Circulating Dry Scrubbers Remove Filterable and Condensable Particulate to Meet Environmental Regulations

McIlvaine Hot Topic Hour
April 26, 2012



ONE SOURCE · ONE PURPOSE · MANY SOLUTIONS

Babcock Power

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Agenda

A. U.S. EPA Regulations

B. CDS Technology

C. PM and Condensable Measurements

U.S. EPA Regulations

A. Mercury and Air Toxic Standards (MATS)

B. Cross State Air Pollution Rule (CSAPR)

C. New Source Review Program

Mercury & Air Toxic Standards

EGU Subcategory	Filterable Particulate Matter	Hydrogen Chloride	Mercury
Existing coal firing not low rank virgin coal*	0.030 lb/E06 Btu (0.30 lb/MWh)	0.0020 lb/E06 Btu (0.020 lb/MWh)	1.2 lb/E12 Btu (0.013 lb/GWh)
New coal firing not low rank virgin coal*	0.007 lb/MWh	0.40 lb/GWh	0.0002 lb/GWh

*>8300 Btu/lb Moist and mineral matter free

1 lb/E06 Btu * E06 Btu/1,000,000 Btu * 10,000 Btu/kWh * 1,000 kWh/MWh = 10 lb/MWh

1 lb/E12 Btu * E06 Btu/$1x10^{12}$ Btu * 10,000 Btu/kWh * $1x10^{6}$ kWh/GWh = 0.01 lb/GWh

