



Plenary Session - Technical Program Update

PM_{2.5} FEM Overview

Tim Hanley – U.S. EPA - OAQPS

Thursday May 17th, 2012

National Air Quality Conference – Ambient Monitoring 2012



Approved PM_{2.5} Class III FEMs

- Met One:
 - BAM-1020 Monitor – EQPM-0308-170
- Thermo Scientific:
 - Series 8500C FDMS or 1405-F – EQPM-0609-181
 - 1405-DF FDMS – EQPM-0609-182
 - Model 5014i or FH62C14-DHS – EQPM-0609-183
 - Model 5030 SHARP – EQPM-0609-184
- GRIMM:
 - Model EDM 180 PM_{2.5} Monitor – EQPM-0311-195

Met One BAM 1020



Thermo
FDMS 1405-DF



Thermo BAM 5030i



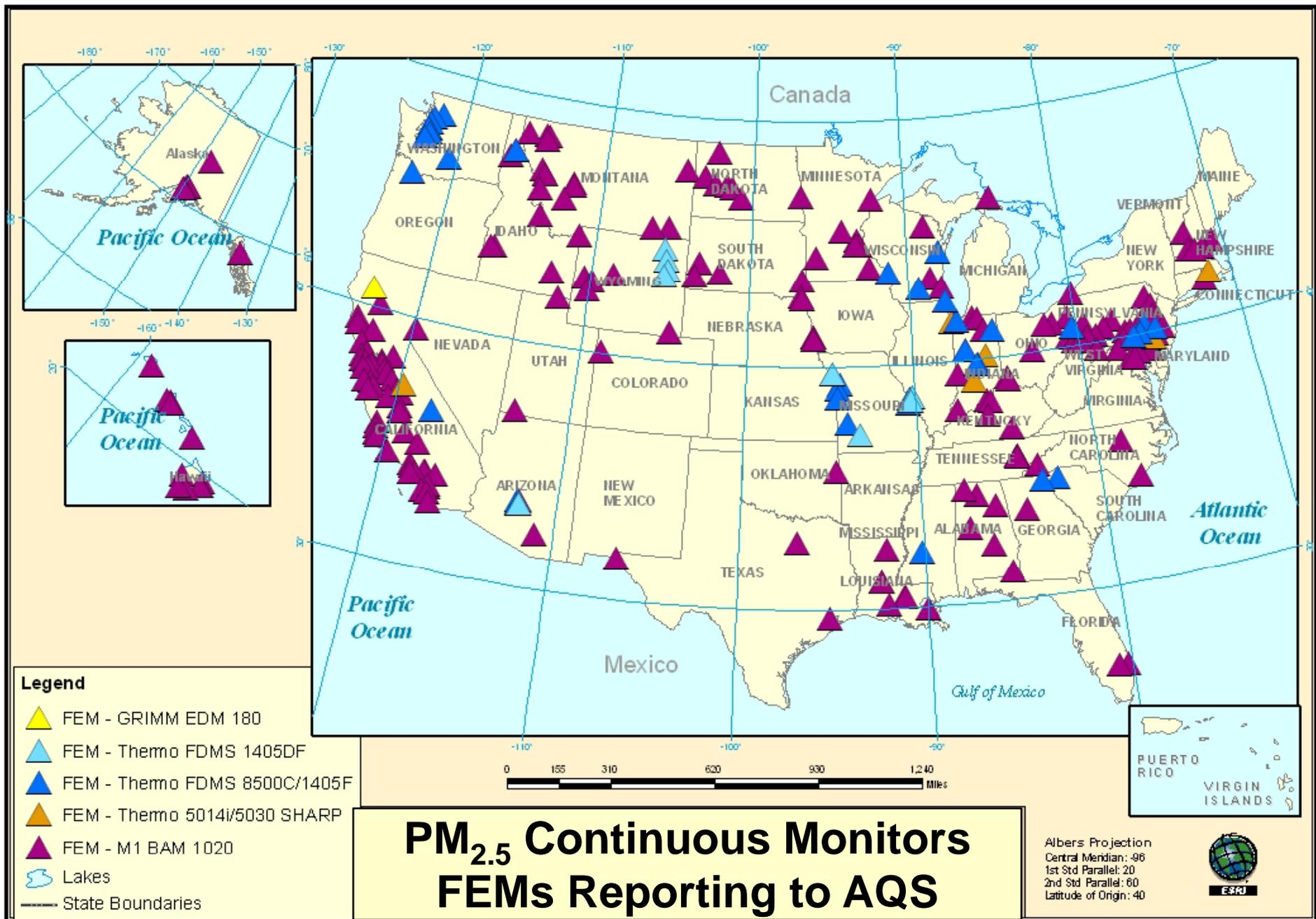
GRIMM 180

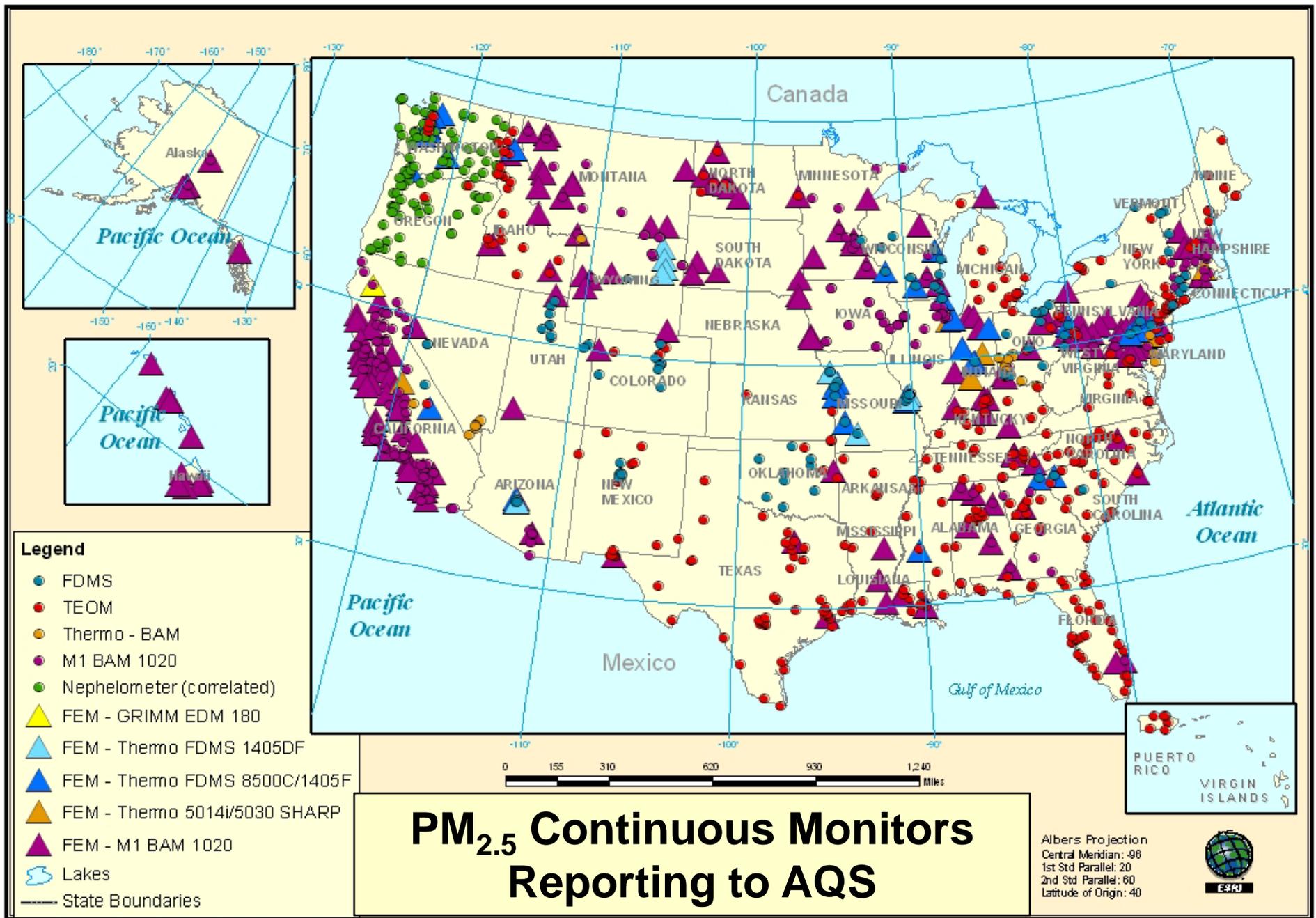




Summary of PM_{2.5} FEMs Reporting to AQS:

Method Description	Method Code	Monitors Reporting to AQS – May '12
Met One BAM-1020	170	209
Thermo 8500C FDMS/1405-F	181	38
Thermo 1405-DF FDMS	182	11
Thermo 5014i or FH62C14-DHS	183	1
Thermo 5030 SHARP	184	7
GRIMM EDM 180	195	2
Totals		268







What Material/Information is available to support operation and evaluation of $PM_{2.5}$ Continuous Monitors?

