BetaGuard PM Particulate Monitoring for Portland Cement MACT

McIlvaine

Focus Webinar

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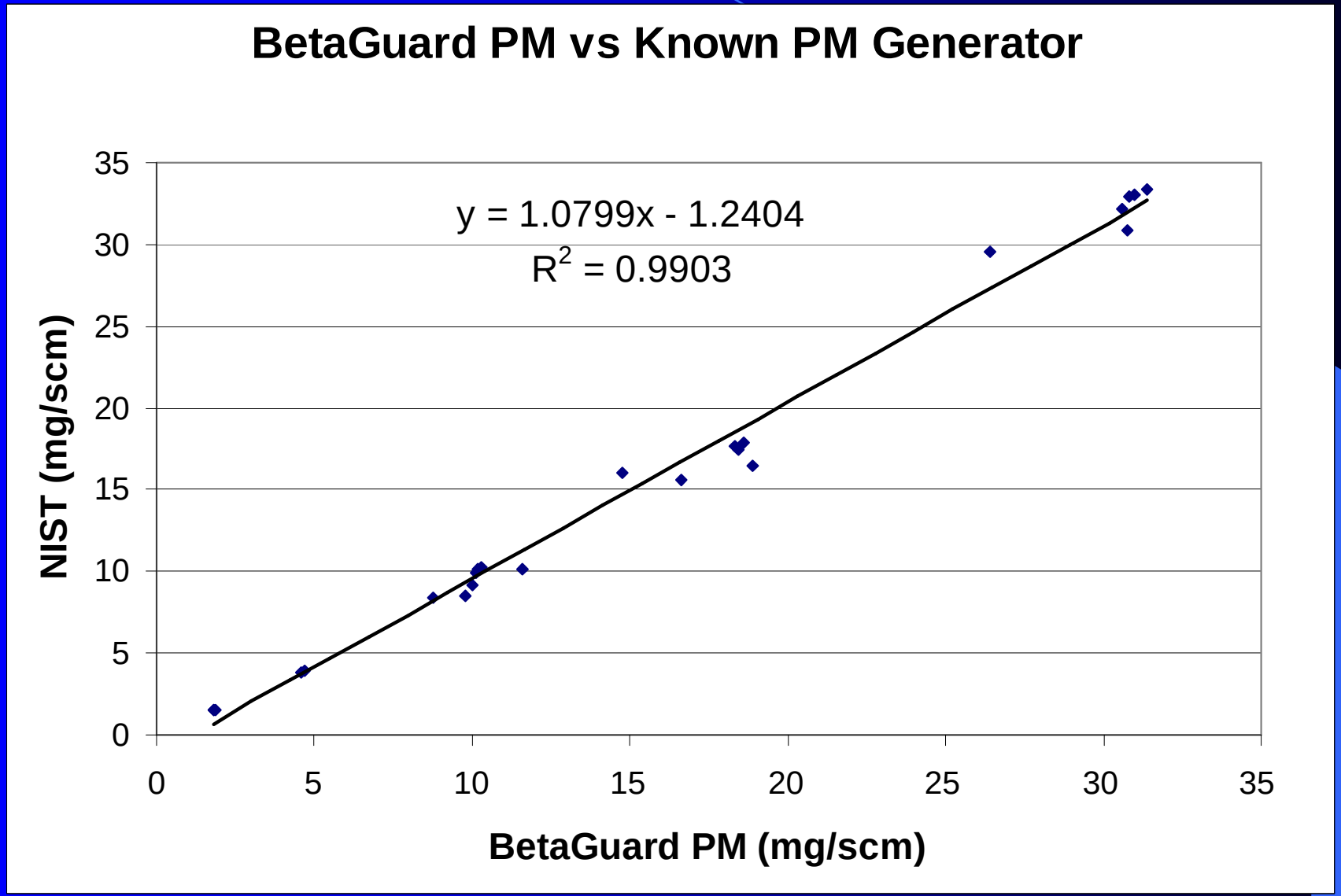
Craig Clapsaddle

MSI/Mechanical Systems, Inc.