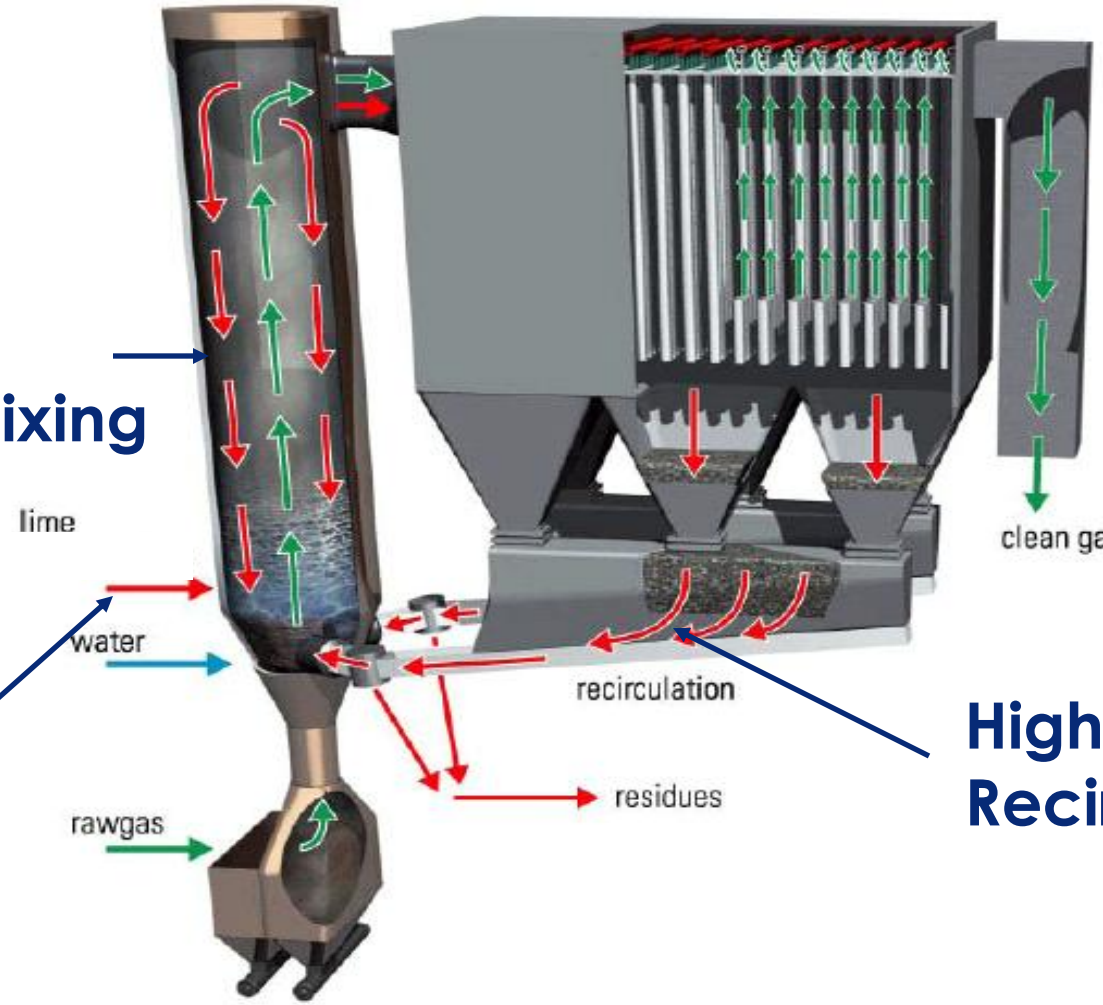
Cross State Air Pollution Rules

- SO_2 contributes to PM2.5, NOx contributes to Ozone
- 27 upwind states must meet state by state allocations
- EPA has developed database of power stations and required reductions of SO_2 and NOx

CONDENSABLE PARTICULATE

- Included in Total Particulate in 2011 proposed MATS rule, but not included in 2012 signed rule
- New EPA method 202
- Condensables included for New Source Review for PM2.5 & PM10 emissions, but recently deleted from “PM Emissions”

