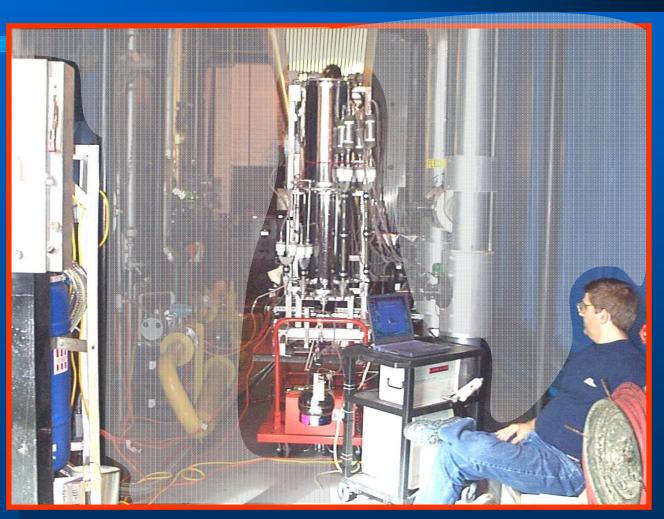
Existing Dilution Methods

- More than Six Variants
 - With/Without Stack Particle Sizing
 - Different Residence Times
 - Dilution Ratios
- Strengths
 - Condense Particulate by Dilution
- Weaknesses
 - Heavy, Bulky, Complex