- Presentations from:
 - This Week
 - Previous Conferences
- Tools on the web and SOPs
- Assessments
 - Assessment (Spring 2011)
 - Comparability Assessment Tool



Monday's Training Session – Best Practices for Operating Continuous PM_{2.5} FEMs

Title	Presenter	Organization
Introductions, overview, web site references, assessments	Tim Hanley	U.S. EPA
Best Practice Operation Of BAM-1020	David Gobeli, Steve Wilson	Met One
Operation of Continuous PM _{2.5} Best Practices, One Agency's Trials and Successes	Adam Blundell	Southwest Ohio Air Quality Agency
Thermo Scientific FDMS & Beta Attenuation Instrumentation – an overview and recommendations to maximize operational performance	Jeff Ambs -	Thermo Scientific
The Use of Optical Technology for Continuous Mass Monitoring of Aerosol Particles	Gil Cossett	GRIMM



Related Presentations this Week

Title	Presenter	Organization	Session
12 Year Data Quality Assessment of the PM _{2.5} Monitoring Network	Shelly Eberly	STI Subcontractor	Wednesday 1pm. Quality Assurance Room - Colorado G
Continuous PM coarse Monitoring in Texas (Met One BAMs)	Bryan Lambeth	TCEQ	Wednesday 3 pm. Criteria Pollutant Methods, Issues, & Updates Room – Colorado F
PM _{2.5} Instrument comparison: FRM vs TEOM, BAM, & GRIMM	Cary Gentry	Forsyth County, NC	Wednesday 3 pm. Criteria Pollutant Methods, Issues, & Updates Room – Colorado F



Select Previous Conference Sessions on PM_{2.5} Continuous Monitoring

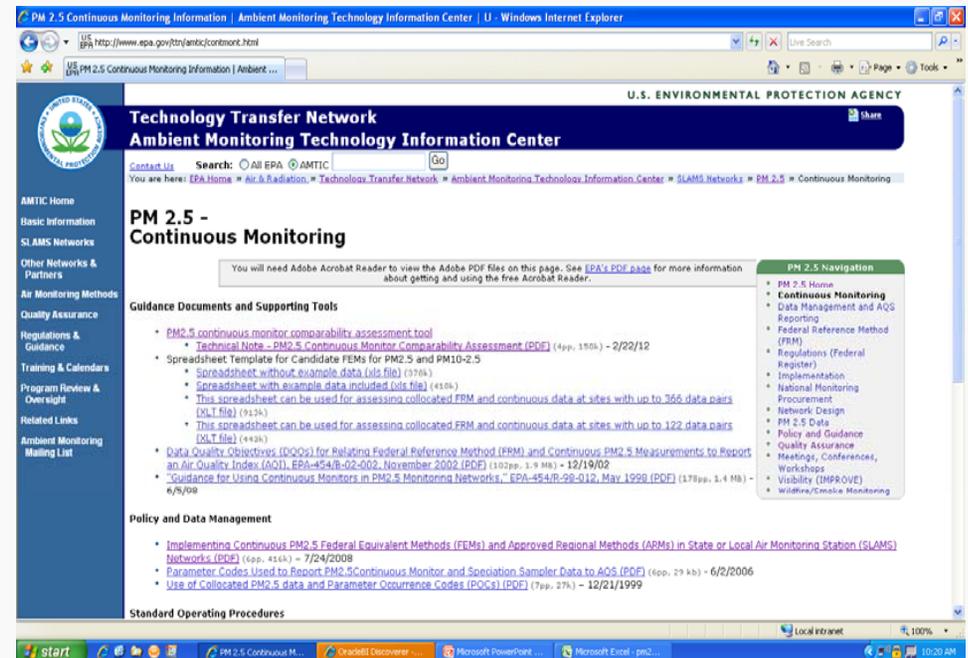
Conference	Session	Instruments Covered	Topics Addressed	URL
2009 National Ambient Air Monitoring Conference – Nashville TN	Continuous PM Mass Instrument Training Session	Thermo: <ul style="list-style-type: none"> ➤ TEOM 1405-DF, ➤ TEOM 1400ab with 8500C, ➤ SHARP (5030), ➤ FH62C14-DHS Beta Monitor Met One: <ul style="list-style-type: none"> ➤ BAM 1020 Grimm: <ul style="list-style-type: none"> ➤ Model 180 	<ul style="list-style-type: none"> ➤ Method Descriptions ➤ FEM Field Testing ➤ Development Status ➤ Tips for operation and maintenance ➤ Operational Key Points 	http://www.epa.gov/ttn/amtic/2009present.html
2008 National Air Quality Conference – Portland OR <i>Note: material in this session was presented by monitoring agency staff</i>	Continuous PM _{2.5} Monitoring Issues	<ul style="list-style-type: none"> ➤ FDMS ➤ Met One BAM 1020 ➤ Nephelometers 	<ul style="list-style-type: none"> ➤ Specific PM_{2.5} continuous methods (tips on configuration, operation, maintenance, calibration and audit, data interpretation) 	http://airnow.gov/index.cfm?action=naq_conf_2008.aq
2006 National Air Monitoring Conference – Las Vegas TN	Air Monitoring Instrumentation – Continuous PM Monitors	<ul style="list-style-type: none"> ➤ TEOM FDMS ➤ Met One BAM 1020 	<ul style="list-style-type: none"> ➤ History, Regs., FEM/ARM performance criteria, Field testing requirements, parameter codes ➤ Setup, Operation, and maintenance 	http://www.epa.gov/ttn/amtic/2006present.html



