

Dry Sorbent Injection of Trona or Sodium Bicarbonate for Air Pollution Control

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MARAMA-ICAC SO₂ & HCl Control Technologies Webinar

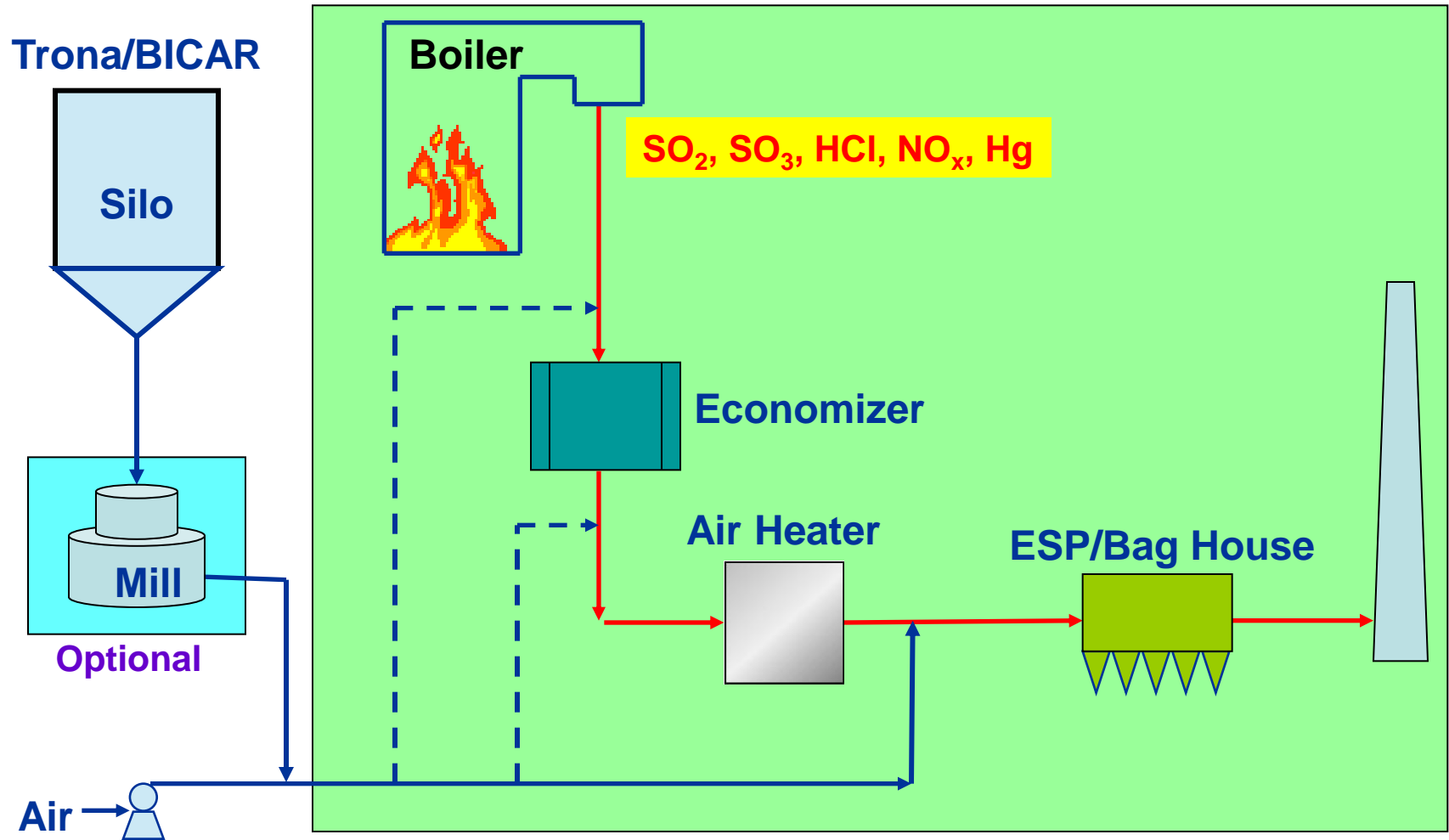
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**Solvay
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Dry Sorbent Injection (DSI) System



What is Trona?

