PM-CEMS and PM-CPMS for Dry Stacks

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LAND

AMETEK®
PROCESS & ANALYTICAL INSTRUMENTS

QUALITY CUSTOMER SOLUTIONS

PM as Surrogate for Non-Hg Metals

EPA studies show that filterable PM is a surrogate for non-mercury hazardous air pollutant metals

- Antimony
- Arsenic
- Beryllium
- Cadmium
- Chromium
- Cobalt
- Lead
- Manganese
- Nickel
- Selenium

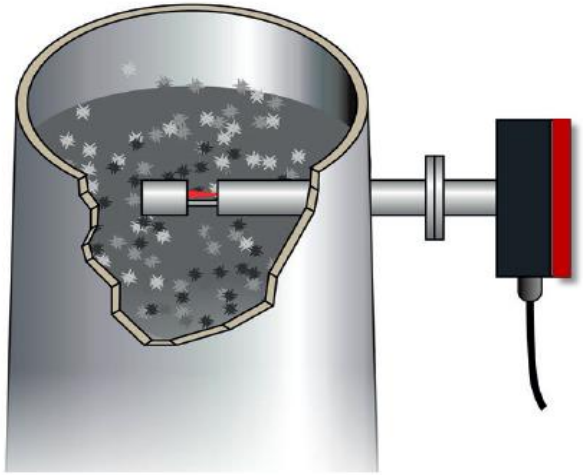
PM Emission Limits

Type of EGU	New	Existing
New coal-fired	9E-2 lb/MWh ≈14 mg/m^3	3E-2 lb/MMBtu ≈53 mg/m^3
New IGCC	7E-2 lb/MWh ≈11 mg/m^3	4E-2 lb/MMBtu ≈70 mg/m^3
Oil-fired (continental)	3E-1 lb/MWh ≈50 mg/m^3	3E-2 lb/MMBtu ≈56 mg/m^3
Oil-fired (non-continental)	3E-1 lb/MWh ≈50 mg/m^3	3E-2 lb/MMBtu ≈56 mg/m^3
Solid oil-derived	3E-2 lb/MWh ≈5 mg/m^3	8E-3 lb/MMBtu ≈14 mg/m^3

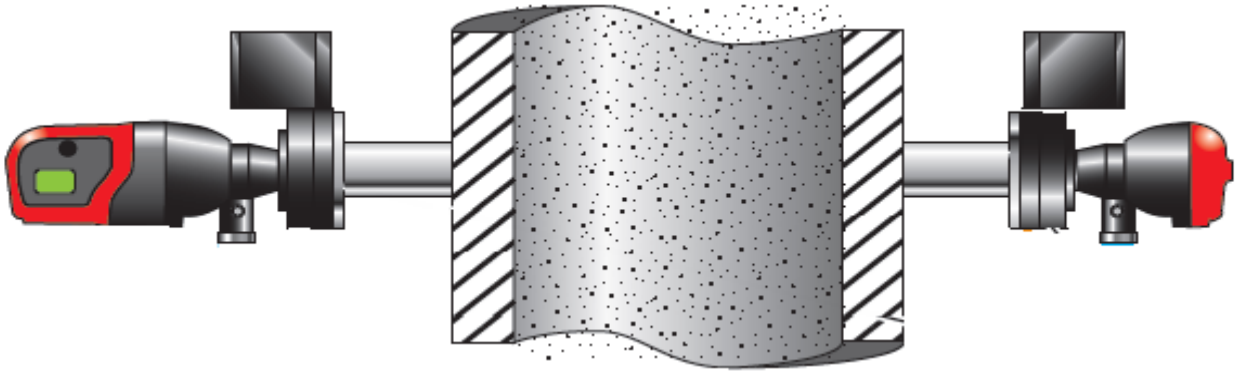
Conversions assume coal is sub-bituminous