Typical Research Test Method



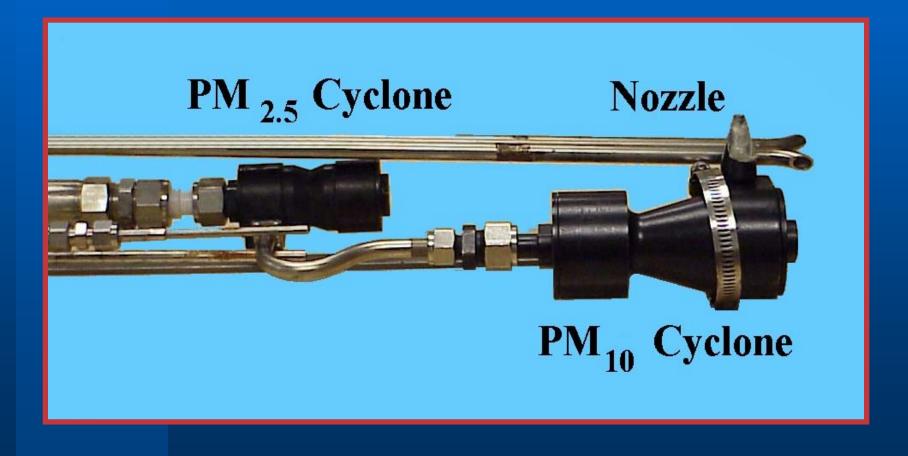
Typical Research Test Method



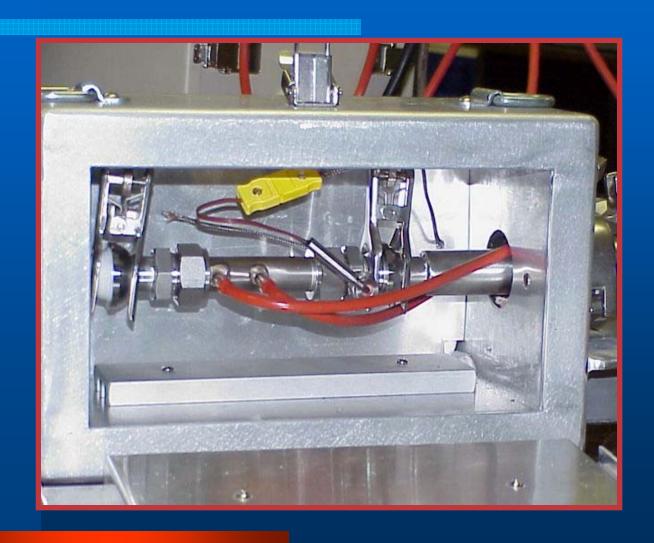
Existing Sampler



In Stack Particle Sizers



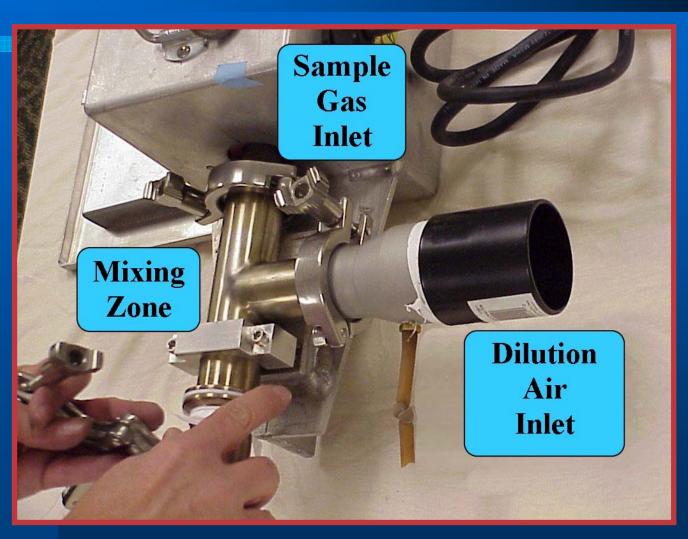
Heated Sample Venturi



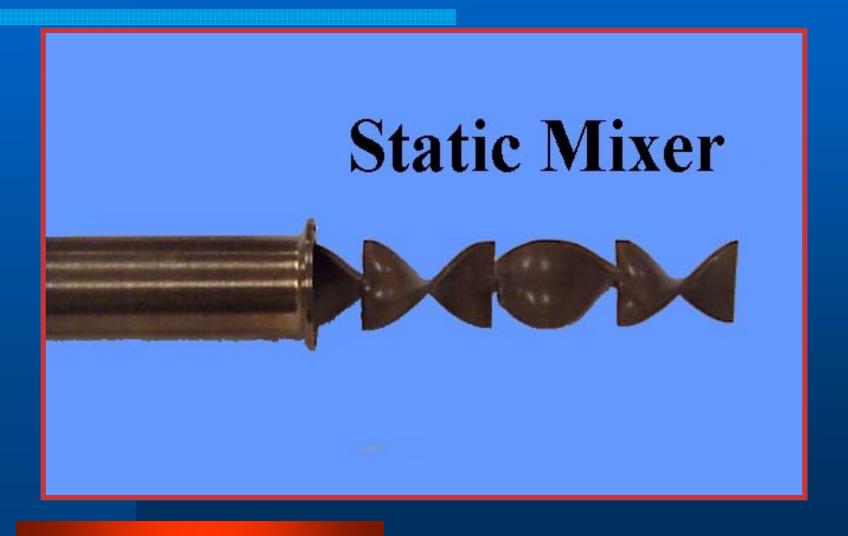
Dehumidifier / HEPA Filter



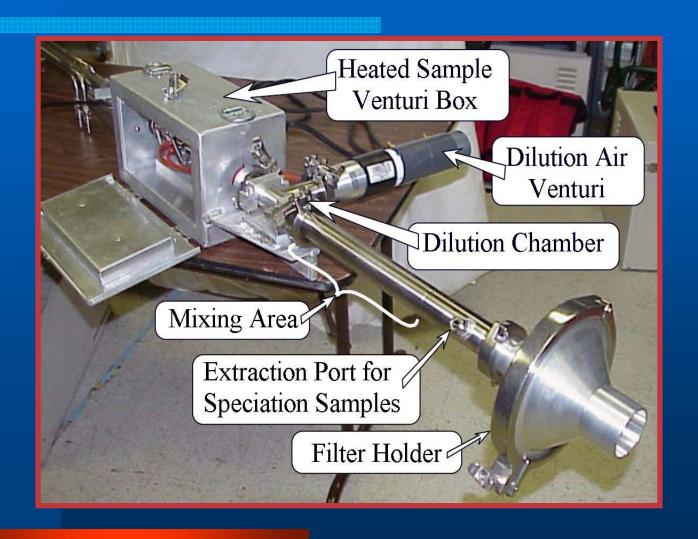
Mixing Chamber



Dilution Air Mixer



Major Components



Speciation Filter Module

- Aliquot of diluted sample extracted for speciation analysis
- Denuders used to remove potentially reactive gases