- ◆ Trona is an ore mined underground
- ◆ Trona is naturally formed sodium sesquicarbonate ($\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$)
- ◆ Green River, Wyoming, has billions of tons of Trona



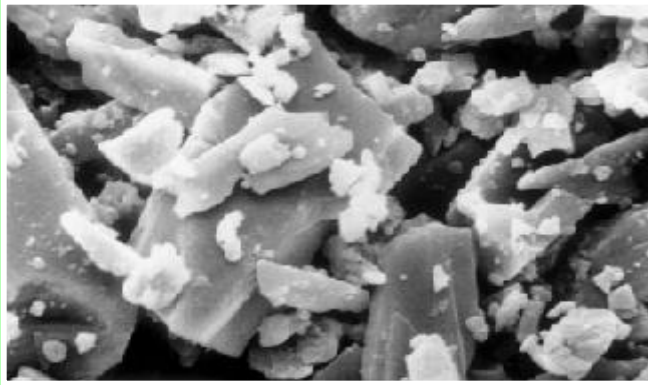
Sodium Sorbents from Solvay

	Trona SOLVAir® Select 200	Sodium Bicarbonate SOLVAir® Select 300*
Formula	$\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$	NaHCO_3
Particle Size: d_{50} (μm)	~ 30 μm	~ 150 μm
Flue Gas Temperature Range for injection	275 ~ 1500 °F	275 ~ 1500 °F**
SO₂ Removal (%)	Up to 90%	Up to 95%
HCl Removal (%)	Over 99%	Over 99%
Sorbent Cost	Low	Medium

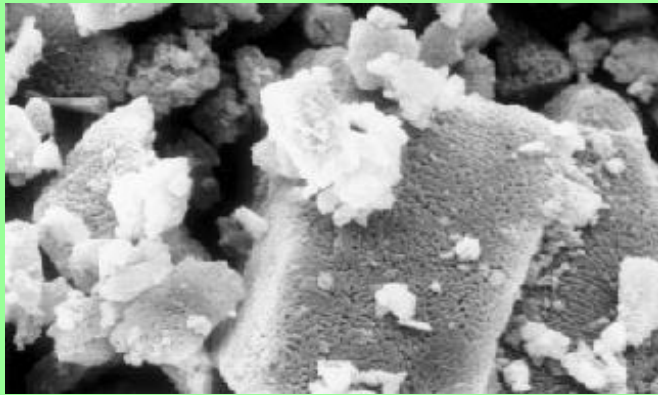
*** Needs to be milled before injection**

SOLVAir® Select Products: Calcination at >275°F

Trona

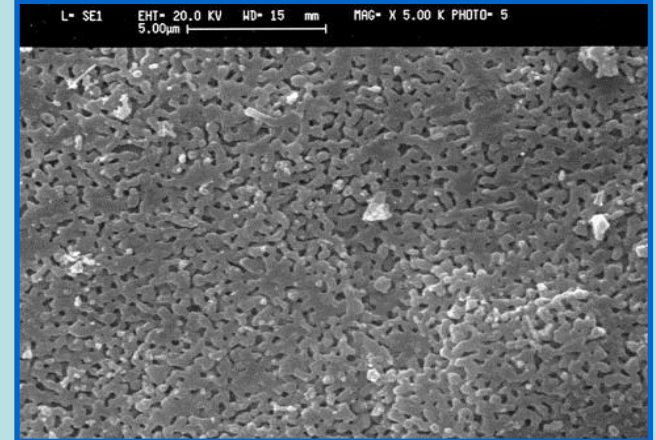
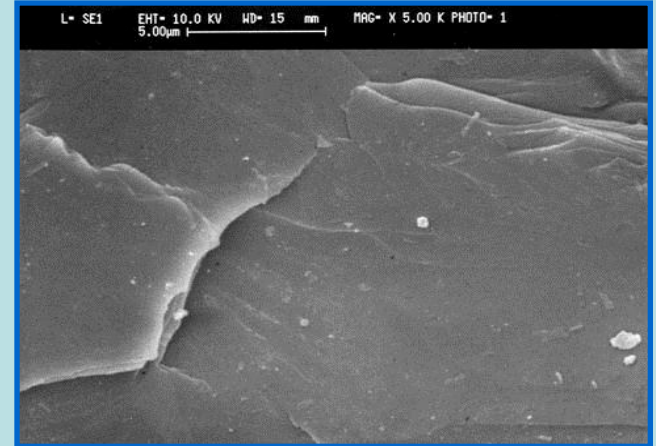