MSI BetaGuard PM

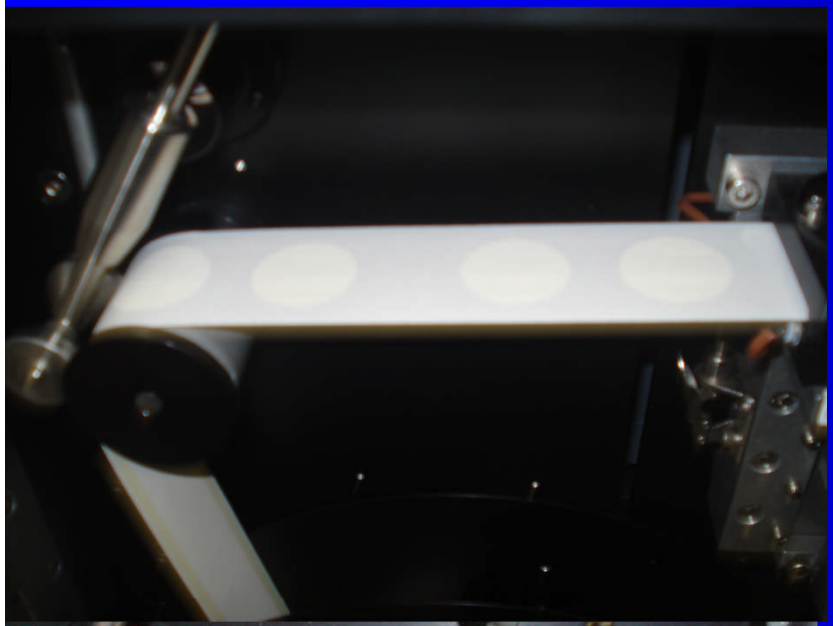
- Direct measure of mass concentration
- Replicates EPA Methods 5, 5B
- NIST traceable mass standards used to calibrate monitor's mass measurement
- Beta attenuation mass measurement is independent of particle characteristics
- Dilution sampling technology
- Isokinetic sampling
- Automatic daily mass and flow drift checks
- Designed for long-term unattended operation with high availability (>90%)
- Truly meets US EPA requirements

