Met One Instruments BAM-1020 $PM_{2.5}$ FEM

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Agenda

- Background
- Test Protocol
- Test Results

Background

- US Regulations (40CFR § 53) revised in October, 2006
- *No Coarse ($PM_{10-2.5}$) Standard*
  - *Very unexpected change of course*
  - US network will be minimal (~75 sites total, probably far fewer with automatic monitors)
  - *At least 5 years before issue is revisited*.
  - *1987 PM_{10} regulations reaffirmed*
- *Detailed designation procedures developed for automatic (Class III) $PM_{2.5}$ monitors*

New US Regulations 40 CFR § 53

- Expect PM monitoring sites currently using Federal Reference Method (FRM) samplers to be replaced with continuous monitors after $PM_{2.5}$ FEM monitors become available.
- US-EPA is encouraging development of particulate speciation samplers for $PM_{10-2.5}$ fraction

$PM_{2.5}$ Comparability Test Protocol

- 5 Test Campaigns
  - 3 Winter
  - 2 Summer
- *Triplicate* BAM-1020 and *Triplicate* FRM
- *Minimum* 23 Valid Days of Data
  - 46 Valid Days for Winter/Summer Site
- Strict criteria for multiplicative (slope), additive (intercept) bias and precision


Allen Park MI
New Haven CT
Logan UT
Bakersfield CA
Chicago
New York
Philadelphia
Washington D.C
Phoenix
Dallas
San Antonio
Houston
Nassau
La Habana (Havana)
1511 mi
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BAM 1020
Met One Instruments