Raw



Calcined

Sodium Bicarbonate



Chemical Reactions

◆ Trona Calcination



◆ Sodium Bicarbonate Calcination

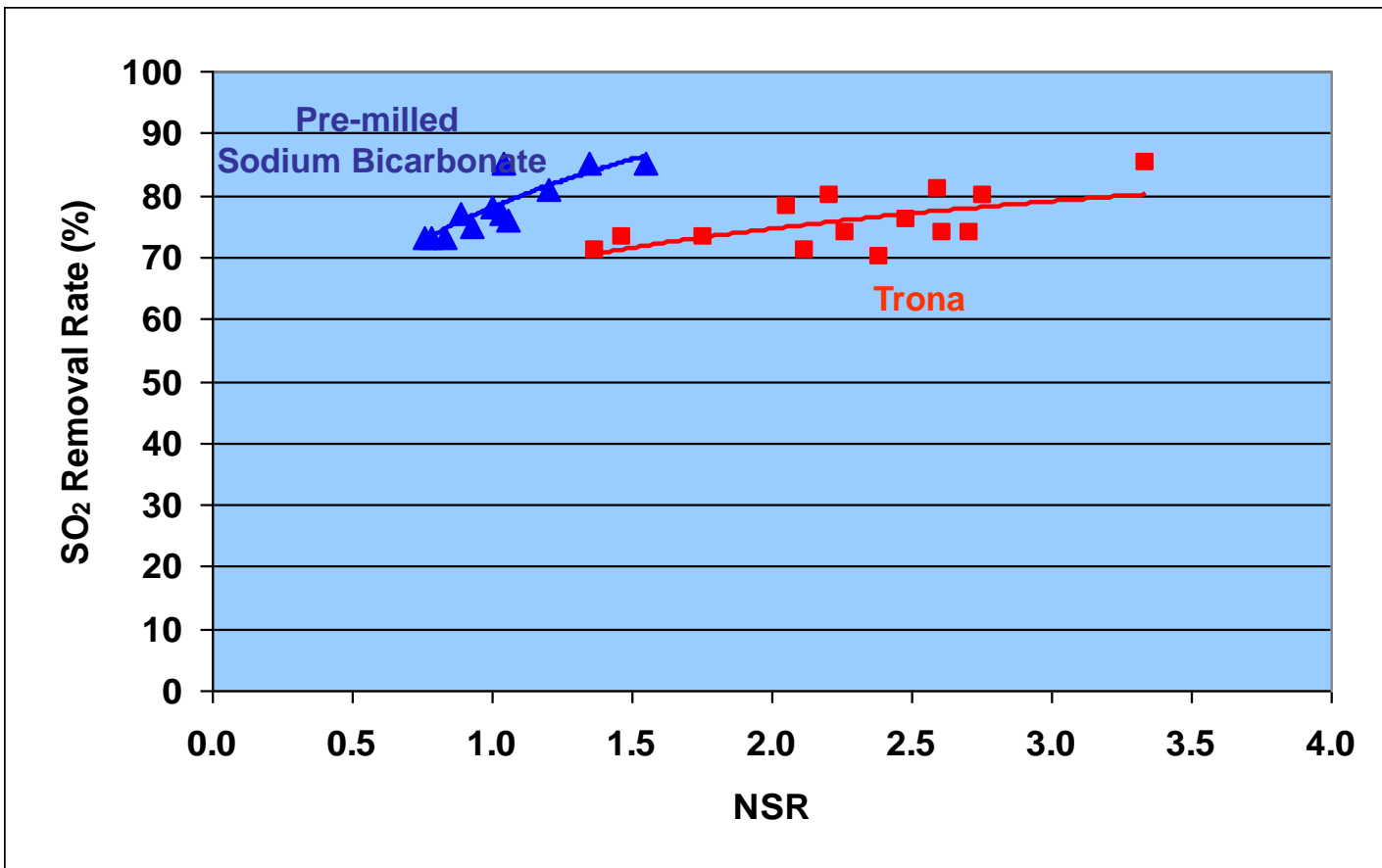