Turbosorp® CDS
Flue Gas and Solids Path Diagram



Turbulent Reactor Mixing

No Slurry Handling

High Solids Recirculation

Turbosorp® CDS Emissions Summary

SO_2	95 – 98 %
SO_3	95 – 99 %
HCl	95 – 99 %
HF	95 – 99 %
Mercury	90 – 95 %

Reduces Condensables

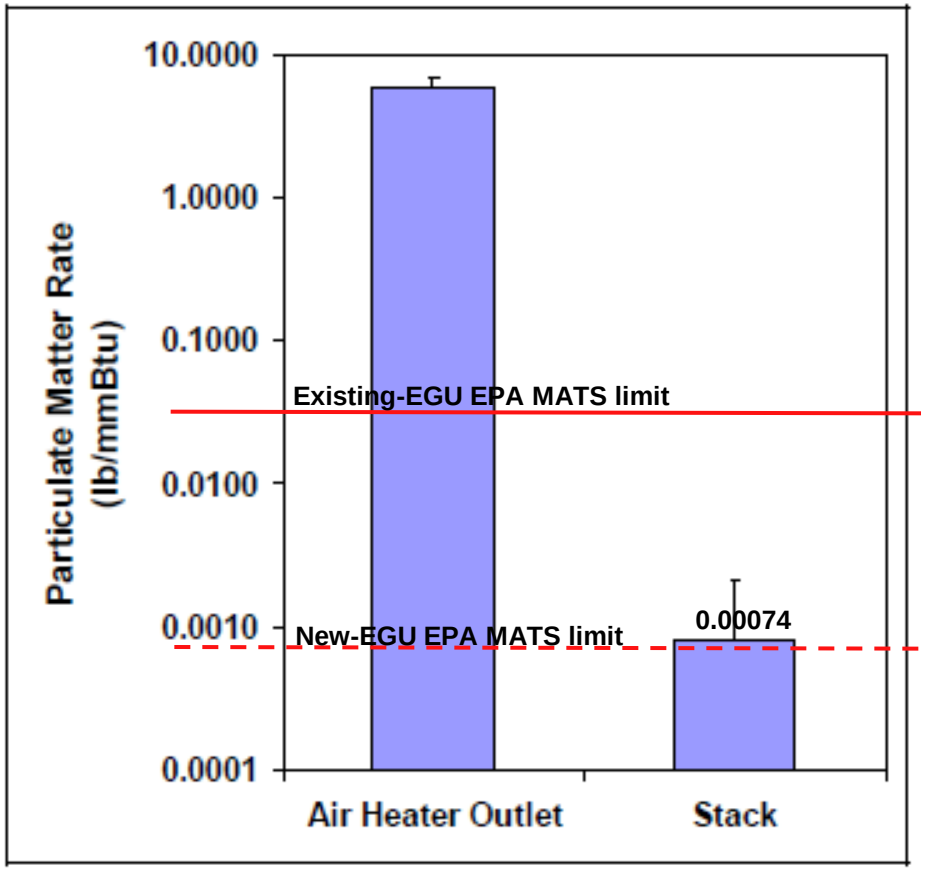
Coals up to 6 lbs of SO_2/E06Btu

SO_2 down to 0.03 lb/E06Btu

CDS Filterable Particulate Emission Data

Figure from U.S.DOE Report*

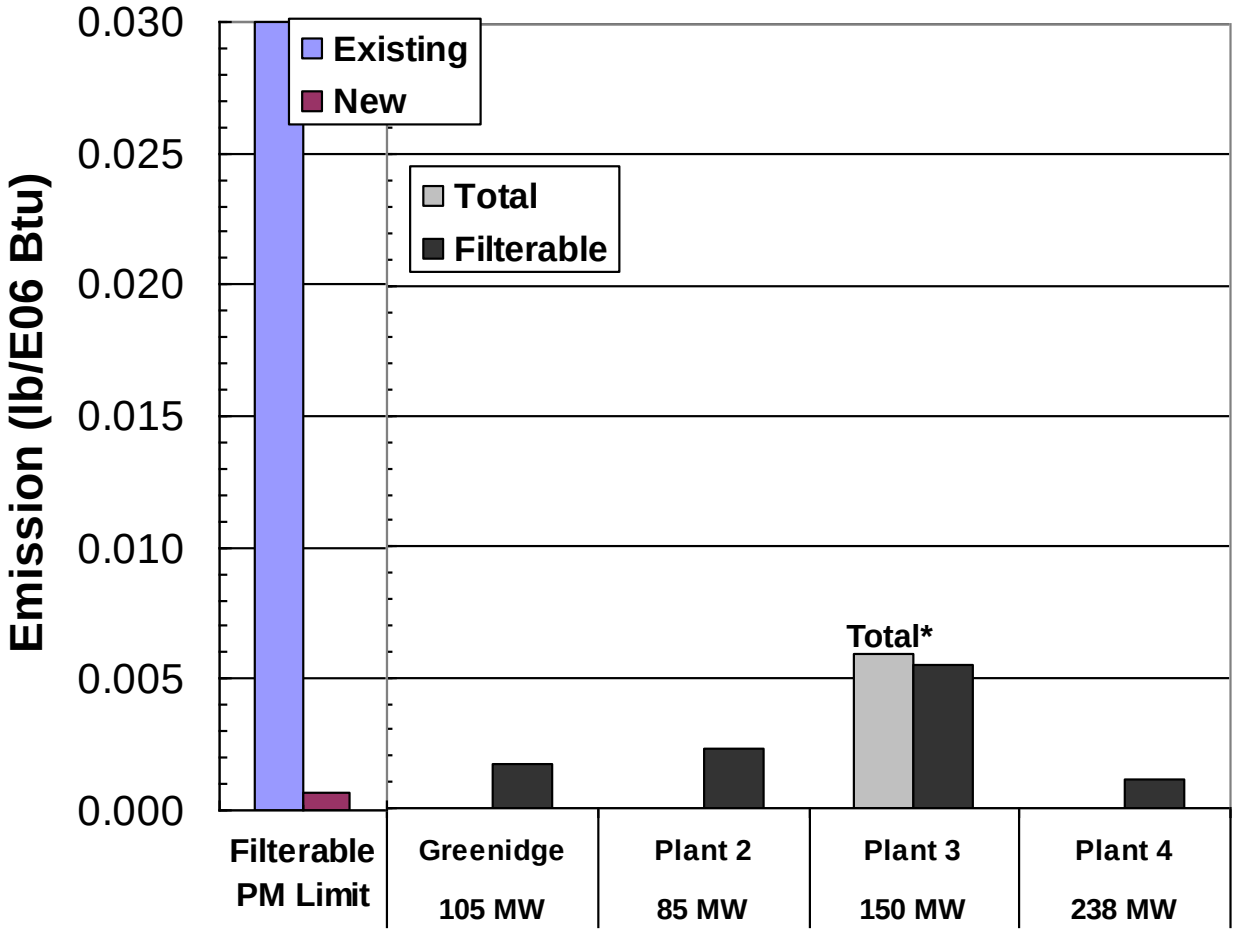
Average stack emission value shown for 59 particulate measurements for a Turbosorp® CDS.