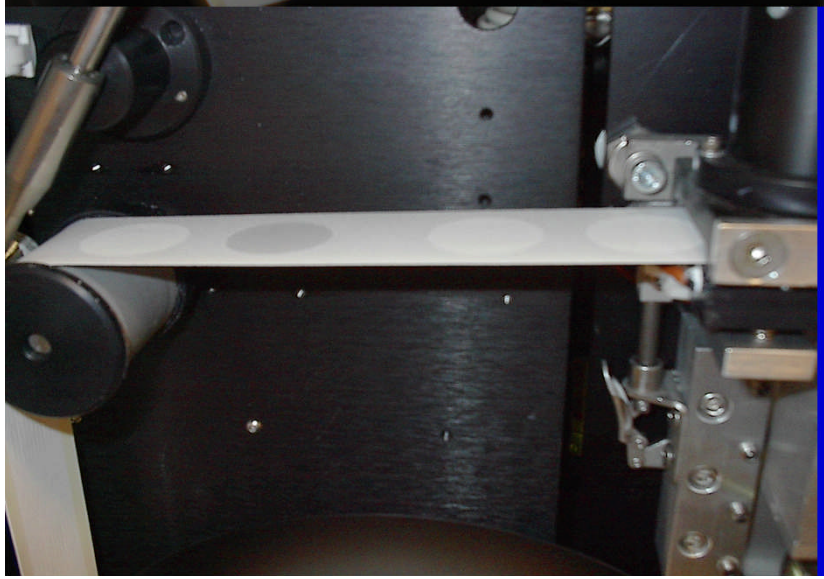
Direct Mass Measurement

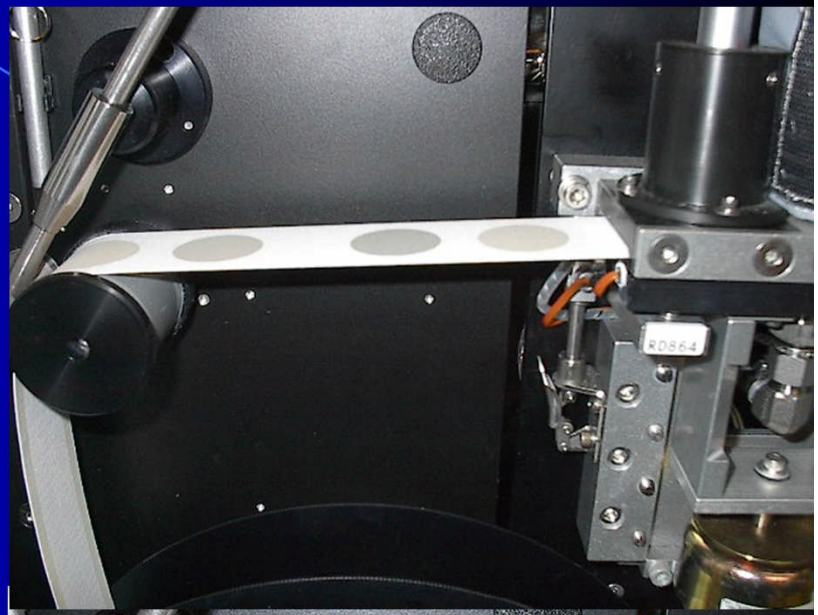


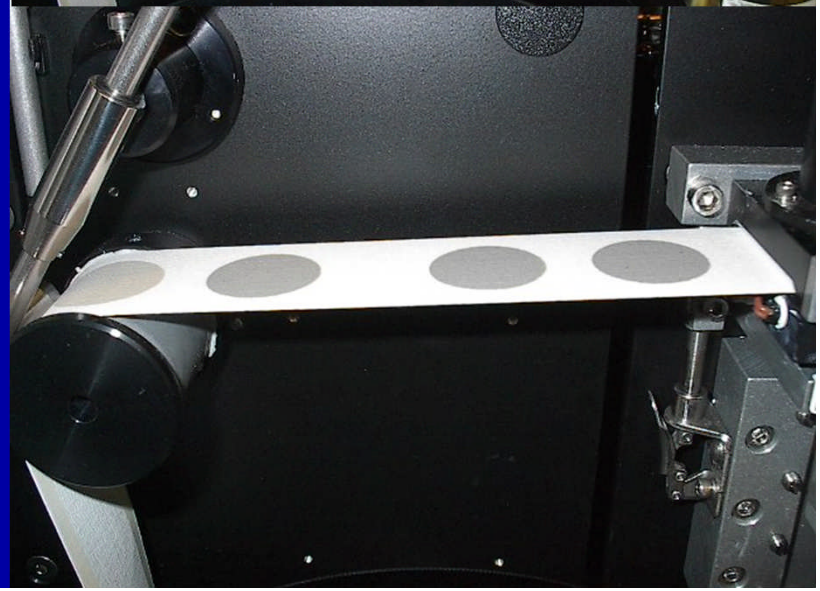
NIST Mass Standards

Independent of Particle Characteristics









PS-11 Requirements

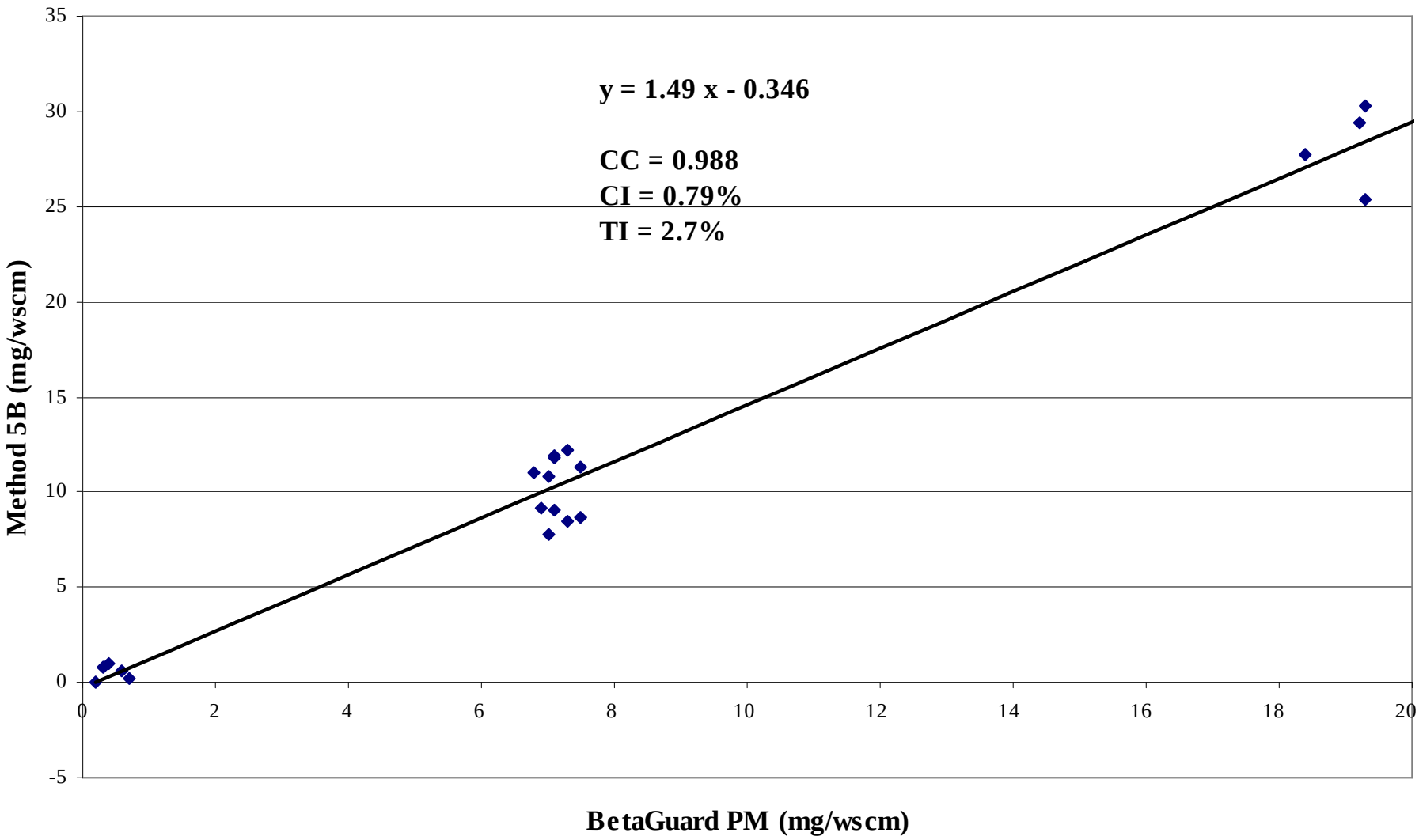
- Select a CPMS appropriate for your source
  - BetaGuard PM works in wet or dry stacks
  - BetaGuard PM measurement not biased by changes in fuel supply, process operation, stack gas flow, moisture, or temperature
- Monitor at location representative of PM emissions measured by Method 5