Allen Park, MI

Logan, UT

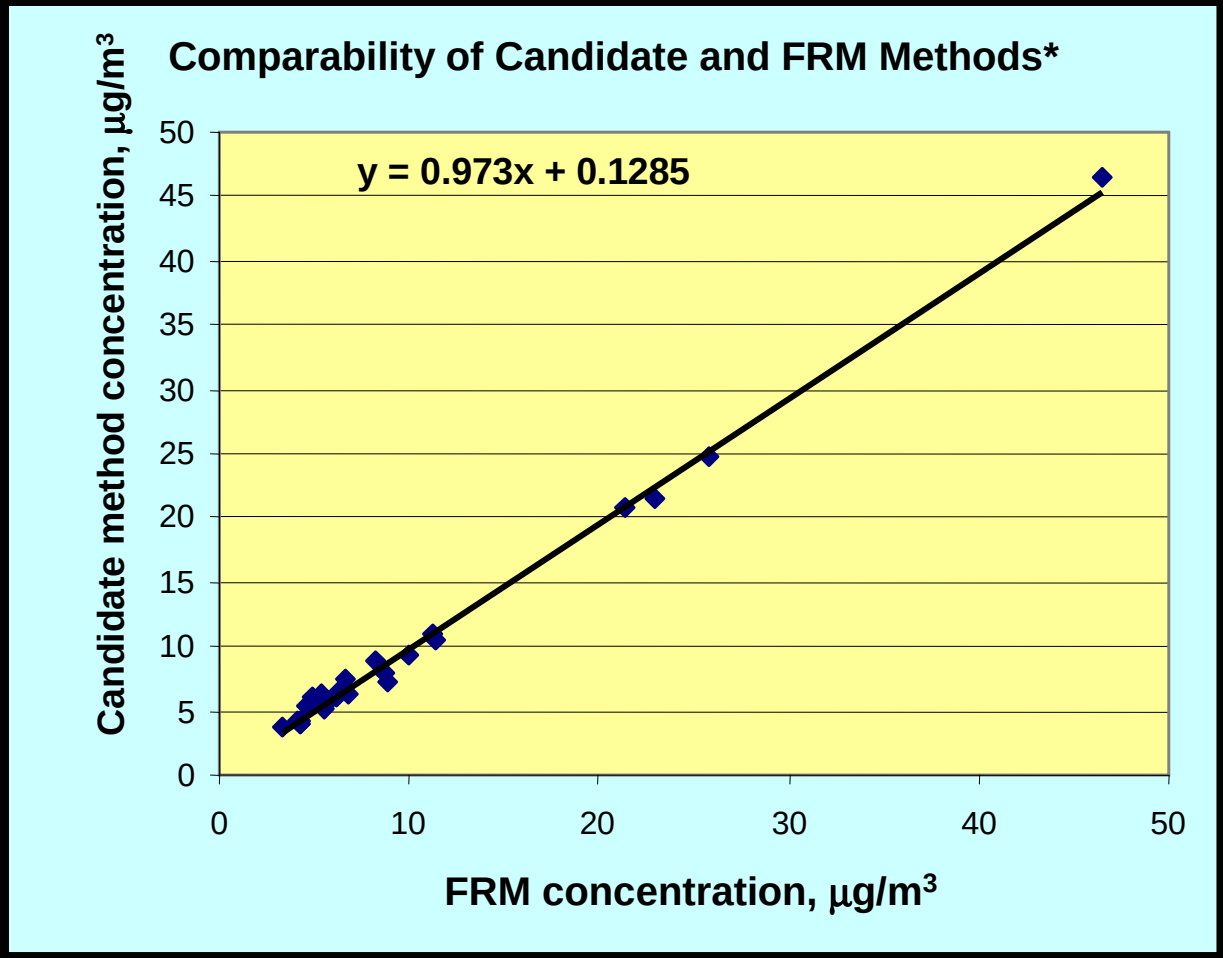
Bakersfield, CA

New Haven, CT

BAM-1020 $PM_{2.5}$ FEM Status

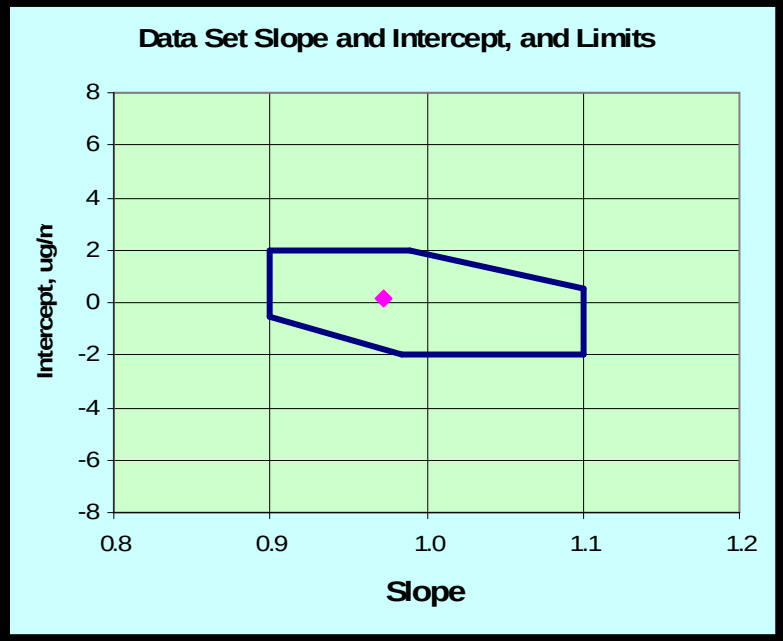
- BAM-1020 successfully completed US-EPA $PM_{2.5}$ FEM field campaigns at all sites
  - Logan UT (winter)
  - Bakersfield CA (winter and summer)
  - Allen Park, MI (winter)
  - New Haven, CT (summer)
- Designation application completed and submitted.