PM_{2.5} Continuous Monitoring Website on AMTIC

(<http://www.epa.gov/ttn/amtic/contmont.html>)

- Guidance and supporting Documents:
 - Comparability assessment tool
 - FEM/ARM spreadsheet templates
- Policy and data management memos
- SOPs
- CASAC related files
- Assessments/verifications
- Presentations





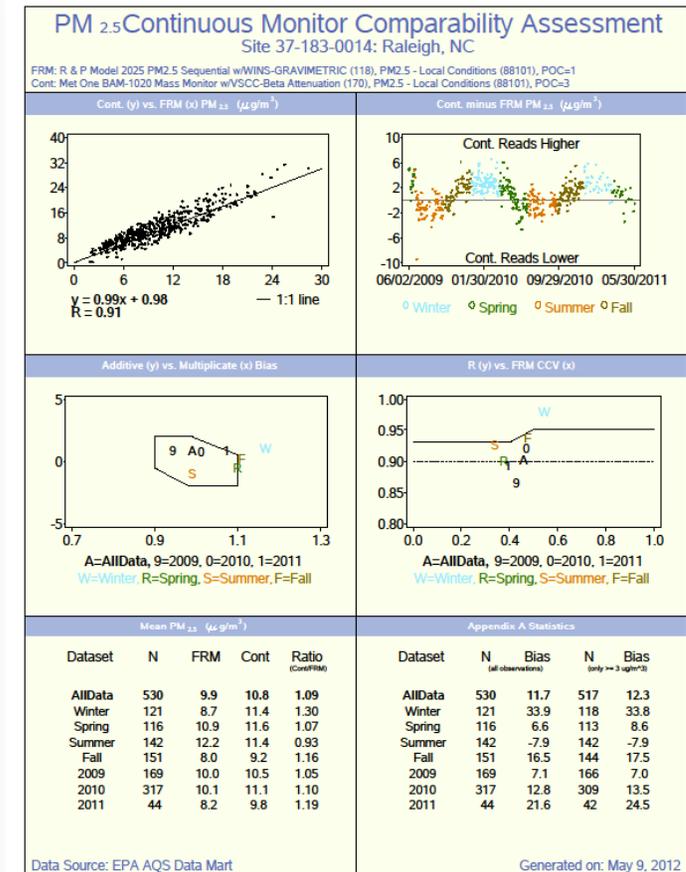
Assessments

- An assessment of available PM_{2.5} FEMs operated by routine monitoring agencies was performed in Spring of 2011
- Assessment was referenced in the PM Policy Assessment (April, 2011) and is included in the PM NAAQS docket:
 - Assessment of PM_{2.5} FEMs Compared to Collocated FRMs; Tim Hanley and Adam Reff, OAQPS; PM NAAQS Docket, EPA - HQ - OAR - 2007 – 0492
 - Memo is available at:
<http://www.epa.gov/ttn/naaqs/standards/pm/data/HanleyandReff040711.pdf>
- Detailed one page assessments are available at:
<http://www.epa.gov/ttn/analysis/pm.htm>
 - Met One BAM 1020 Assessments - 61 sites
 - Thermo Scientific Ambient Particulate Monitor with Series 8500C FDMS Assessments - 17 sites
 - Thermo Scientific Model 5030 SHARP Assessments - 2 sites



