
SOLVAir®
SOLUTIONS

Agenda

- **Introduction SOLVAir Solutions**
- **Summary of HCl requirements**
- **EERC Pilot Test Results and Plant Experience**
- **SOLVAir Solutions**

SOLVAir® Solutions - North America

- Chemical products for the air pollution control market
- Bring expertise to customers, engineering companies, and many others
- Consists of Sales, Marketing, and Technical support

SOLVAir® Global Mission Statement:

To offer and continuously develop competitive and sustainable environmental solutions used for air emissions control and associated waste, which includes a portfolio of products, services, technologies and treatment systems.

HCl Requirements Summary

Rule	Utility MATS	Industrial Boiler MACT
HCl Limit	0.002 lbs/MMBTU	0.022 lbs/MMBTU
Effective Date	April 16, 2015 (one year extensions available)	January 31, 2016 (one year extensions available)

Solvay testing with EERC

- **Coal contained .78 lb/MMBTU Sulfur and 954 to 970 ppm HCl**
- **Regents used**
  - Standard trona (S200)
    - d_{50}: 30 µm
  - Milled Trona (labeled as S250)
    - d_{50}: 15 µm, d_{90}: 60 µm
    - equivalent to milling S200 with a pin mill
  - Milled Sodium Bicarbonate (S350)
    - d_{50}: 12 µm, d_{90}: 40 µm
    - commercially available, pin mills can approach this particle size
  - Finely Milled Sodium Bicarbonate (labeled as S450)
    - d_{50}: 7 µm ,d_{90}: 17 µm
    - can be milled on site with a classifier mill
  - Standard Hydrated Lime
    - d_{90}: 45 µm, purity: 96.8%

