

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 $>10\mu\text{M}$
 - Smaller Cyclone Separates PM $>2.5\mu\text{M}$
- **Air Dilution Condenses Vaporous PM**
 - Air is Filtered & Dehumidified
 - Sample is Diluted up to 40 to 1
- **PM_{2.5} 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

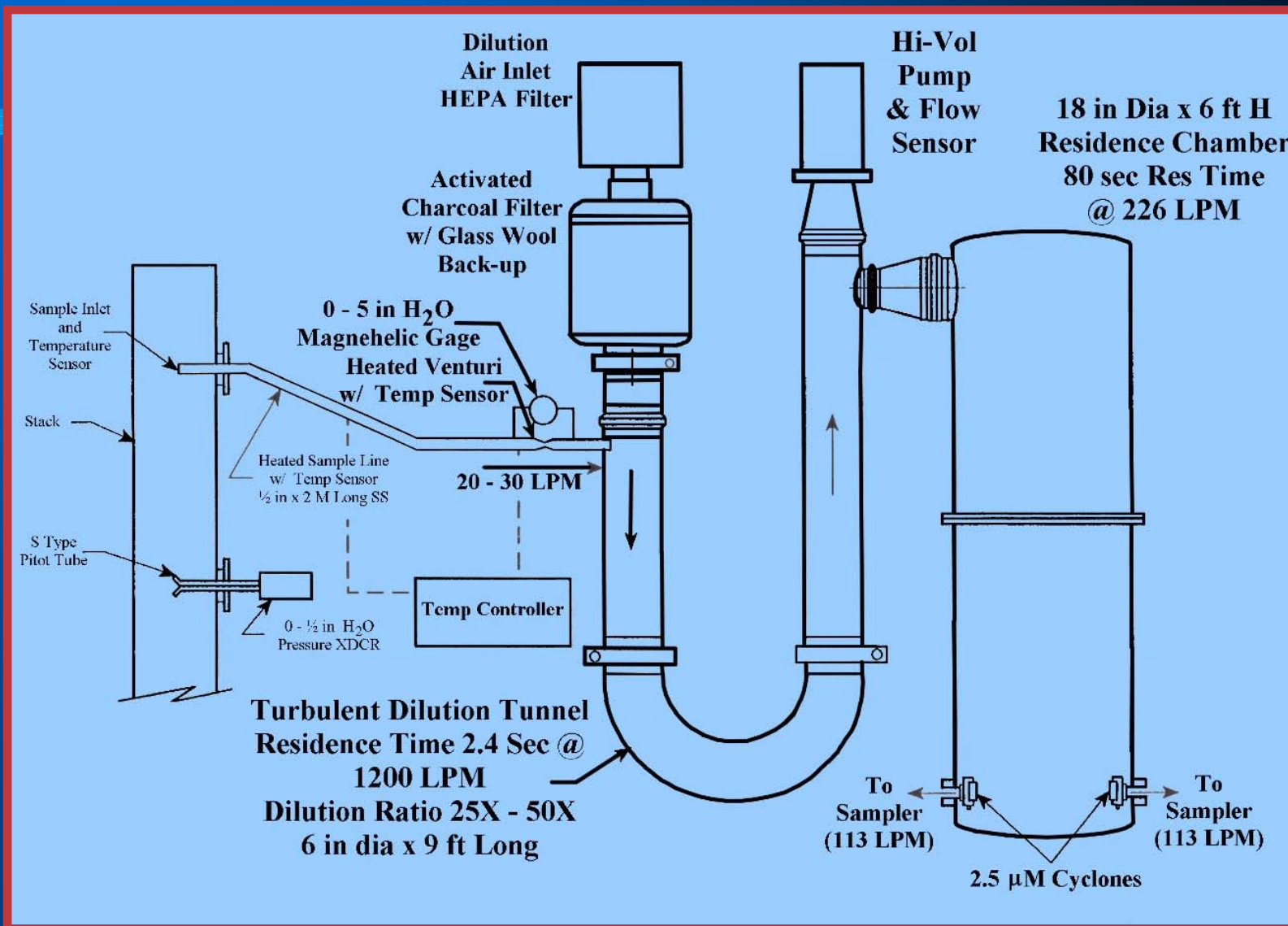
EPA Reference Methods