PM Options for Dry stack

PM-CEMS
PM-CPMS

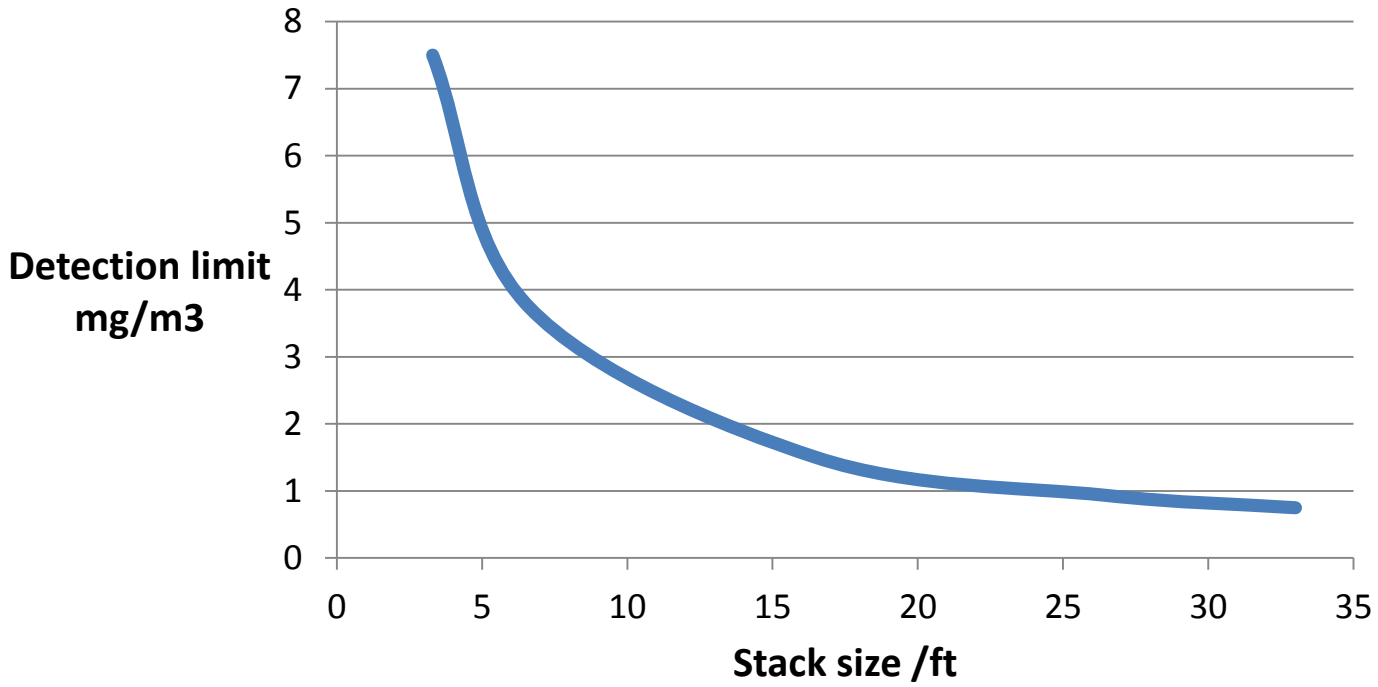


Opacity with periodic testing



Limits of Opacity Measurement

Opacity cannot measure extremely low dust concentrations

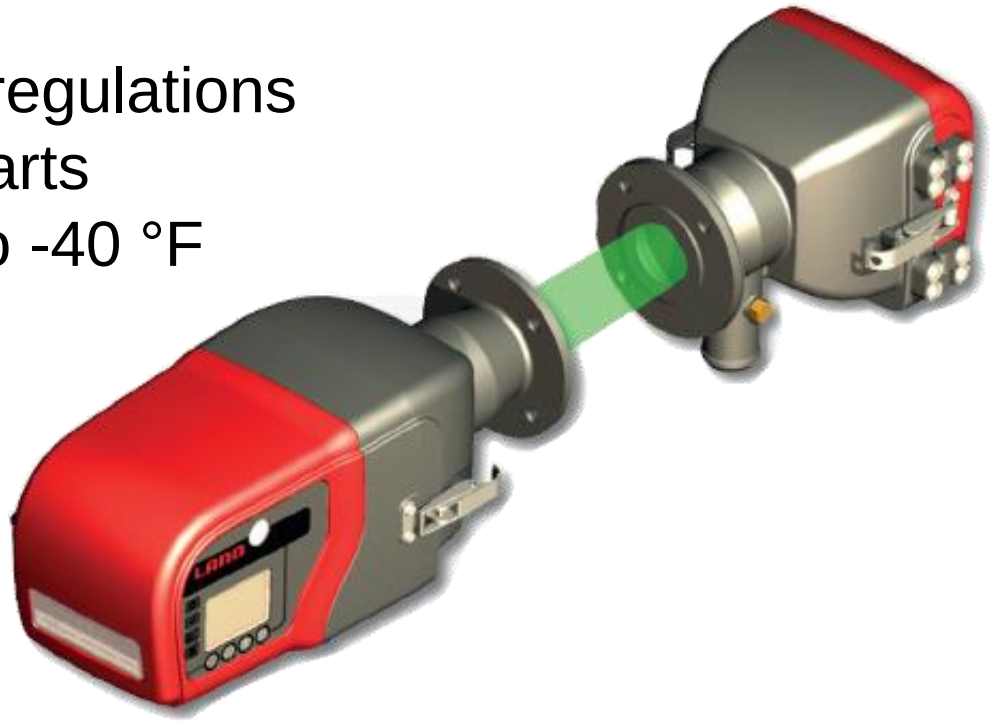


Opacity with Stack Testing

- Continuous opacity measurement is needed unless PM-CEMS or PM-CPMS is installed