◆ Acid Neutralization Reactions



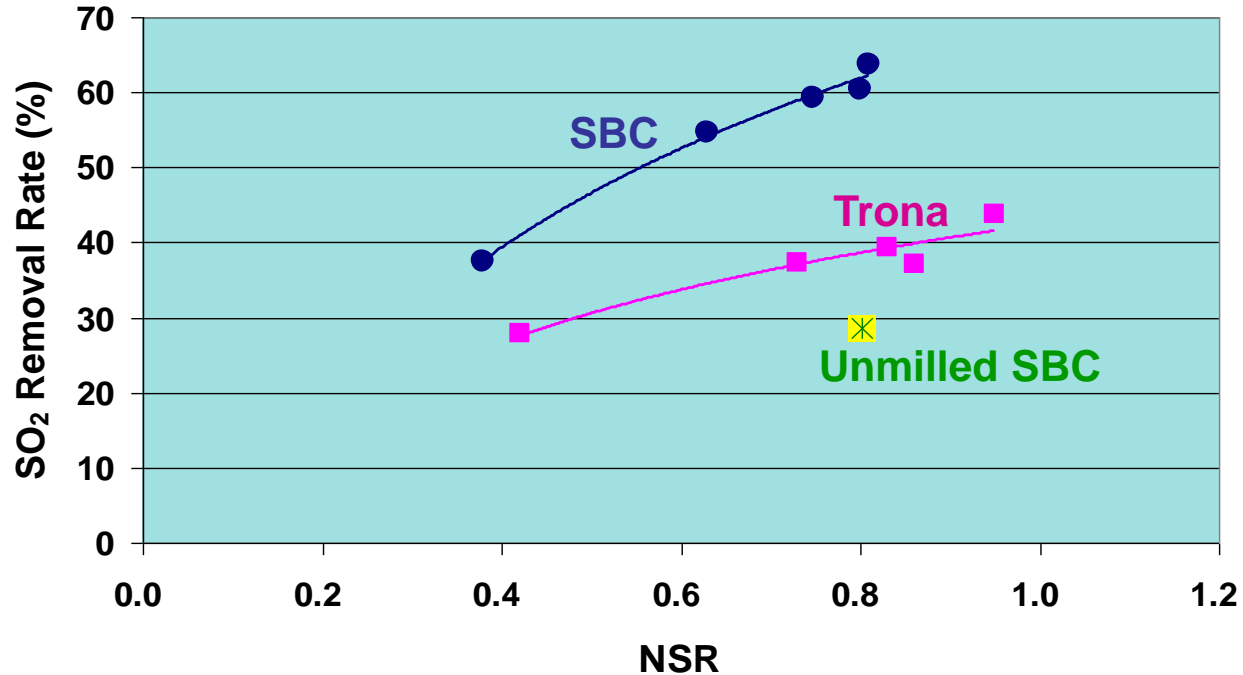
Na_2SO_4 , NaCl and NaF are collected in fly ash.