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

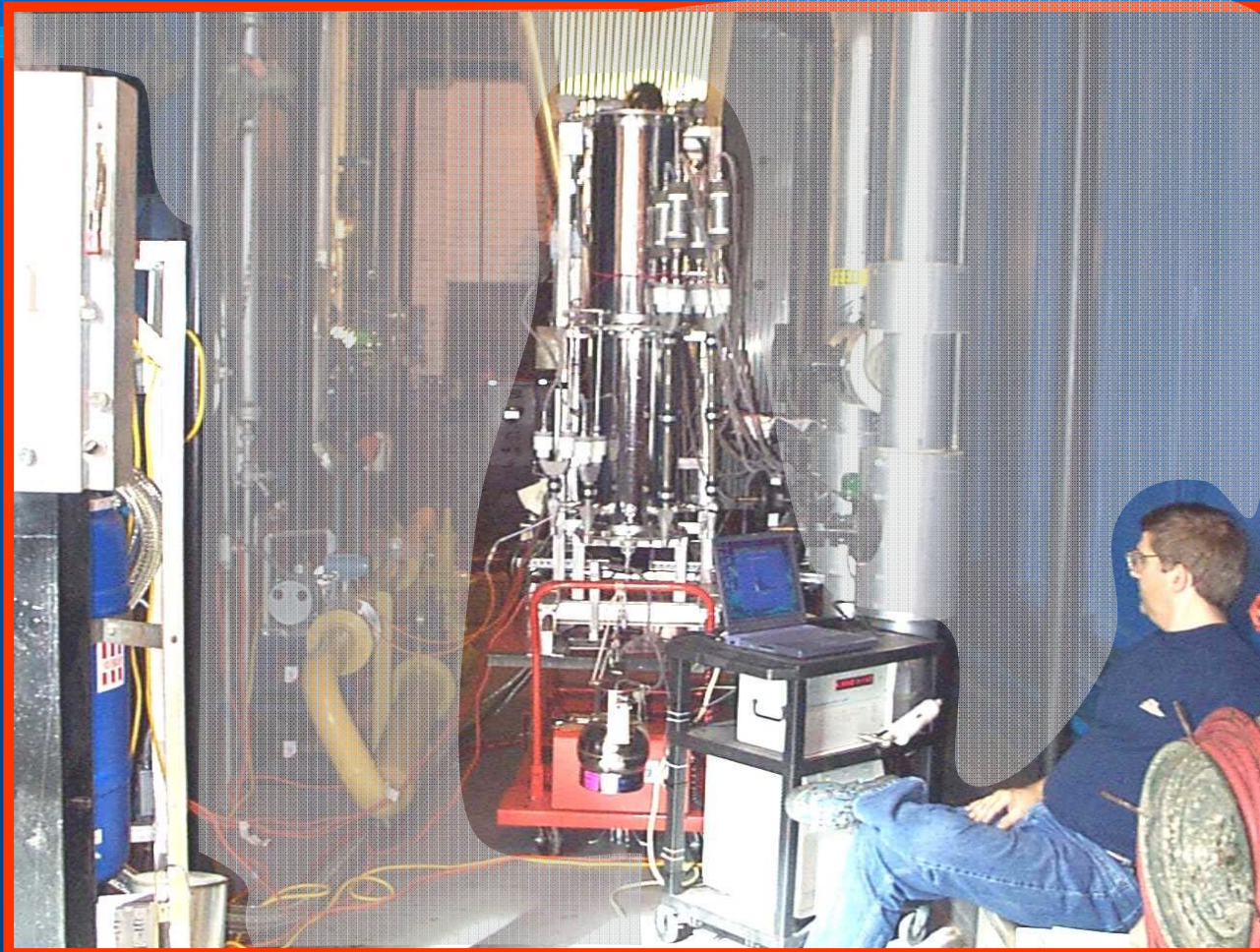
Existing Dilution Methods

- **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



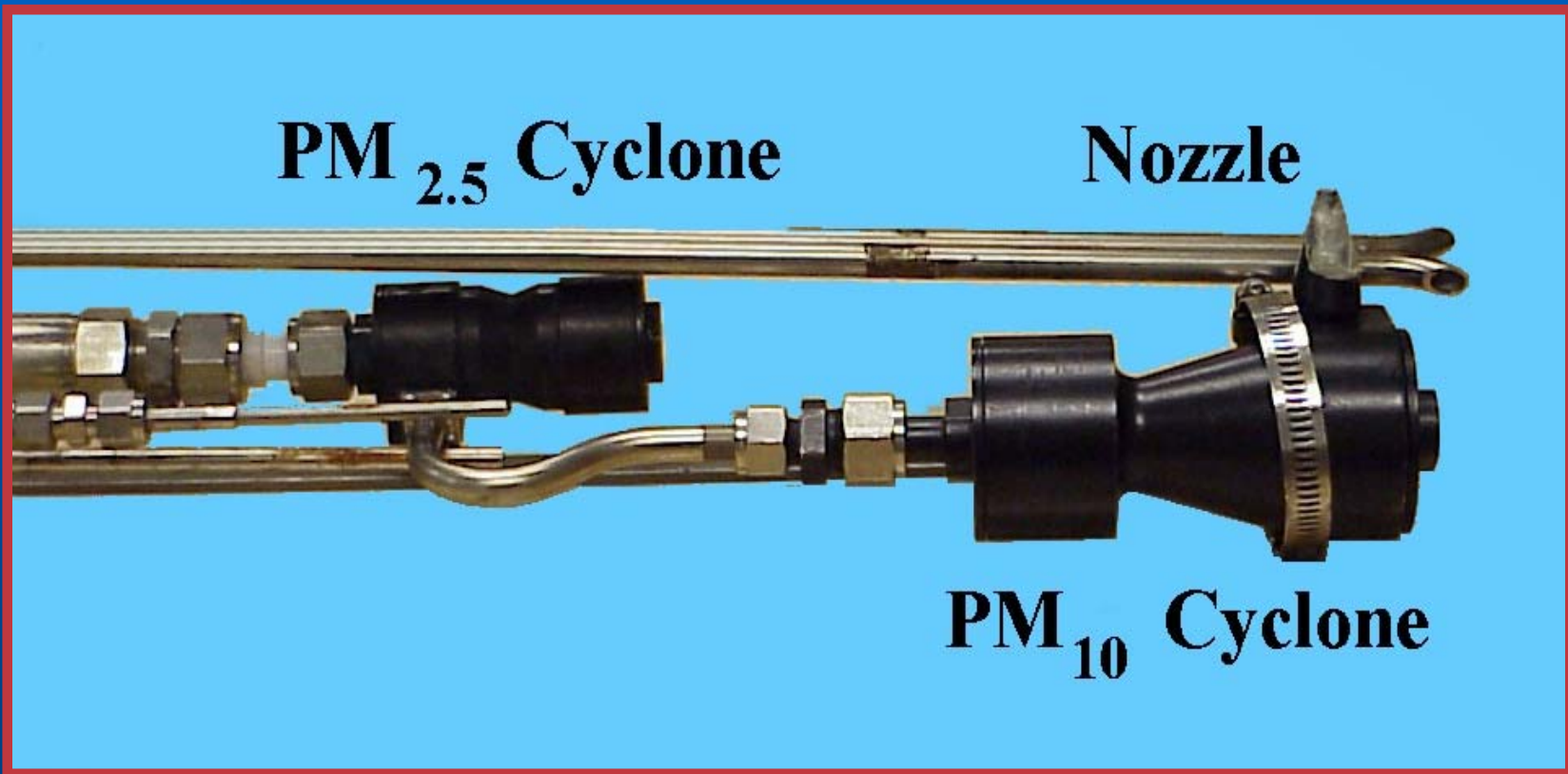