Logan, UT Winter

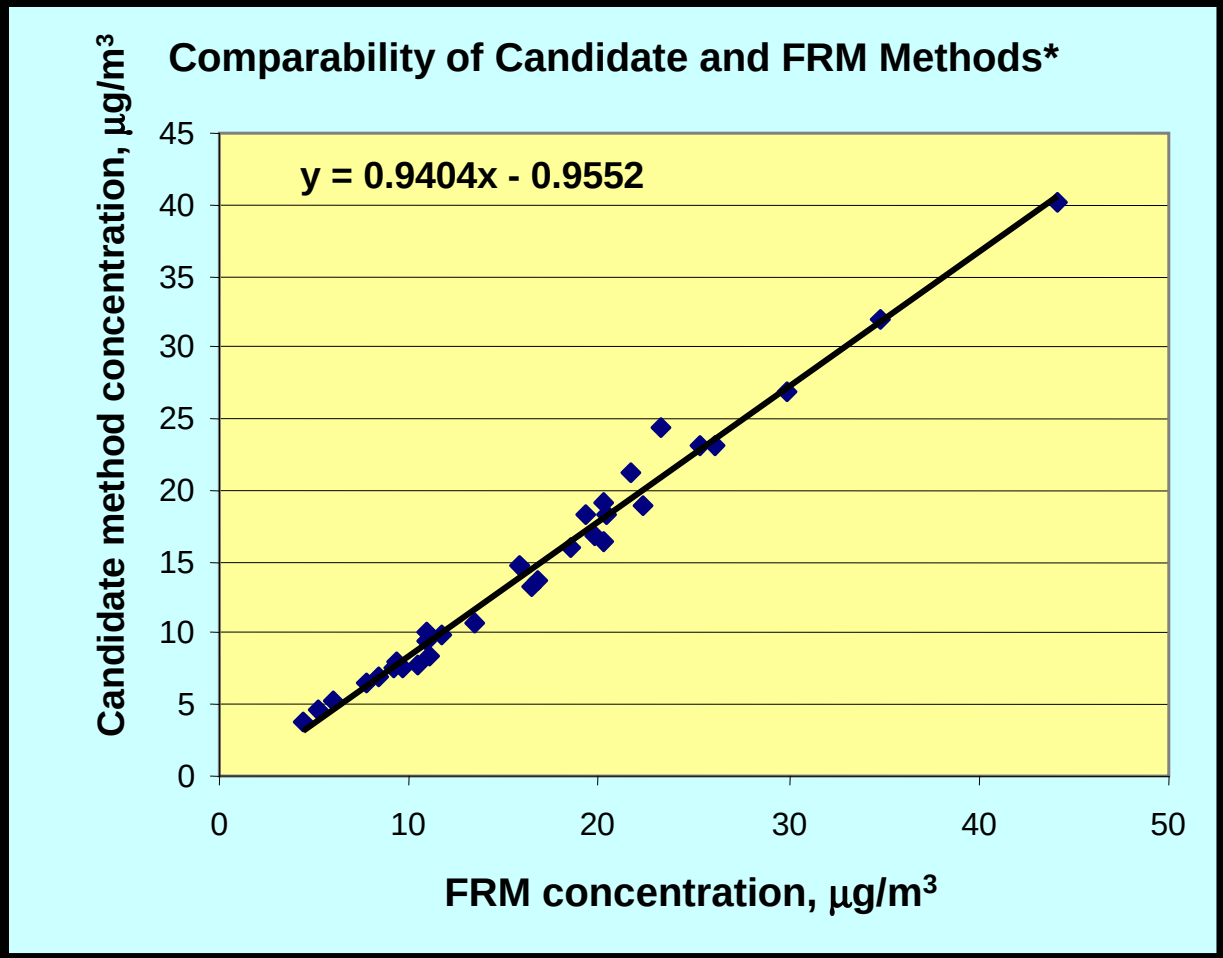


Logan, UT Winter

Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.973	0.129	0.99751
Limits for	Upper:	1.100	2.000	
PM2.5 Class III	Lower:	0.900	-1.803	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