*Connell, D. Greenidge Multi-pollutant Control - Project Final Report. U.S, DOE Coop. Agreement DE-FC26-06NT41426, April 2009.

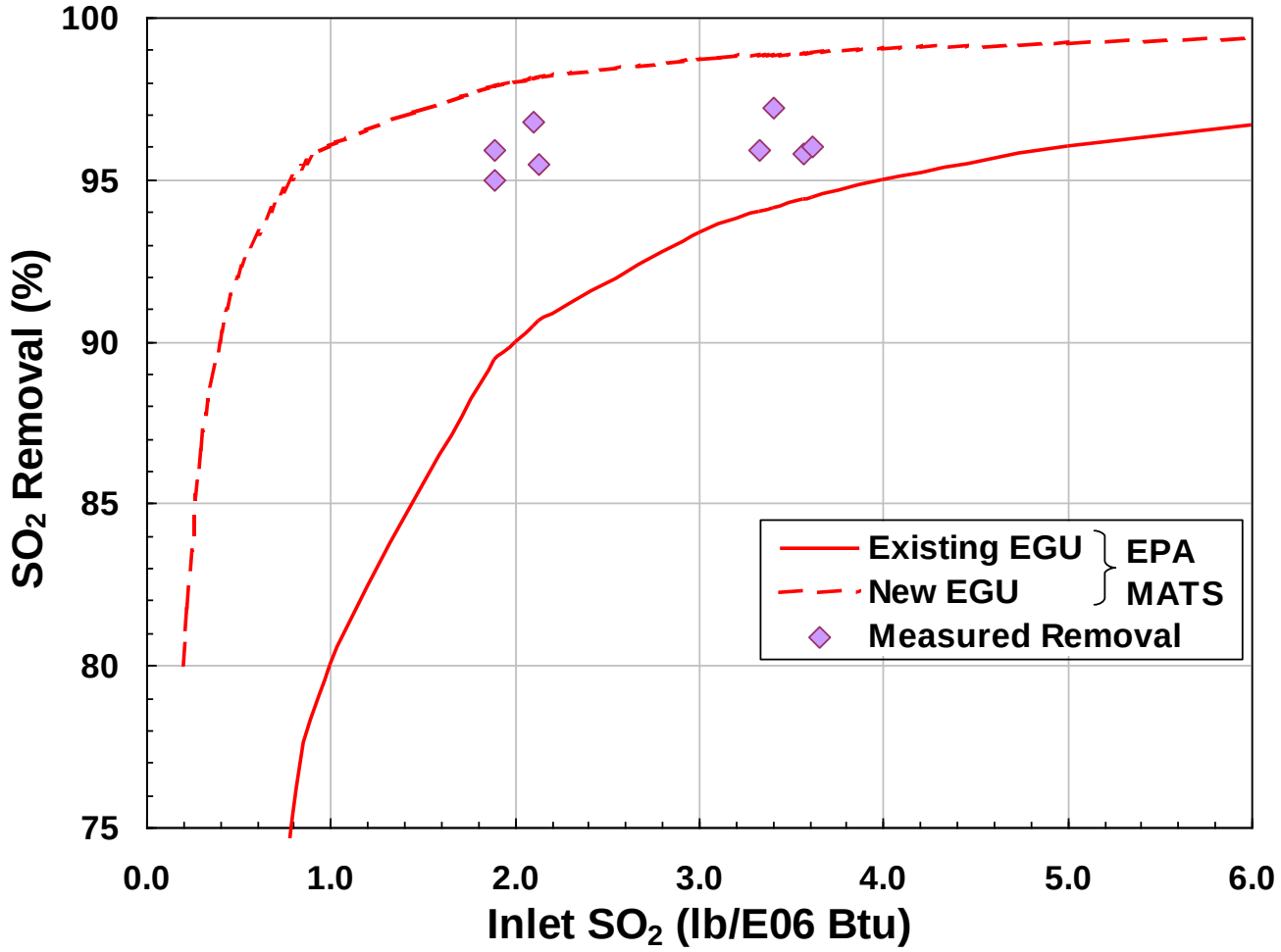
Note logarithmic scale.
One standard deviation error bar = 0.00011 lb/E06 Btu is shown.