Typical Research Test Method



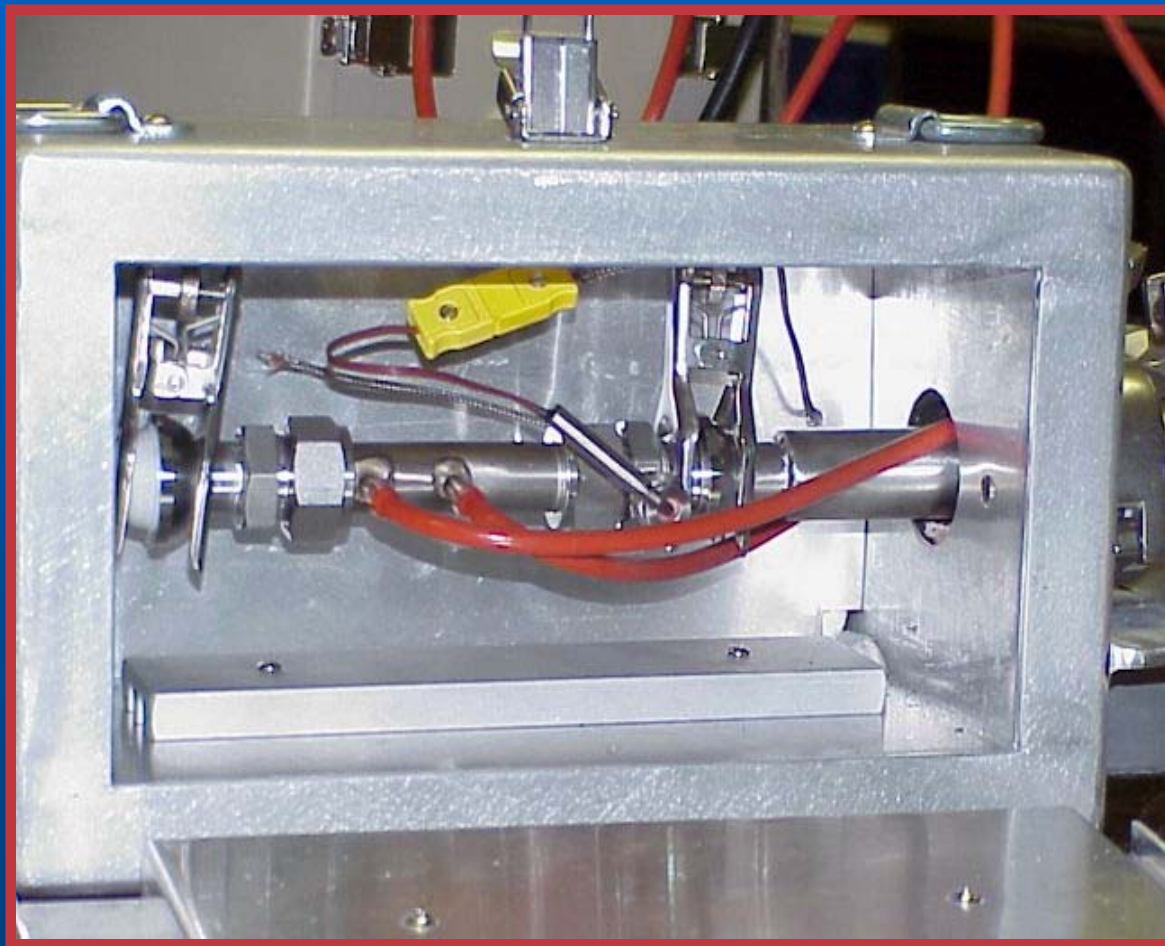
Existing Sampler



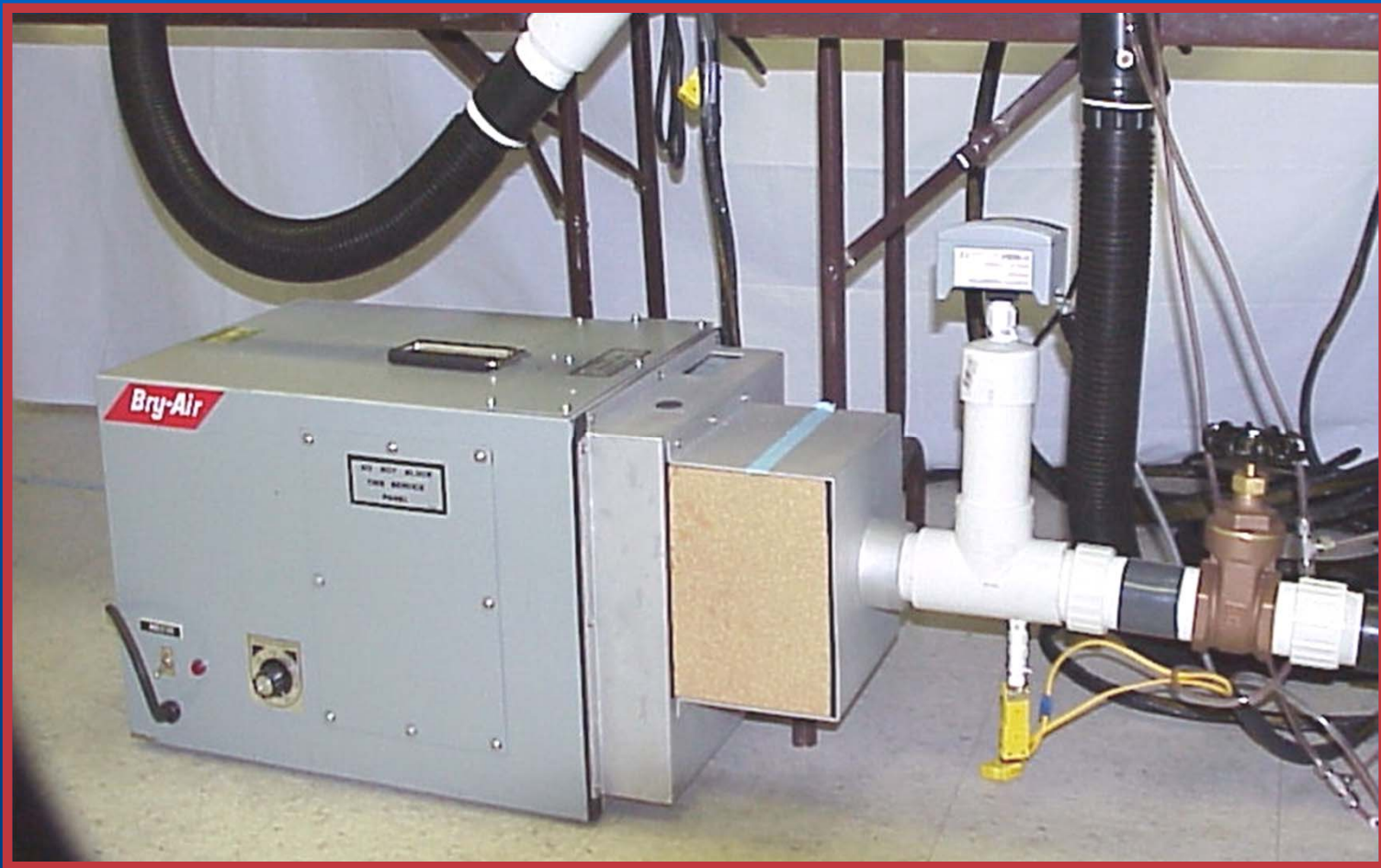
In Stack Particle Sizers