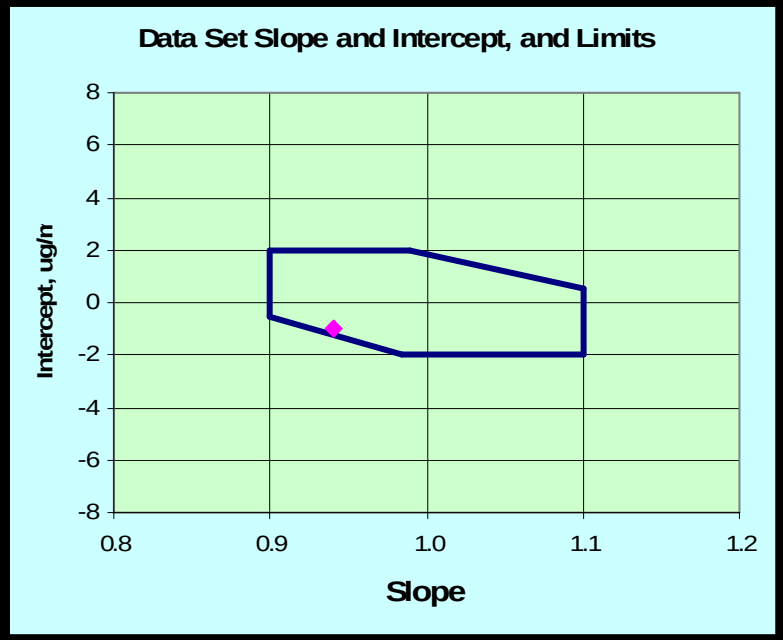


Allen Park, MI Winter

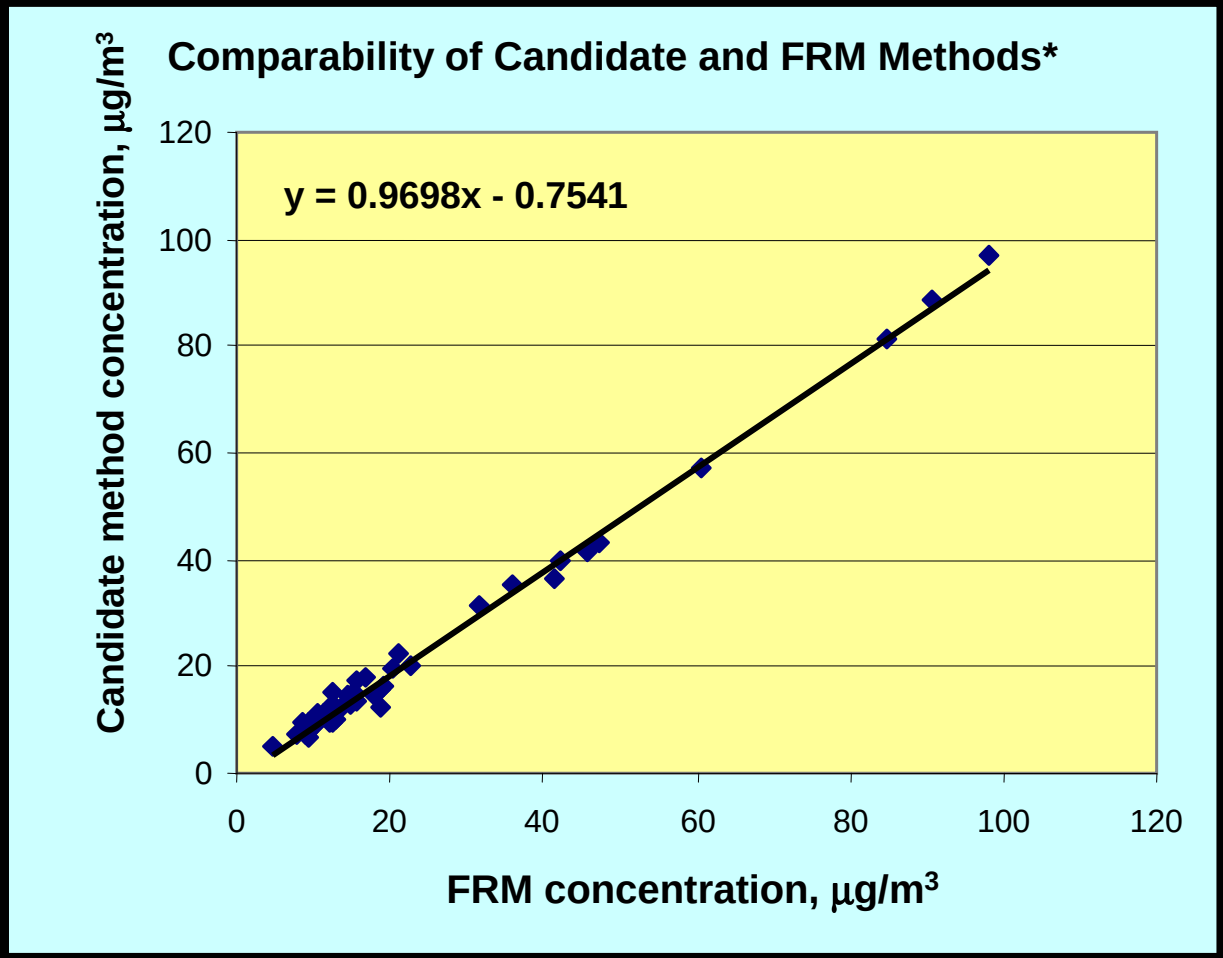


Allen Park, MI Winter

Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.940	-0.955	0.99275
Limits for	Upper:	1.100	2.000	
PM2.5 Class III	Lower:	0.900	-1.238	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