  - BetaGuard PM probe length can vary as needed
  - MSI can perform a particulate characterization test to find a representative location

PS-11 Requirements

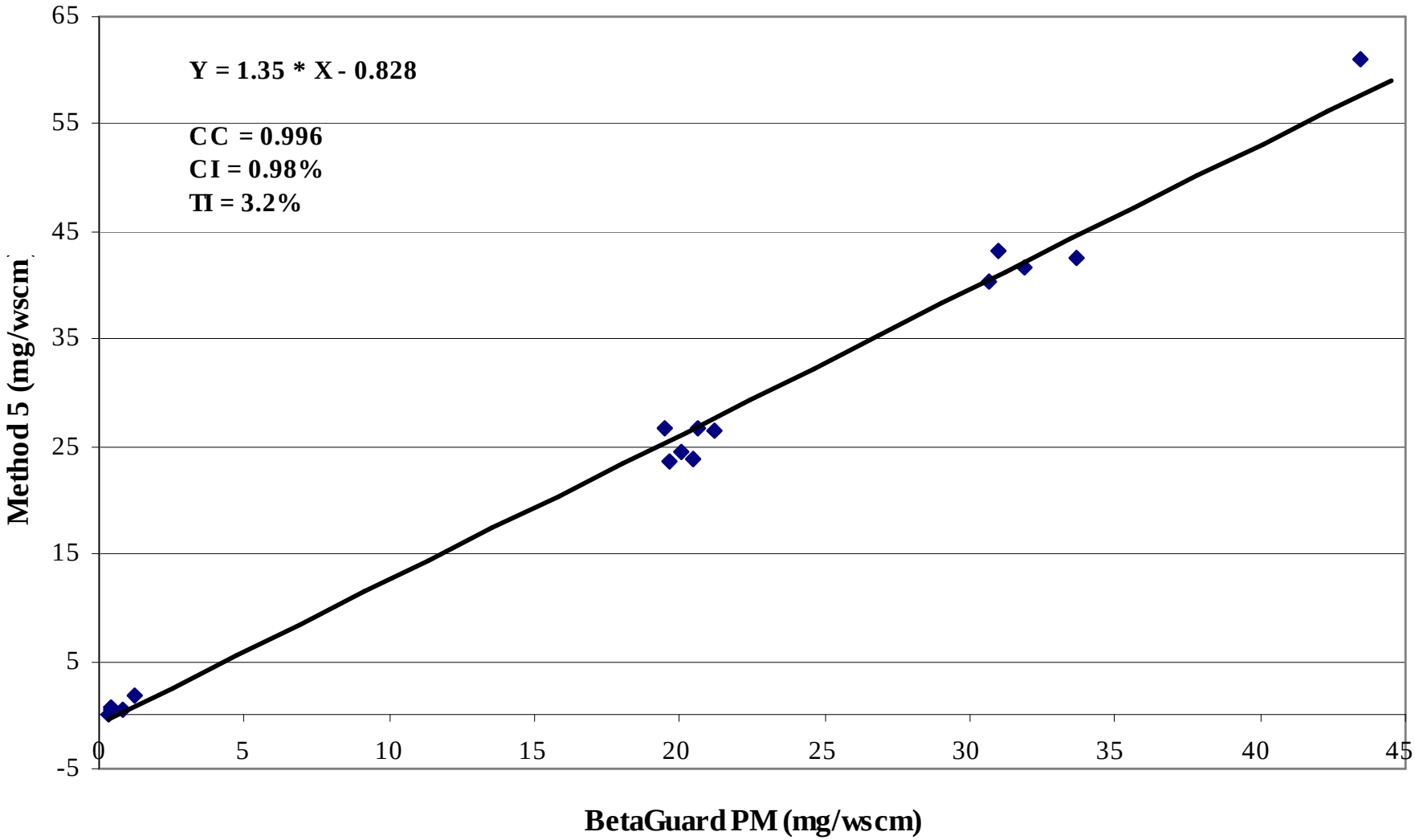
- Extractive CPMS must maintain isokinetic sampling rate
  - BetaGuard PM samples at 100% isokinetic
- Install CPMS and determine what process changes affect PM emissions
  - MSI works with operations personnel to set up operating procedures for PS-11 correlation test
- Certification process
  - 7-day drift test and correlation test
  - MSI can conduct the correlation test