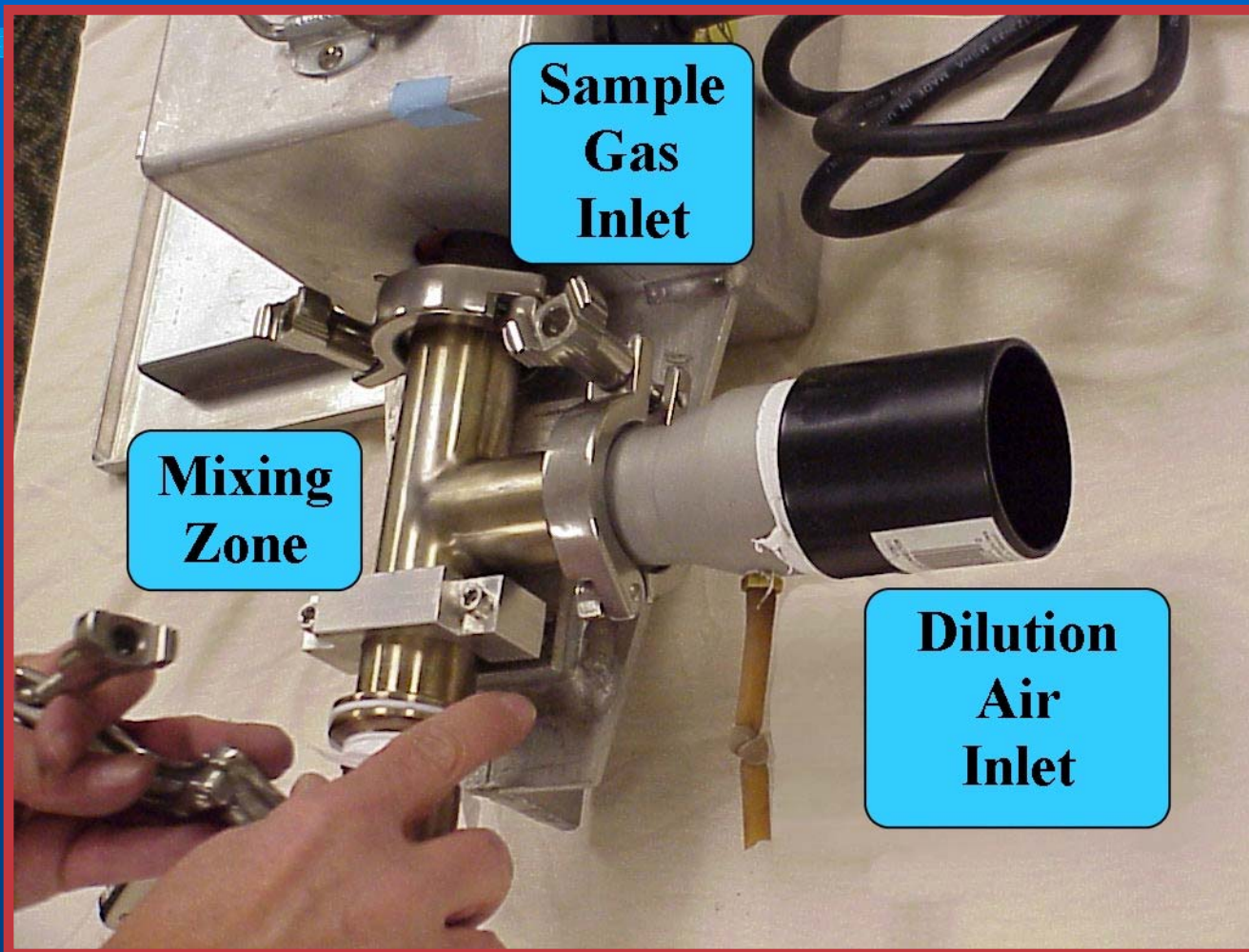
Heated Sample Venturi



Dehumidifier / HEPA Filter



Mixing Chamber

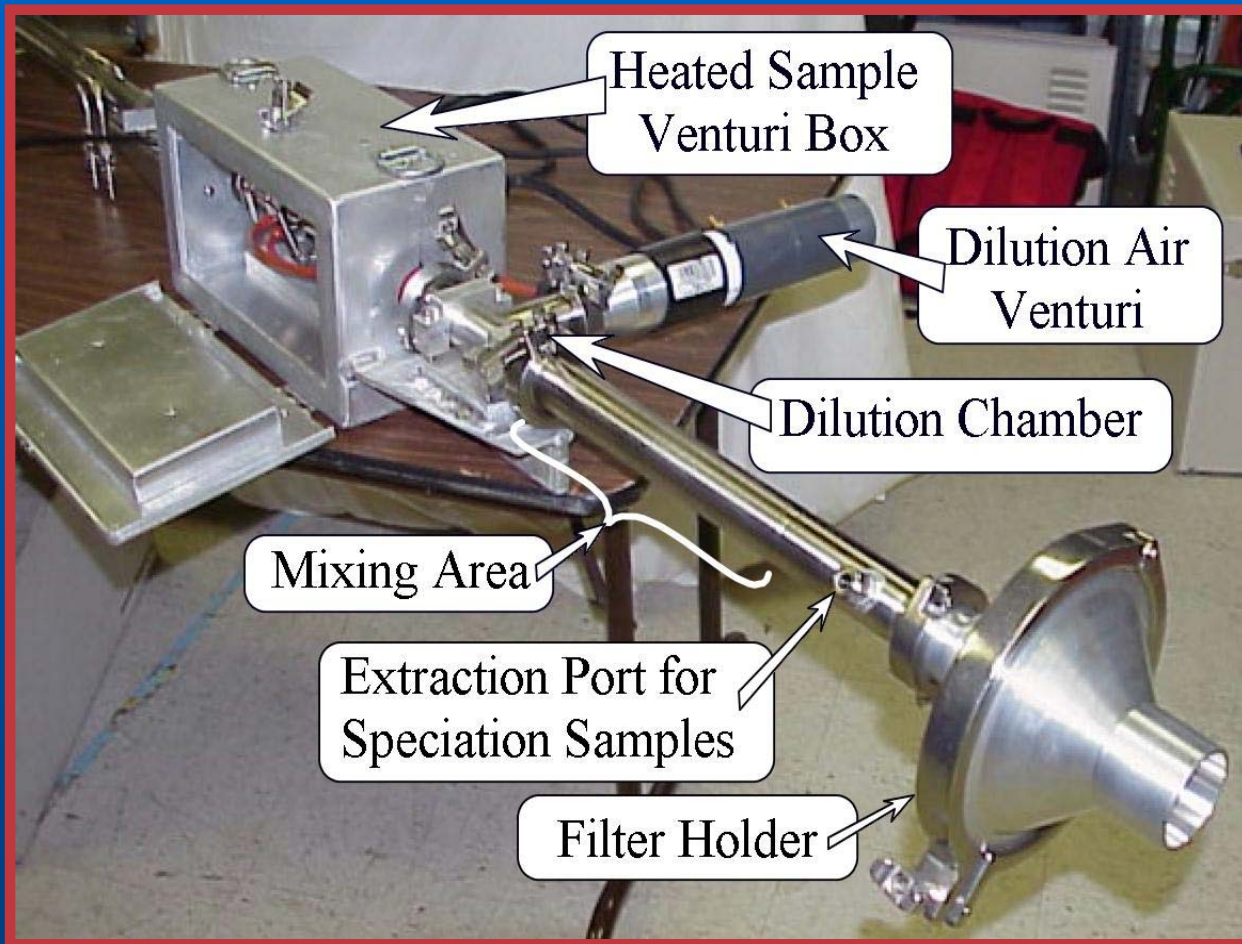


Dilution Air Mixer

Static Mixer