SO₂ Mitigation: ESP



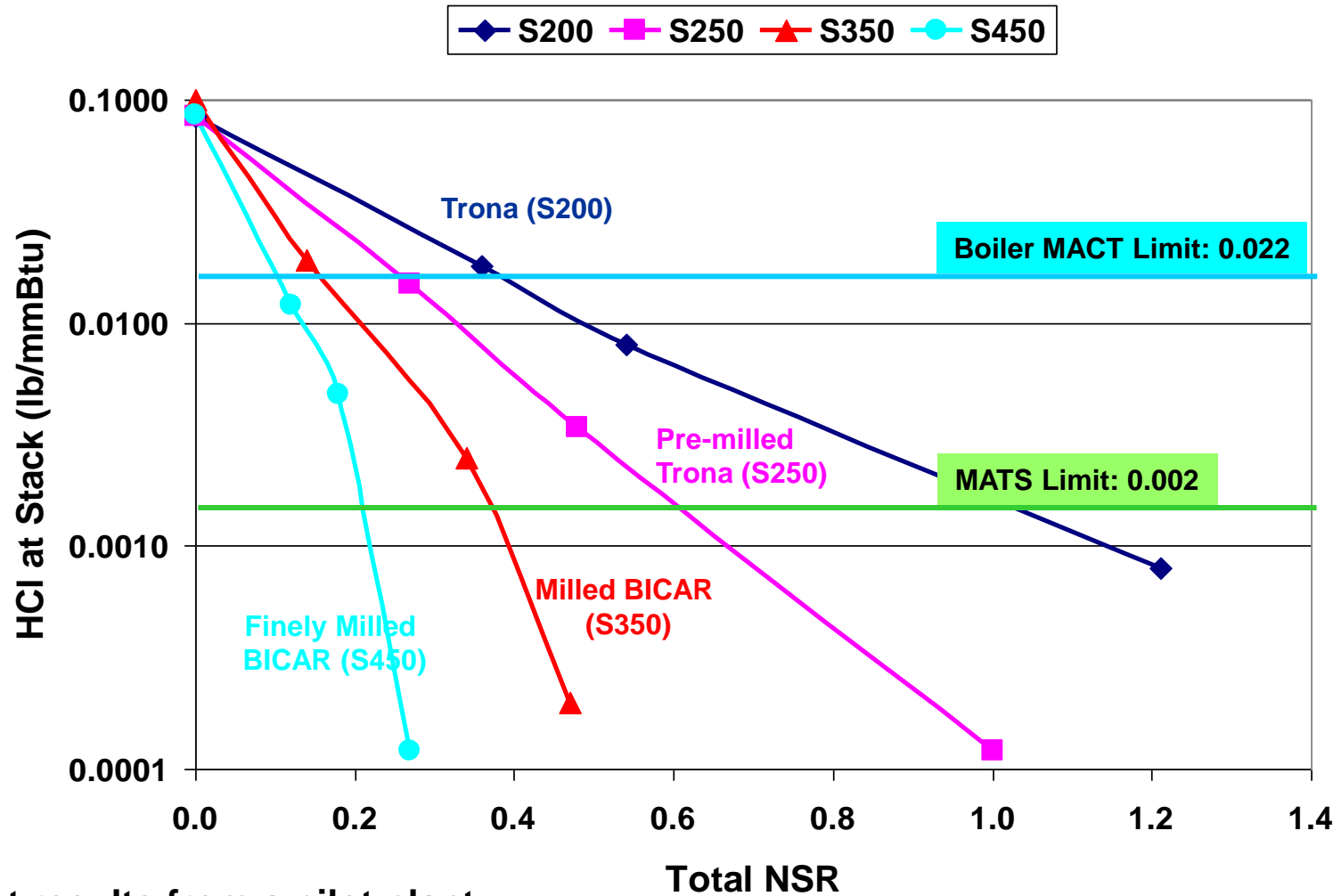
- Boiler: 100 MW burning low-sulfur coal (SO₂: 1.2 lb/mmBTU)
- Sorbent injected upstream of hot-side ESP @ 650 °F.