- Quarterly stack test for filterable PM required according to Method 5
- Can also perform Method 29 for individual metals

Model 4500 MkIII

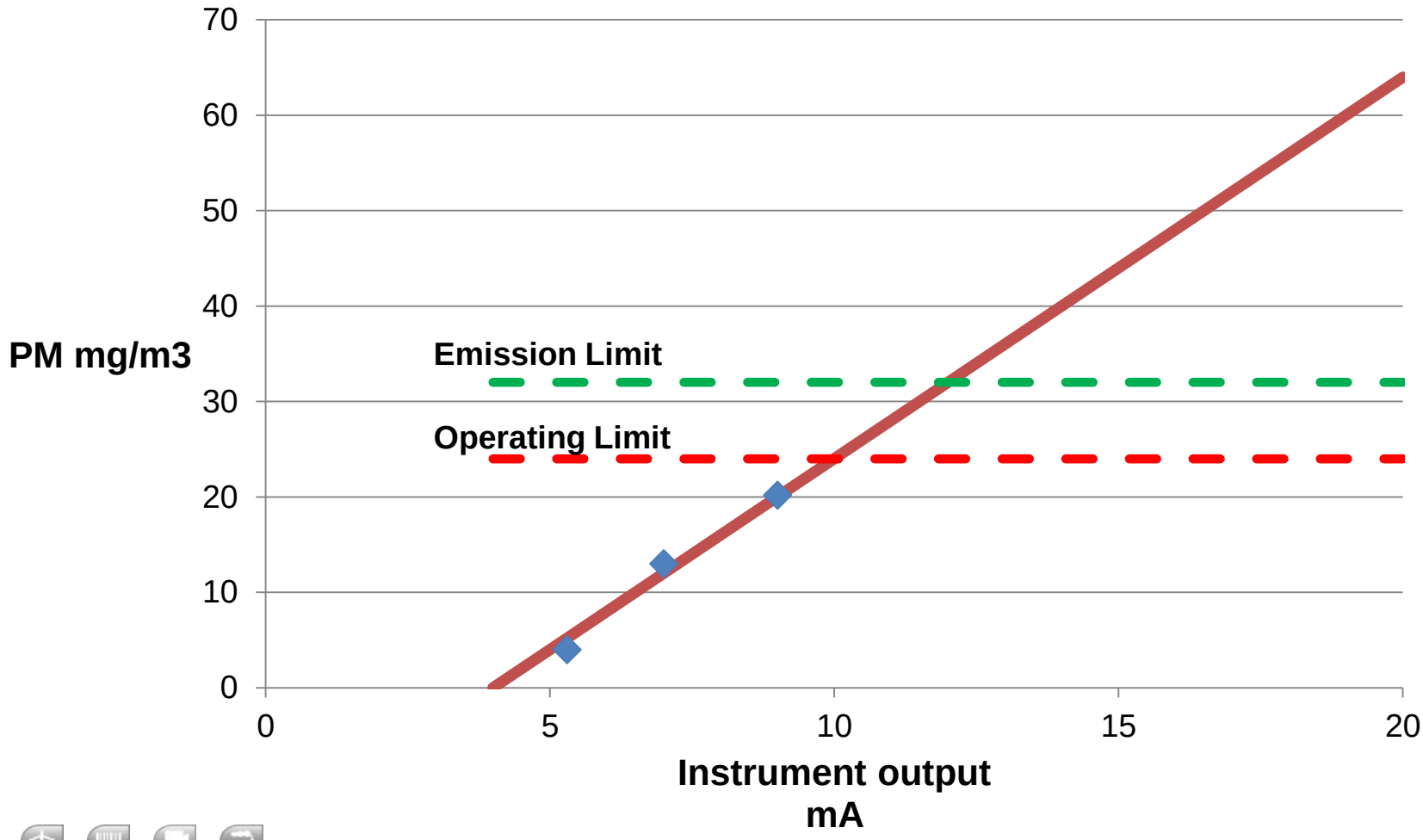
- Latest Model
- Exceeds all ASTM & EPA regulations
- No continuously moving parts
- Wide temperature range to -40 °F
- Flexible configuration