Turbosorp® CDS PM Emission Data Compared to EPA MATS

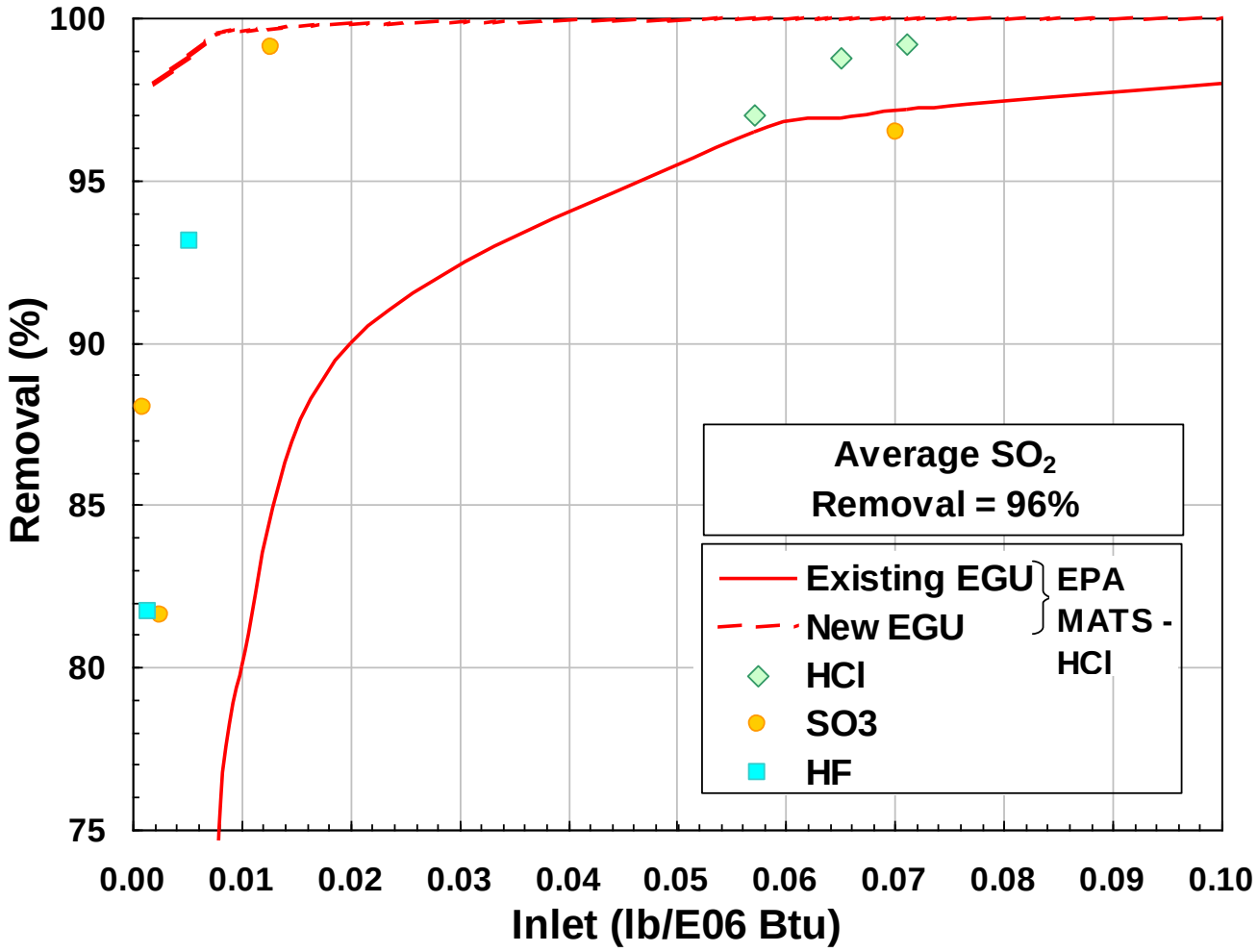


*Condensables not measured with new method 202

Turbosorp® CDS SO_2 Removal Compared to EPA MATS



Turbosorp® CDS Acid Gas Removal Compared to EPA MATS



Summary

- U.S. EPA issued multiple regulations about Particulate Matter.
- The Turbosorp® CDS removes filterable particulate with a fabric filter as well as SO_2 and acid gases that contribute to fine and condensable PM.

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