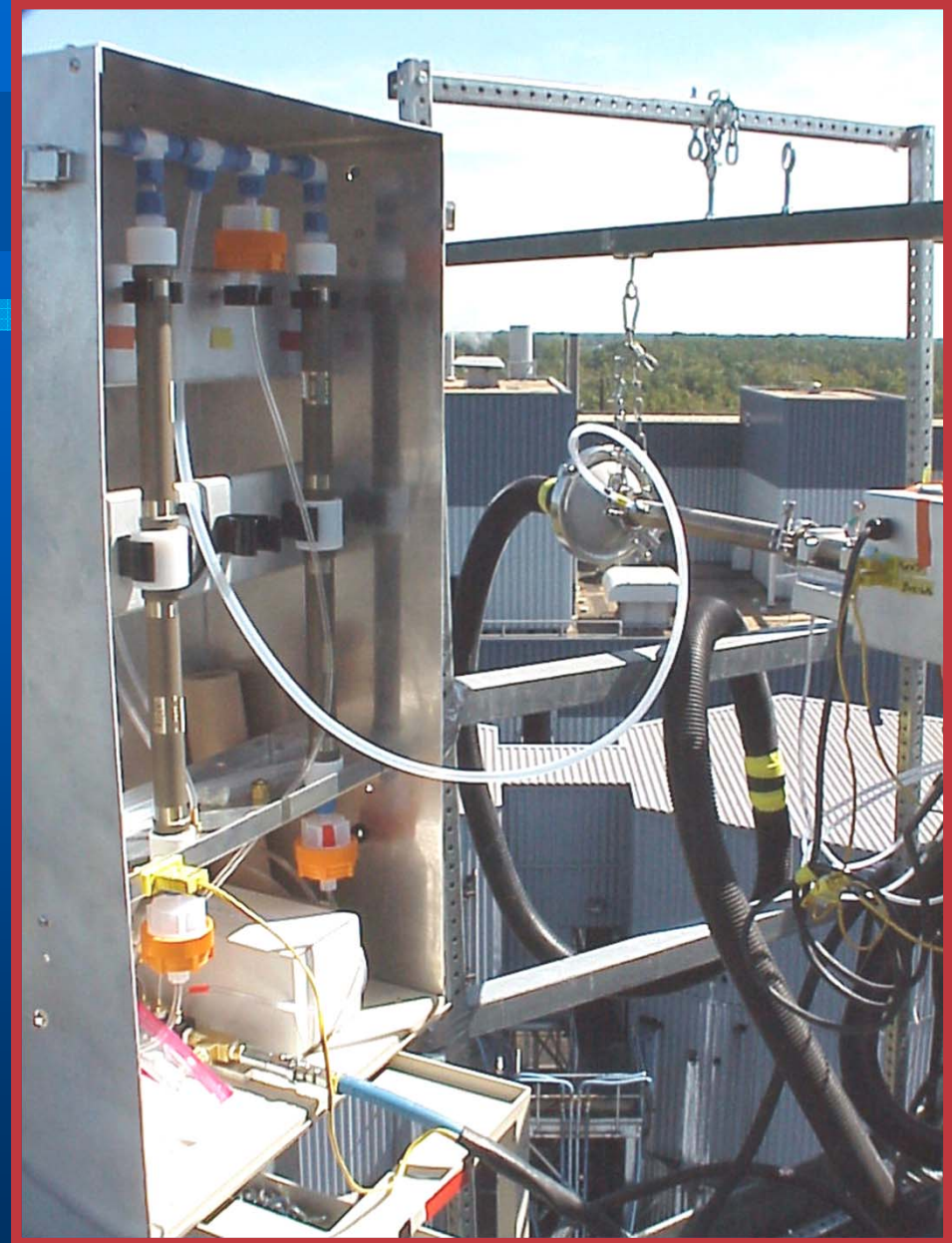


Major Components



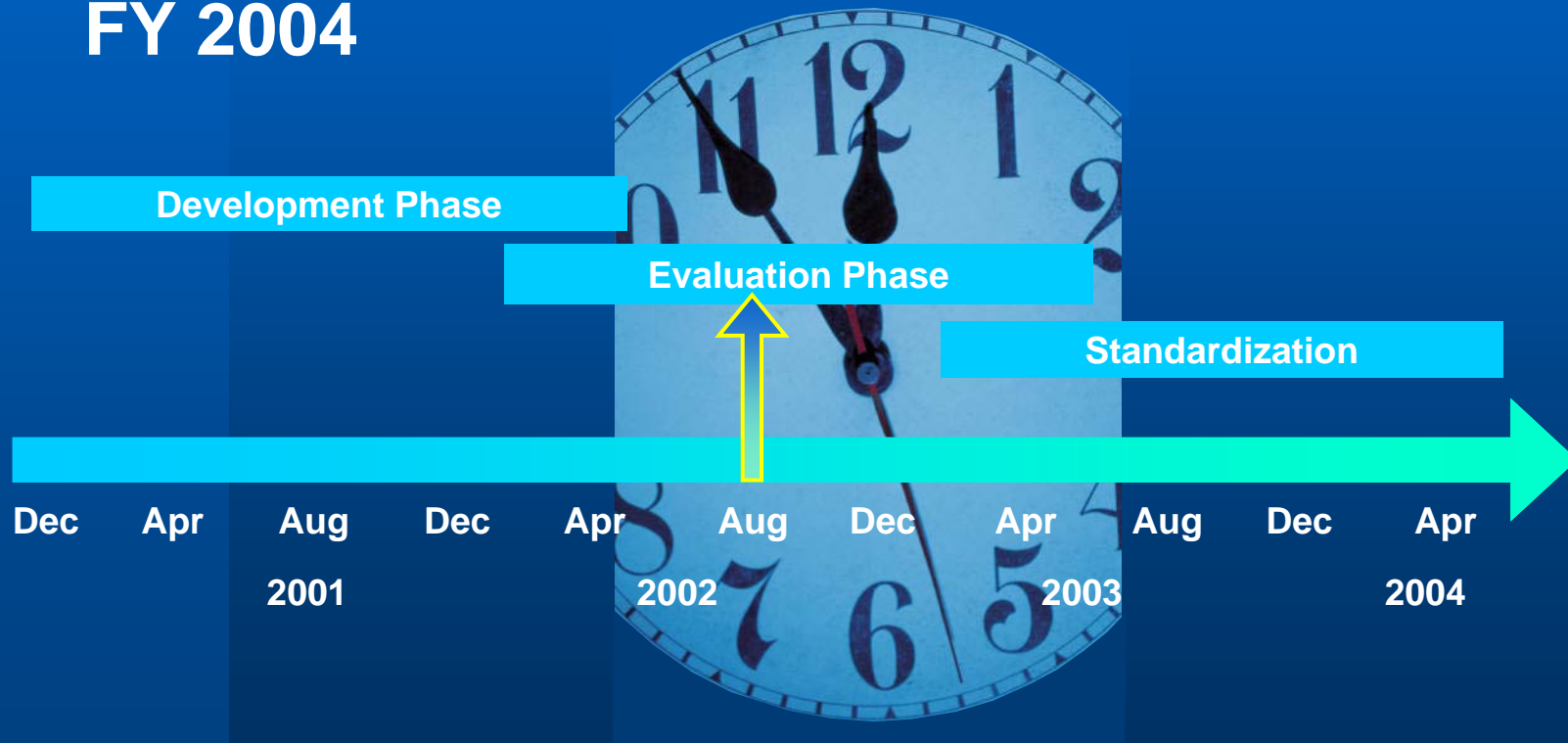
Speciation Filter Module

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



Schedule