PS-11 Correlation Test

- Requires 15 data points over a wide range of PM concentrations
  - Need at least 3 PM levels
  - Need at least 20% of data points in each PM level (3)
- Obtaining different PM concentrations is a challenge but not impossible
  - Use different flow or production rates or fuels
  - Raw mill On/Off
  - Detune primary PM control equipment
  - Pull probe from stack and sample ambient air for zero (only for the beta gauge monitor)
- Calculate "correlation" between monitor and RM
  - Determine CC, CI, TI – compare to criteria


BetaGuard PM Correlation
y = 1.49 x - 0.346
CC = 0.988
CI = 0.79%
TI = 2.7%
Method 5B (mg/wscm)
BetaGuard PM (mg/wscm)
35
30
25
20
15
10
5
0
-5
0
2
4
6
8
10
12
14
16
18
20

BetaGuard PM Correlation



Advantages & Benefits

- Direct measure of mass concentration, BetaGuard does not experience inaccuracy when particles change
  - Complete fuel and plant operational flexibility
- PM concentration output is in standard units to calculate lb/ton clinker emission rate
  - No need for temperature, pressure, or moisture correction monitors
- mg/dscm output for startup & shutdown

Advantages & Benefits

- Measures real PM concentration (mg/wscm) similar to a stack test not a surrogate like light scatter intensity
  - BetaGuard measurement is insensitive to changes in control equipment operation and plant operations
  - Will not need multiple PS-11 correlations

Advantages & Benefits

- Isokinetic sampling
  - Extracts PM at same concentration as exists in the stack (only means to get a representative sample)
  - No bias in measurement when stack gas velocity changes
  - No additional testing to prove acceptability

Advantages & Benefits

- Probe length is adjustable and can be positioned if dictated by characterization test
  - Probe lengths can vary from 24 inches to 15 feet
- BetaGuard PM monitor can be located remote from the probe up to ~150 feet
  - Monitor can be installed in CEMS shelter at ground level

Summary

- BetaGuard is reliable and accurate, simple to operate, and easy to maintain
- BetaGuard truly meets PS-11
- BetaGuard has wide operational flexibility allowing for site specific optimization
- BetaGuard is direct measure of PM concentration
- MSI can provide all services required, no need for outside consultant
- MSI has extensive experience monitoring particulate emissions in the U.S.
  - We can help ensure a successful PM monitoring program – complete integration into your CEMS