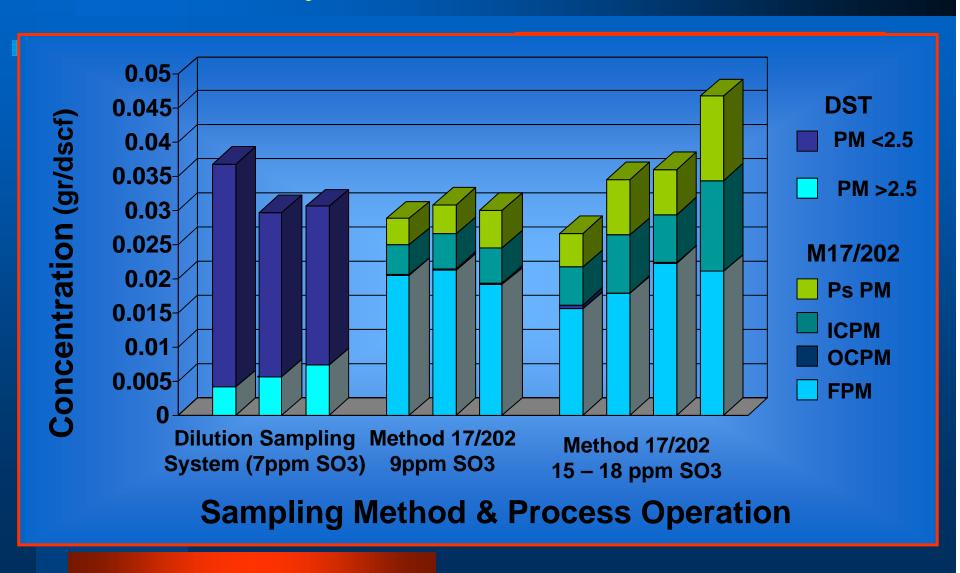
Schedule



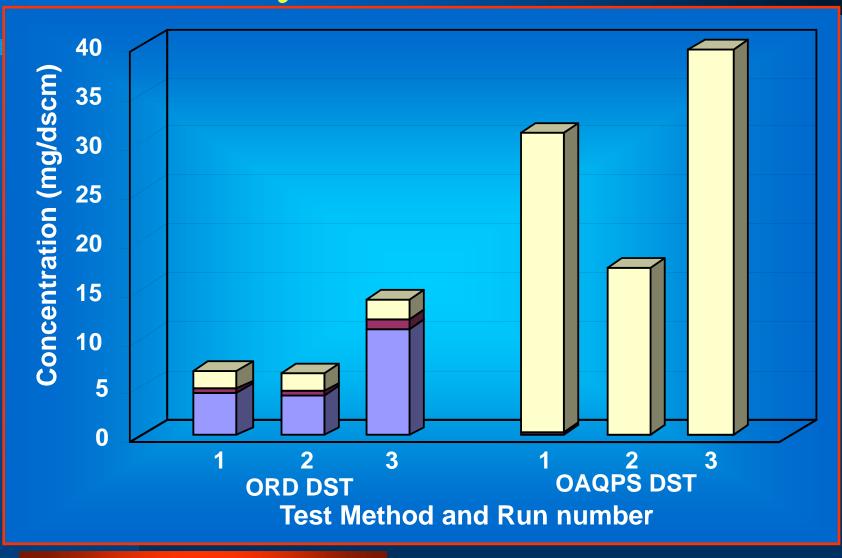
Current Status

- Completing Hardware Development
 - Hardware Operates as Expected
 - Sample Rate Maintained
 - Isokinetics Maintained
 - Dilution Ratios Maintained
 - Temperatures Maintained
 - Have Final Results from 2nd Hardware Shakedown Test
- Completed Two Comparison Tests
 - Modified URG Dilution Sampler
 - Pre M4 & Method 202

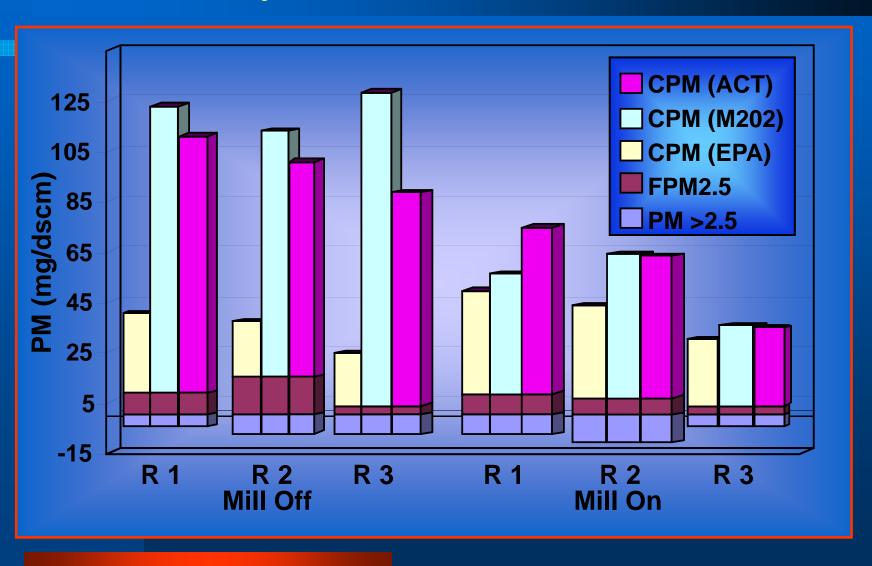
Preliminary Results of Second Test



Preliminary Results of Third Test



Preliminary Results of Fourth Test



Operating OAQPS Sample Train



QUESTIONS