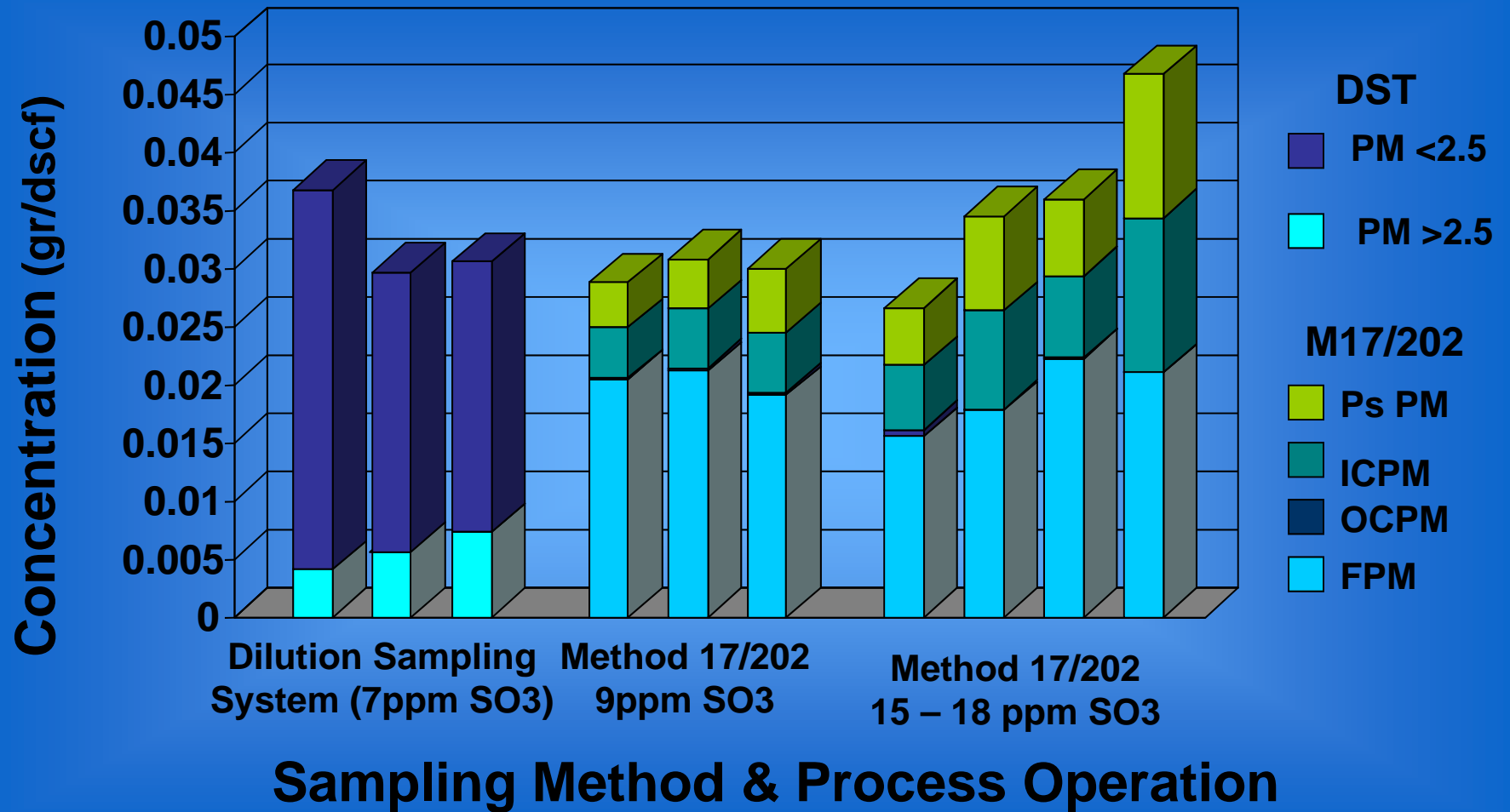
- Expected Need in FY 2004



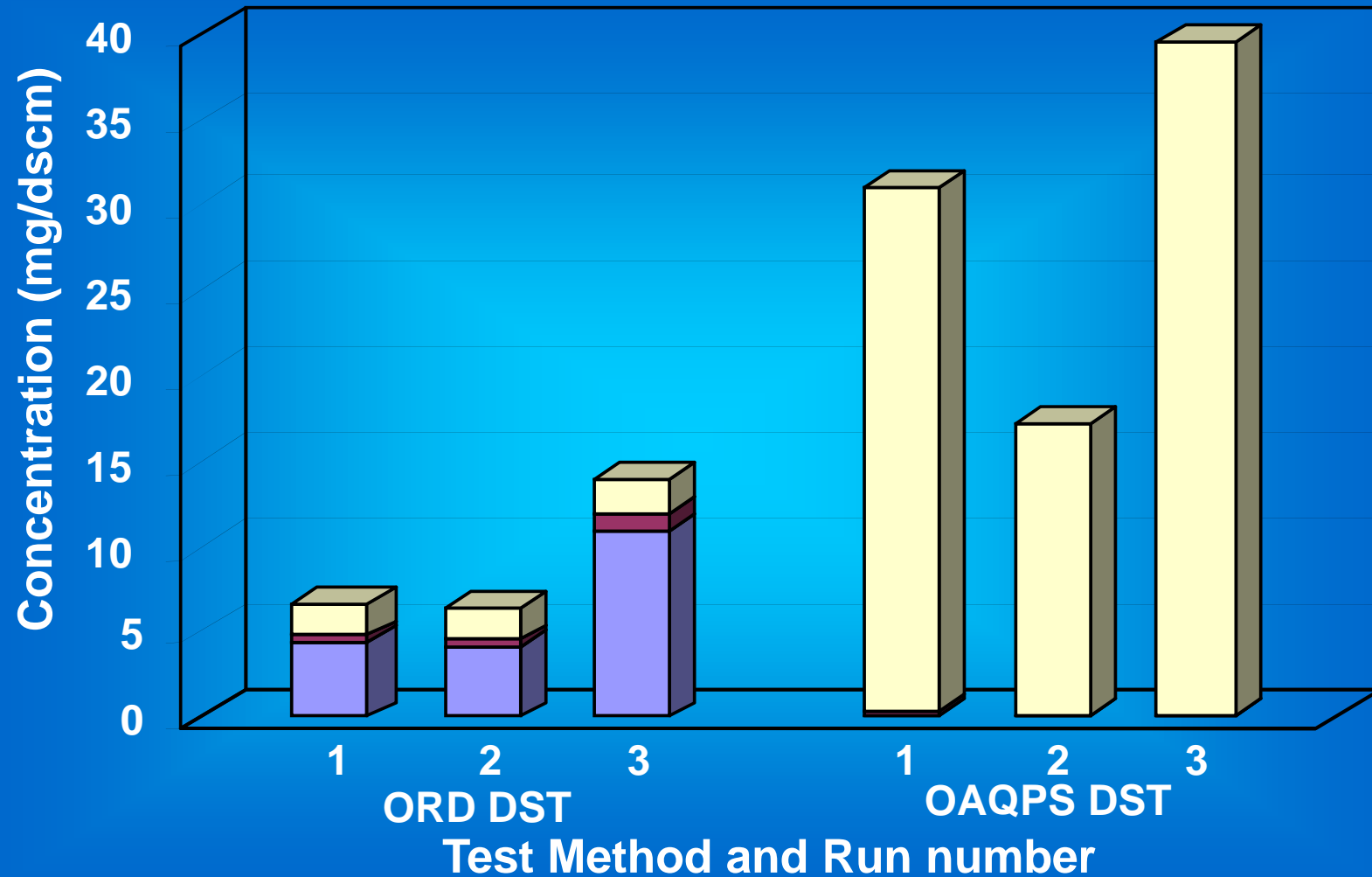
Current Status

- **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