SO₂ Mitigation - Baghouse



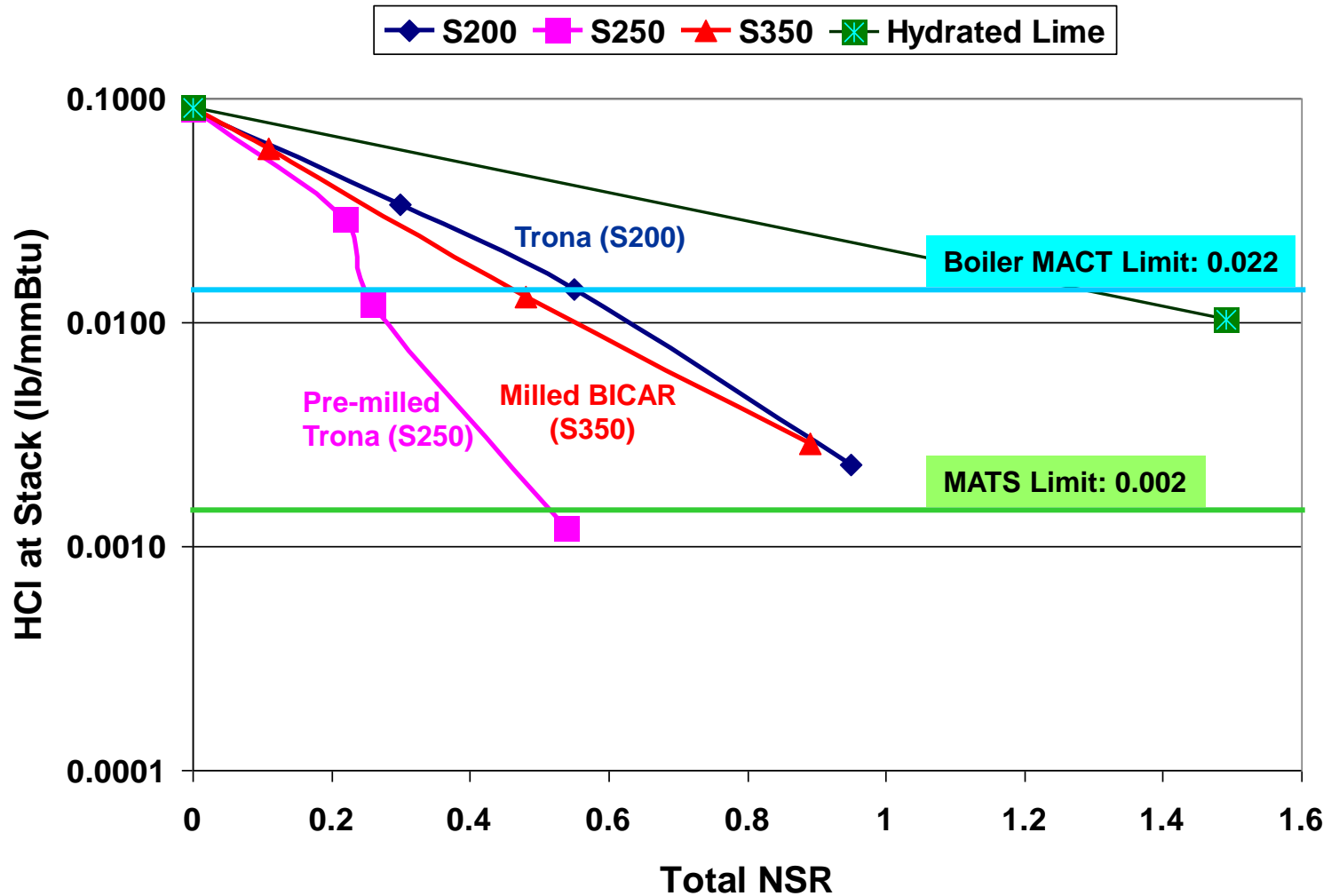
- Boiler: 100 MW burning low-sulfur coal (SO₂: 0.59 lb/mmBTU)
- Sorbent injected upstream of bag house @ 290 °F.