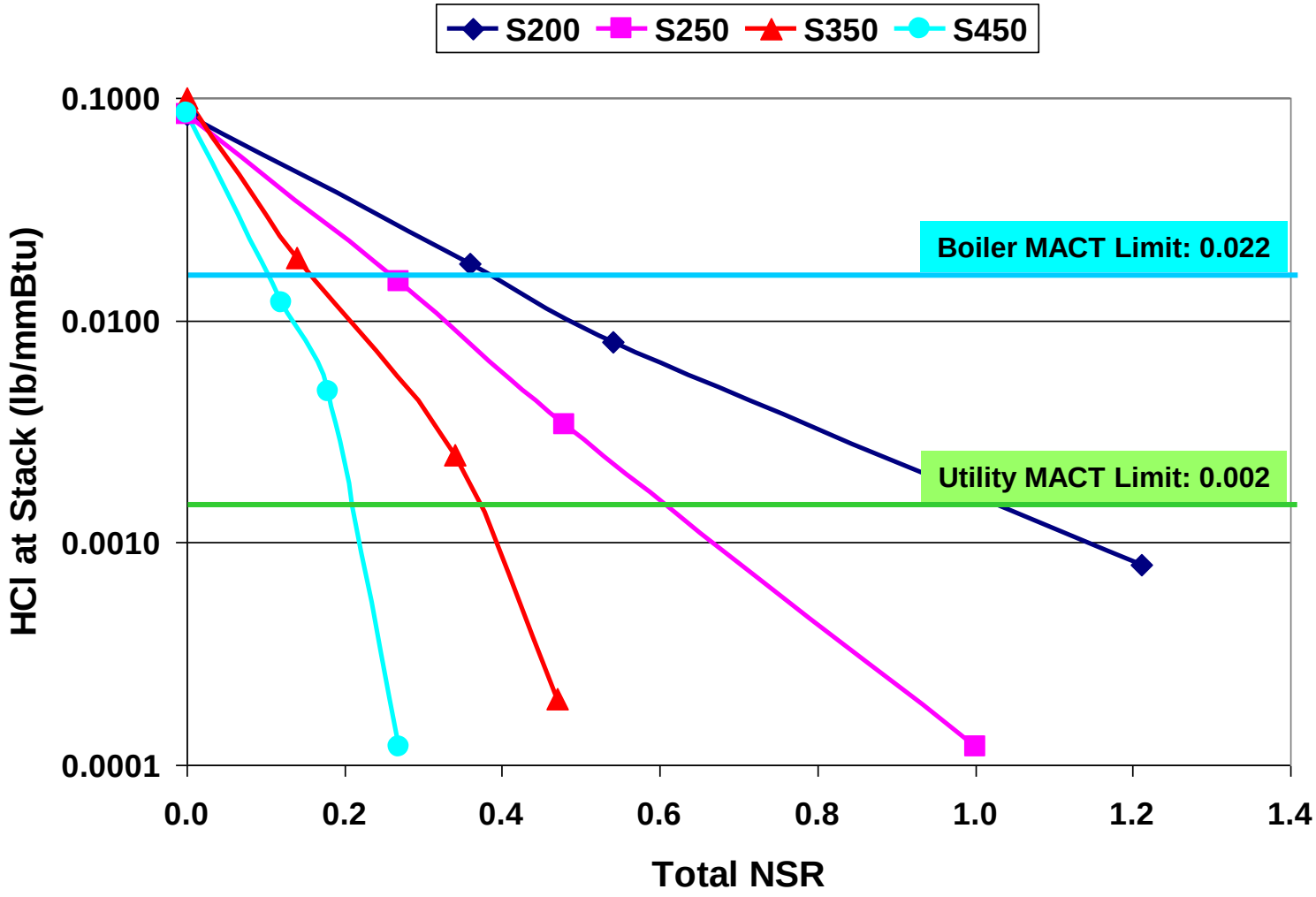
Injected upstream of ESP

- 2.5 seconds residence time at 650°F

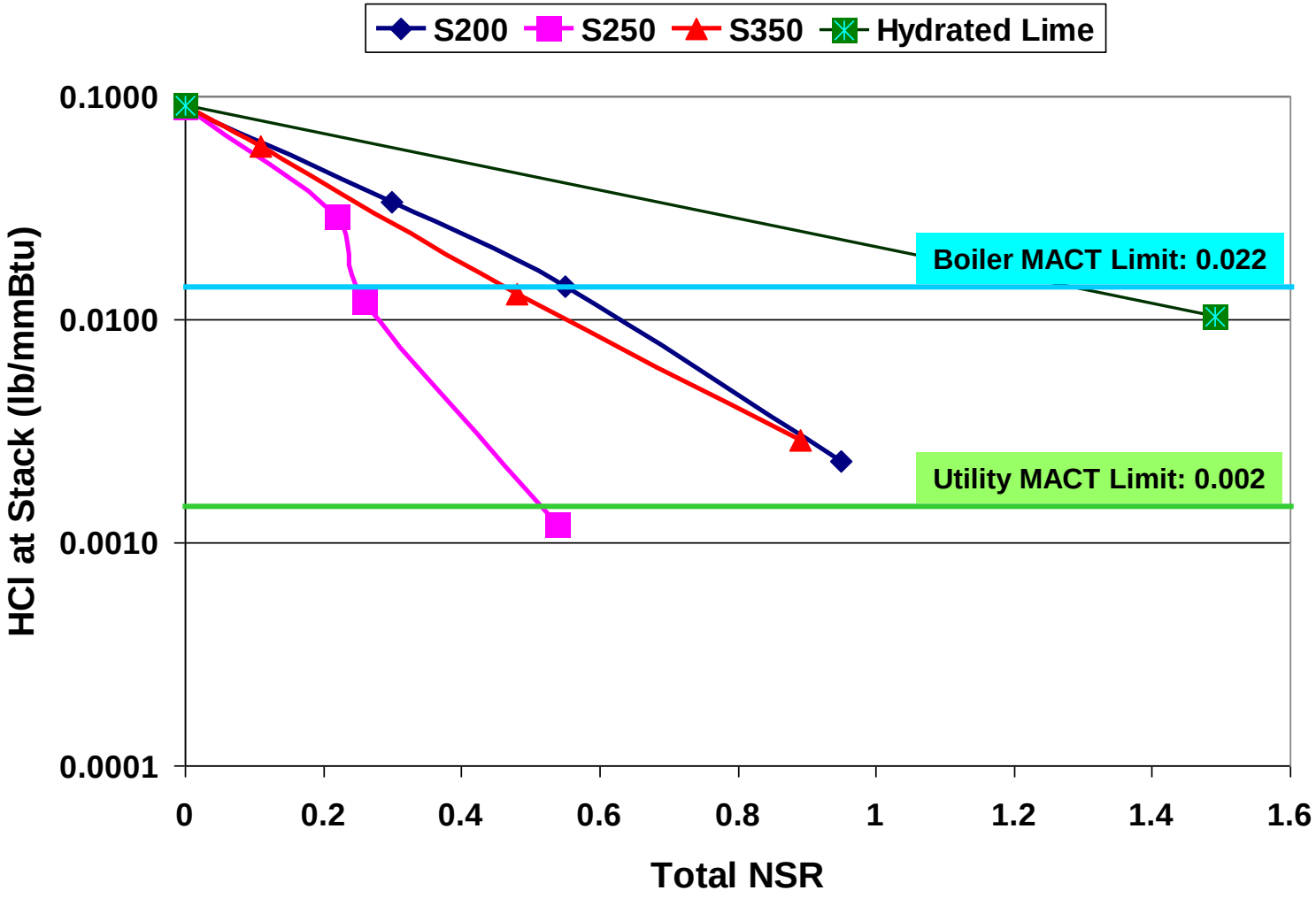