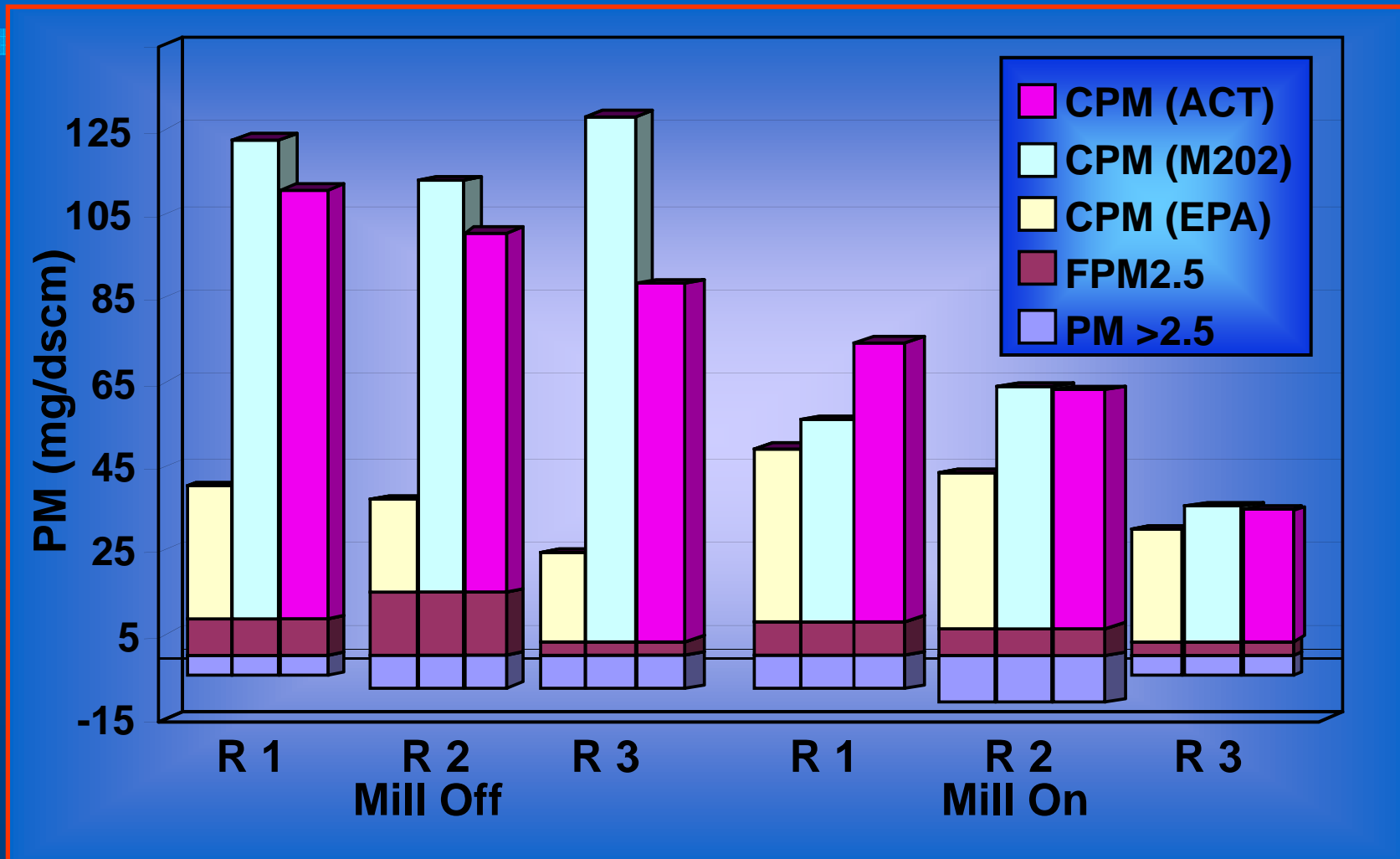
Preliminary Results of Second Test



Preliminary Results of Third Test



Preliminary Results of Fourth Test



Operating OAQPS Sample Train



QUESTIONS