Comparability Assessment Tool

- Available at:
http://www.epa.gov/airquality/airdata/ad_rep_frmvfem.html
- Provides one-page assessment
- Data is from AQS Data Mart where there is a collocated PM_{2.5} FRM and PM_{2.5} continuous monitor.
- Includes PM_{2.5} continuous data submitted to any the following parameter codes:
 - 88101, 88500, 88502, 88501
- Technical note explaining tool is available at:
<http://www.epa.gov/ttn/amtic/files/ambient/pm25/comparabilityassessmenttool.pdf>





Comparability Assessment Tool Summary

- Tool provides quick and valuable assessment
 - However, some runs may take several minutes
- The assessment assumes the FRM represents the true value, even though the FRM will have its own uncertainty
- Assessments should be used as a guide and not a bright line

From Section 2.3.1.1 of Appendix A to Part 58:

Measurement Uncertainty for Automated and Manual PM_{2.5} Methods.

The goal for acceptable measurement uncertainty is defined as 10 percent coefficient of variation (CV) for total precision and plus or minus 10 percent for total bias

Bias is calculated from samples collected in PEP program.



AQS Parameter Codes for PM_{2.5} Continuous Monitoring Data Reporting

Parameter Name	Parameter Code	Purpose	Data uses
PM2.5 LOCAL CONDITIONS	88101	Appropriate code for all FRM/FEM/ARMS	<ul style="list-style-type: none"> ➤ AirData AQI calculations ➤ NAAQS (unless coded with “non-regulatory”)
PM2.5 TOTAL ATMOSPHERIC	88500	Valid data from methods measuring total PM _{2.5} aerosols in the atmosphere, including those that can be volatilized from the FRM	
PM2.5 RAW DATA	88501	Valid uncorrected data that <u>does not</u> reasonably match the FRM	
ACCEPTABLE PM2.5 AQI & SPECIATION MASS	88502	Valid data that <u>does</u> reasonably match the FRM with or without correction, but not to be used in NAAQS decisions	<ul style="list-style-type: none"> ➤ AirData AQI calculations
PM2.5 VOLATILE CHANNEL	88503	Store important related data such as the FDMS reference channel	

Technical Note covering codes available at
<http://www.epa.gov/ttn/amtic/cpreldoc.html>

**88101 is only parameter code
 eligible for NAAQS decision-making** 14



PM_{2.5} Continuous Monitoring Data Reporting Summary

- General
 - Report hourly data, make sure flow system is operating on local conditions, ensure data for a given hour is placed as the “Start Hour”.
- Two related policy Memo’s address data reporting to AQS:
 - Implementing Continuous PM_{2.5} Federal Equivalent Methods (FEMs) and Approved Regional Methods (ARMs) in State or Local Air Monitoring Station (SLAMS) Networks, 7/24/2008
 - Parameter Codes Used to Report PM_{2.5} Continuous Monitor and Speciation Sampler Data to AQS, 6/2/2006
- Monitoring Agency decision to use FEM continuous PM_{2.5} data for comparison to the NAAQS:
 - Generally “SLAMS” and “Primary monitor” to use data, or
 - “SPM” and “Non-regulatory” to not use it; however, other FRM/FEM must be operating as primary monitor.
 - Recommend your agency state intentions in Annual Network Plan



Areas to Work On:

- Continue to use assessments to inform where improvements are needed:
 - PM_{2.5} Continuous Monitor Comparability Assessment
 - PM_{2.5} Performance evaluation data
 - WINS vs VSCC
 - PM_{2.5} Continuous FEM vs PEP?
- Develop Audit Checklists specific to PM_{2.5} Continuous FEMs
 - Generic
 - For specific areas of the most utilized methods
 - e.g., zero test on Met One BAM 1020
 - e.g., yearly (minimum) maintenance on FDMS dryer



Areas to Work On (*continued*):

- Update to Draft SOPs:
 - Incorporate what we have learned
 - Provide concise directions for the most common maintenance and troubleshooting areas
- Incorporate improvements to PM_{2.5} continuous FEMs where available?
 - Collaboratively with instrument companies
 - As ARMs?
- Anything Else?