HCl Removal with Sorbent Injected at ESP Inlet



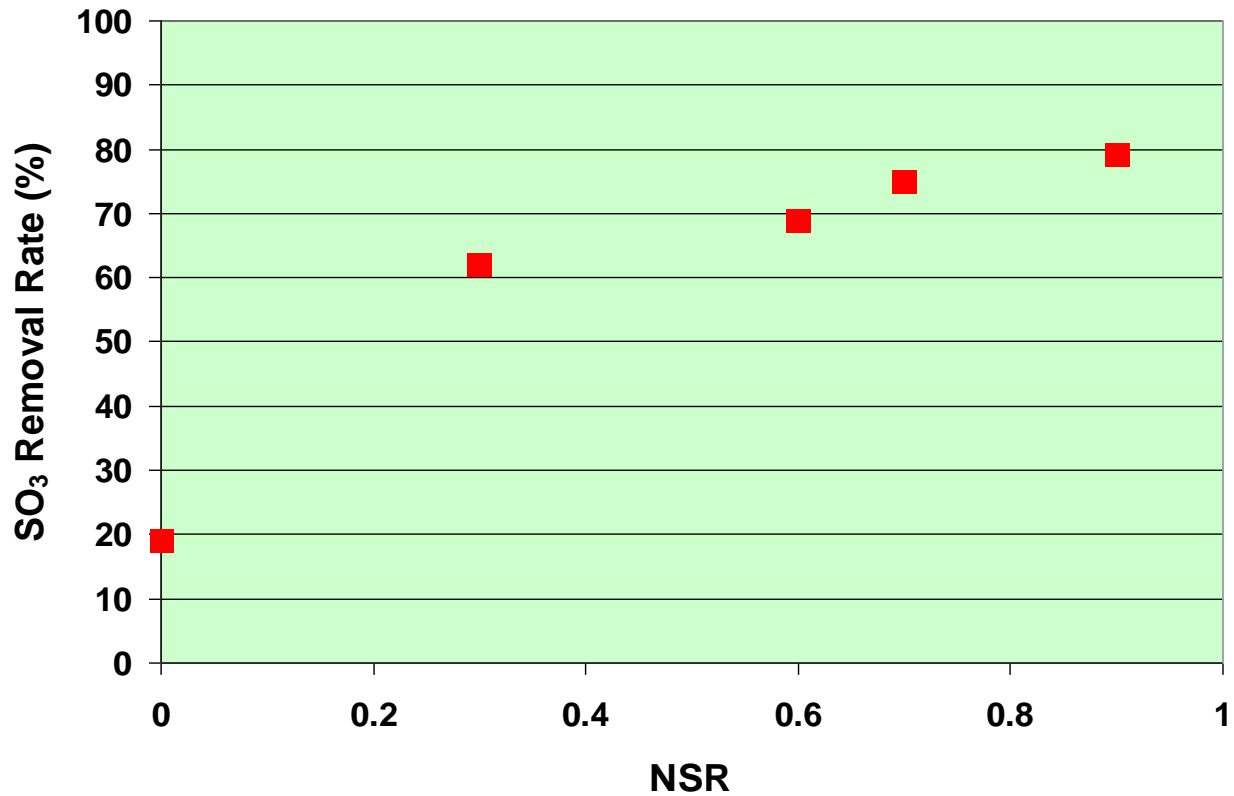
* Test results from a pilot plant

HCl Removal with Sorbent Injected at Baghouse Inlet

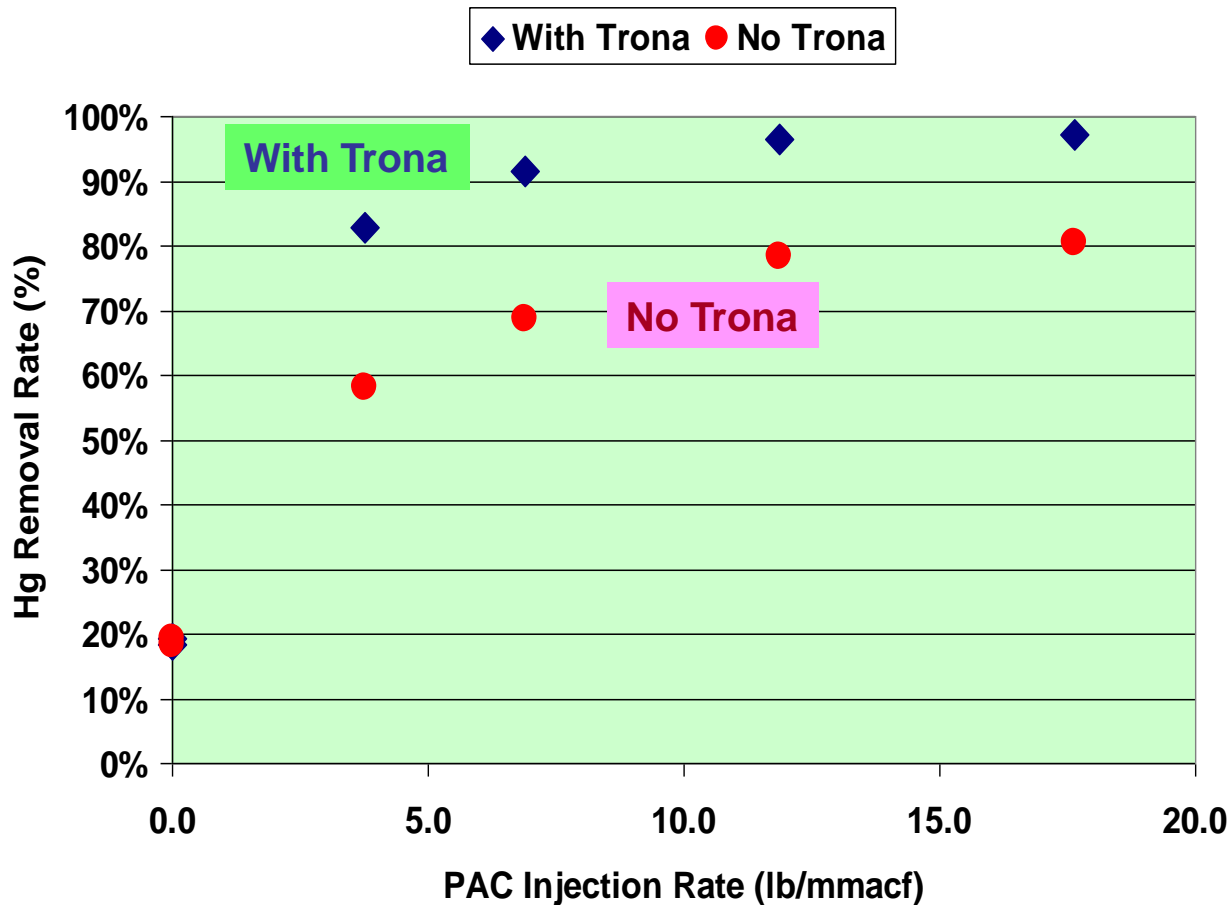


* Test results from a pilot plant

Power Plant Trial Data - SO₃ Removal



Effect on Mercury Removal – Trona / with PAC



- SO₃ at SCR Outlet: 3 PPM

Summary

- ◆ **Dry Injection of trona or sodium bicarbonate is a cost effective way to mitigate HCl, SO₂ and SO₃.**
 - Low capital cost.
 - Compatible with ESP and Baghouses.
- ◆ **Able to achieve high removal rates for HCl (>99%) and SO₂ (>90%)**
 - Able to meet the HCl limit in MATS (0.002 lb/MMBtu) and Industrial Boiler MACT (0.022 lb/MMBtu)
- ◆ **Effective over a wide temperature range (275 °F – 1500 °F)**
- ◆ **Has been implemented at many coal-fired power plants in the United States and waste incinerators in Europe .**

Thanks!

Questions?

For more information, please visit www.solvair.us