PM-CPMS Parametric Measurement

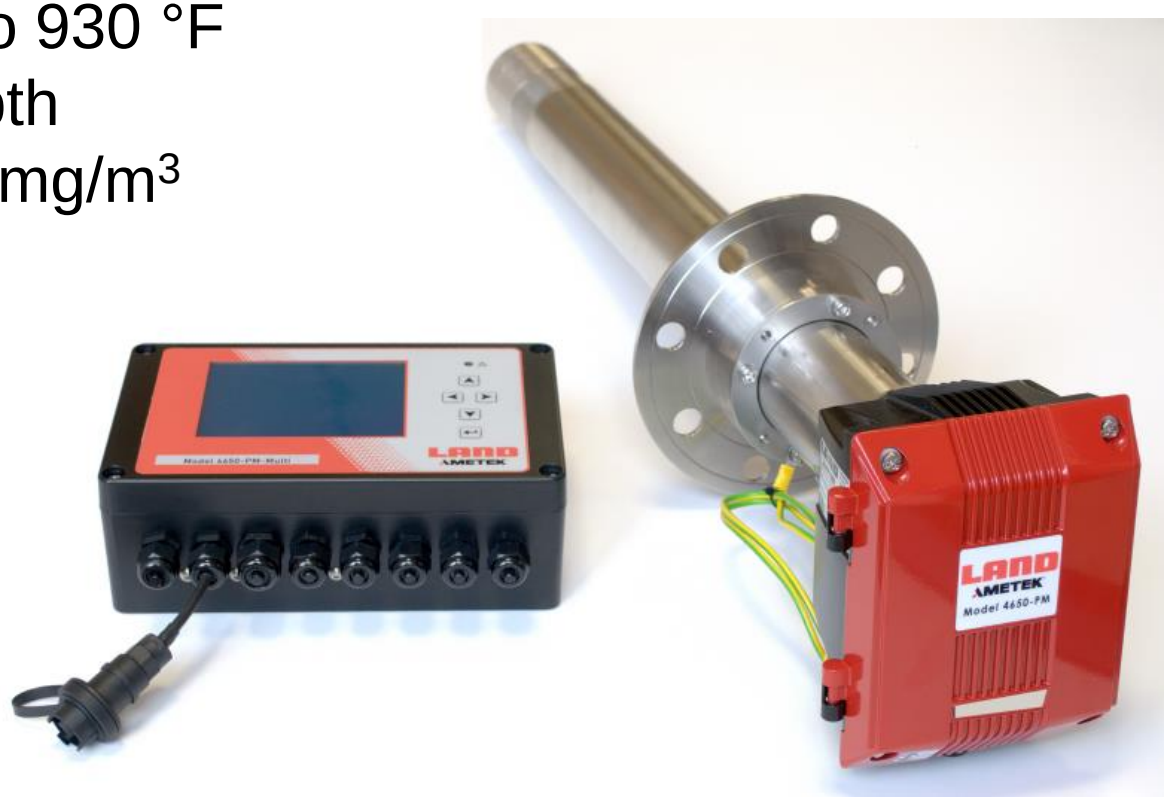
- EPA initially expected most sources to employ PM-CPMS
- May use scattered light, beta absorption, scintillation or mass accumulation (microbalance). Detection limit 0.5 mg/m^3 or better
- Annual stack test for filterable PM required according to Method 5
- PM-CPMS sets operating limit equivalent to 75% of emission limit value (30 day average)

PM-CPMS Parametric Measurement



Model 4650-PM

- Laser forward scattering
- Stack temperatures to 930 °F
- Variable insertion depth
- Minimum range 0-15 mg/m^3