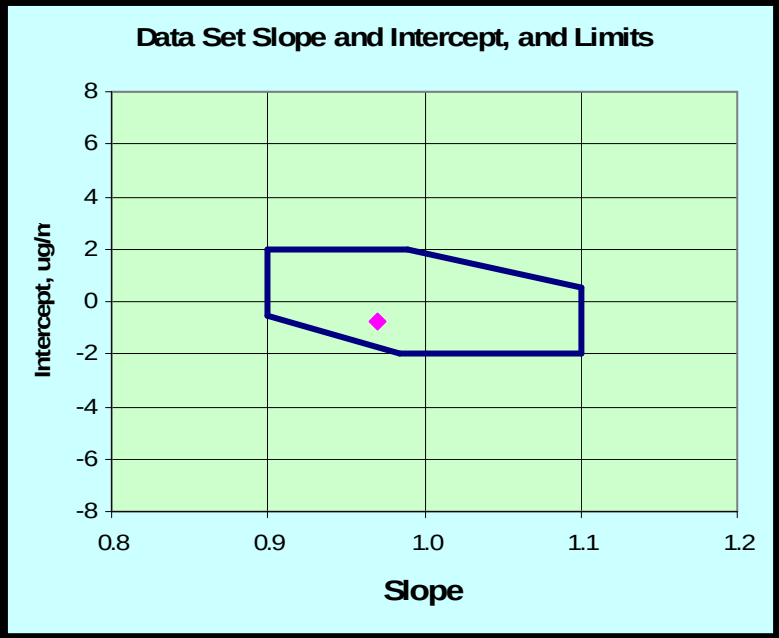


Bakersfield, CA Winter and Summer

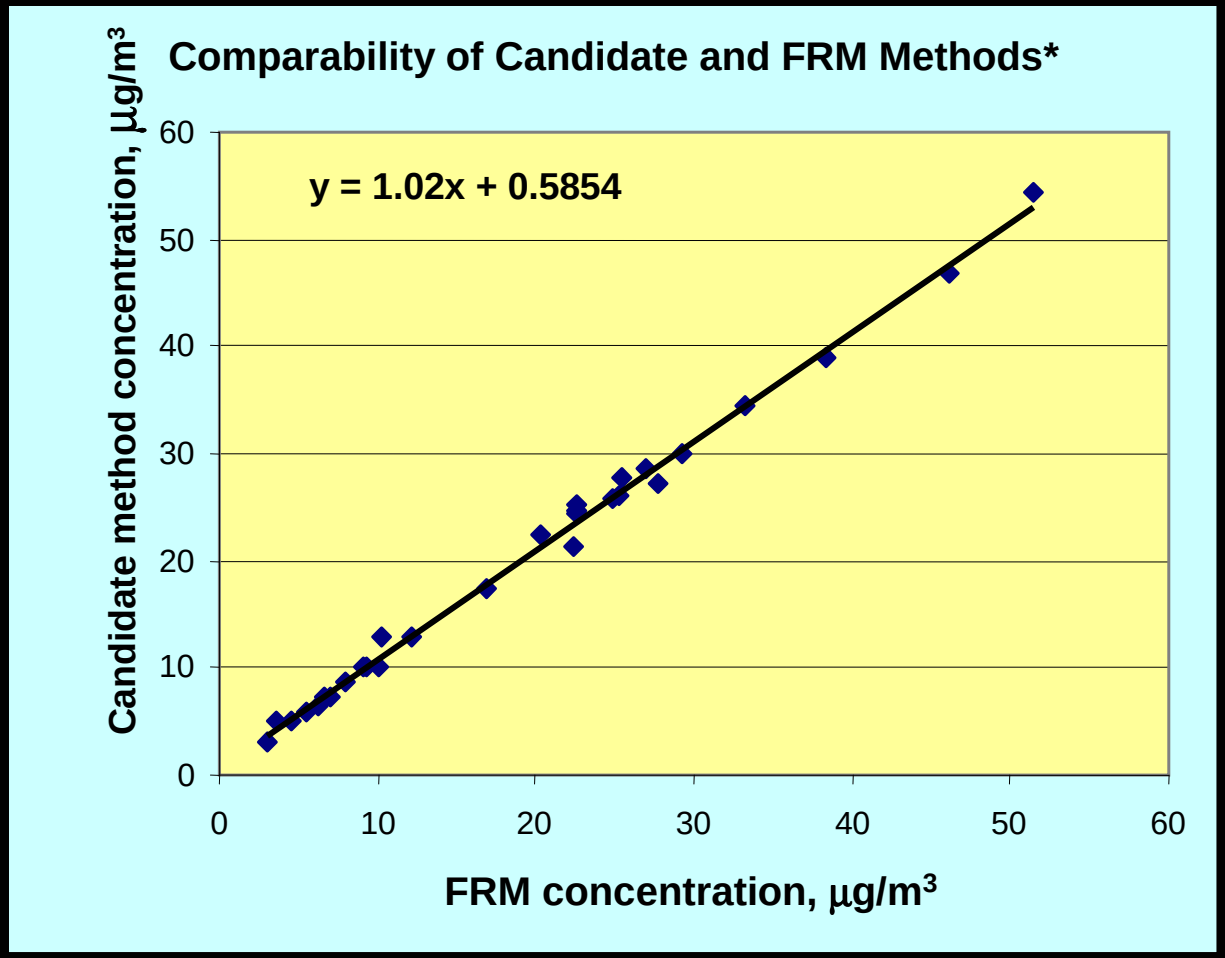


Bakersfield CA Winter and Summer

Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.970	-0.754	0.99678
Limits for	Upper:	1.100	2.000	
PM2.5 Class III	Lower:	0.900	-1.748	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

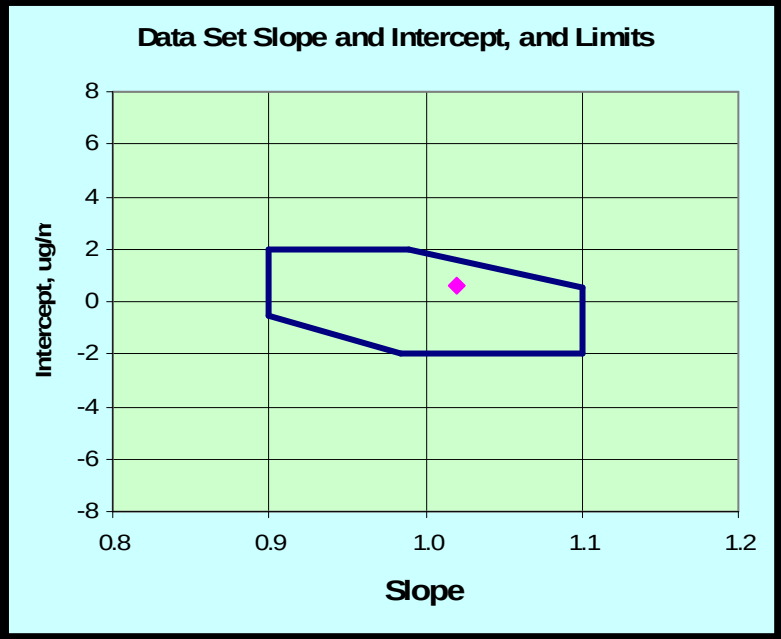


New Haven, CT - Summer



New Haven, CT Summer

Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		1.020	0.585	0.99765
Limits for	Upper:	1.100	1.586	
PM2.5 Class III	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS



Conclusions

- Slope/Intercept almost identical at each test site
  - No geographical influence
  - No seasonal influence
- Changes to BAM-1020 required to meet new designation rules are relatively modest
  - No increased complexity
- *No site specific calibration factors*

Conclusions *(continued)*

- BAM-1020 will likely be the first $PM_{2.5}$ monitor to receive US-EPA designation as Class III FEM.

BAM-1020 FEM Specifications

Parameter	Performance Specification
Measurement Ranges	0-1,000 µg/m^3 standard
Measurement Cycle	1 hour standard, others available
Sampling period per measurement cycle	40-50 minutes user selectable depending on counting period per cycle
Counting period per measurement cycle	4, 6 or 8 minutes
Lower Limit of Detection (2 σ) 1 hour	< 3.0 µg/m^3
Lower Limit of Detection (2 σ) 24-hours	< 0.6 µg/m^3
Root mean square (RMS) error (1-hour)	< 1.5 µg/m^3
Root mean square (RMS) error (24-hours)	< 0.3 µg/m^3
Source Composition and Activity	^{14}C < 100 µCi