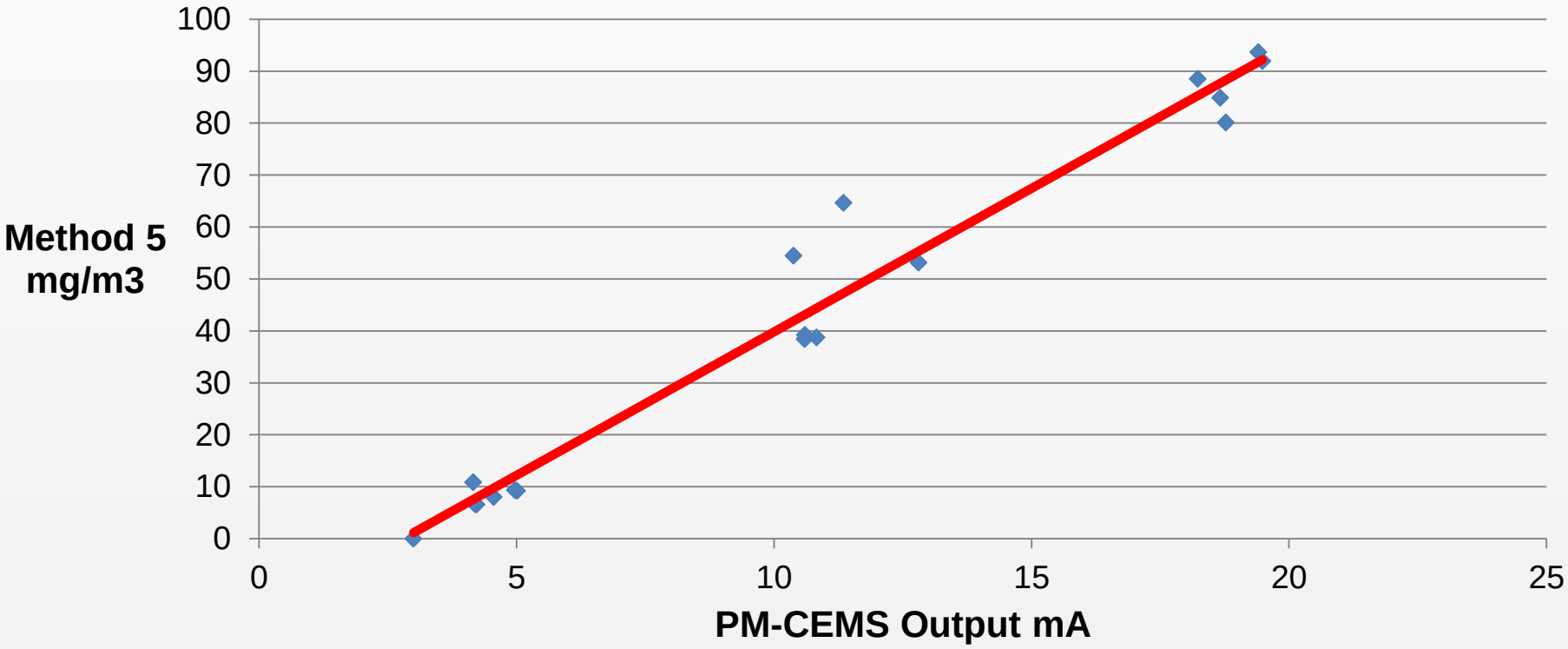


PM-CEMS Calibrated Measurement

- Any measurement method allowed
- Calibrated using a correlation test according to PS-11
- Dry PM Monitor costs $25k to $40k (Wet PM Monitor costs $80k upwards)

PM-CEMS Correlation Test

Compare instrument measurements with gravimetric sample to obtain the correlation function



	Opacity plus Testing	PM-CPMS	PM-CEMS
Pro	Low initial cost Can upgrade later	Simple concept No correlation test	True PM measured
Con	Test needed every quarter	Reduced compliance margin	Complexity of correlation test Need spiking or other method for upscale values
Monitor cost	$15k to $25k	$25k to $40k	$25k to $40k
Testing cost	$10k to $15k (x4)	$10k to $15k 3 samples	$30k to $4k 18 samples
Initial cost	$	$$	$$$
Long-term cost	$$$	$	$$