Injected upstream of Baghouse

- 1 second residence time at 325°F

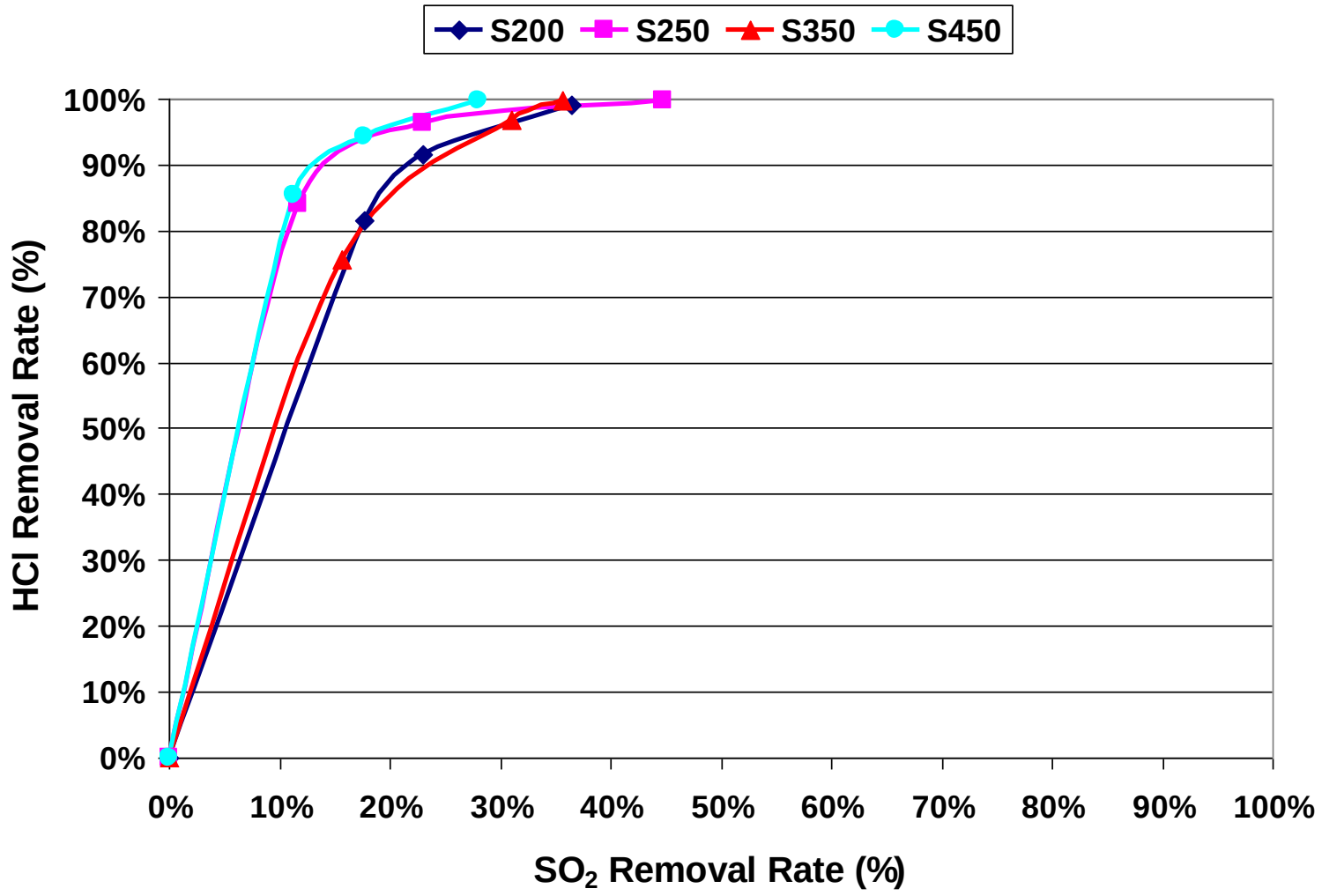
HCl Removal with Sorbent Injected at ESP Inlet



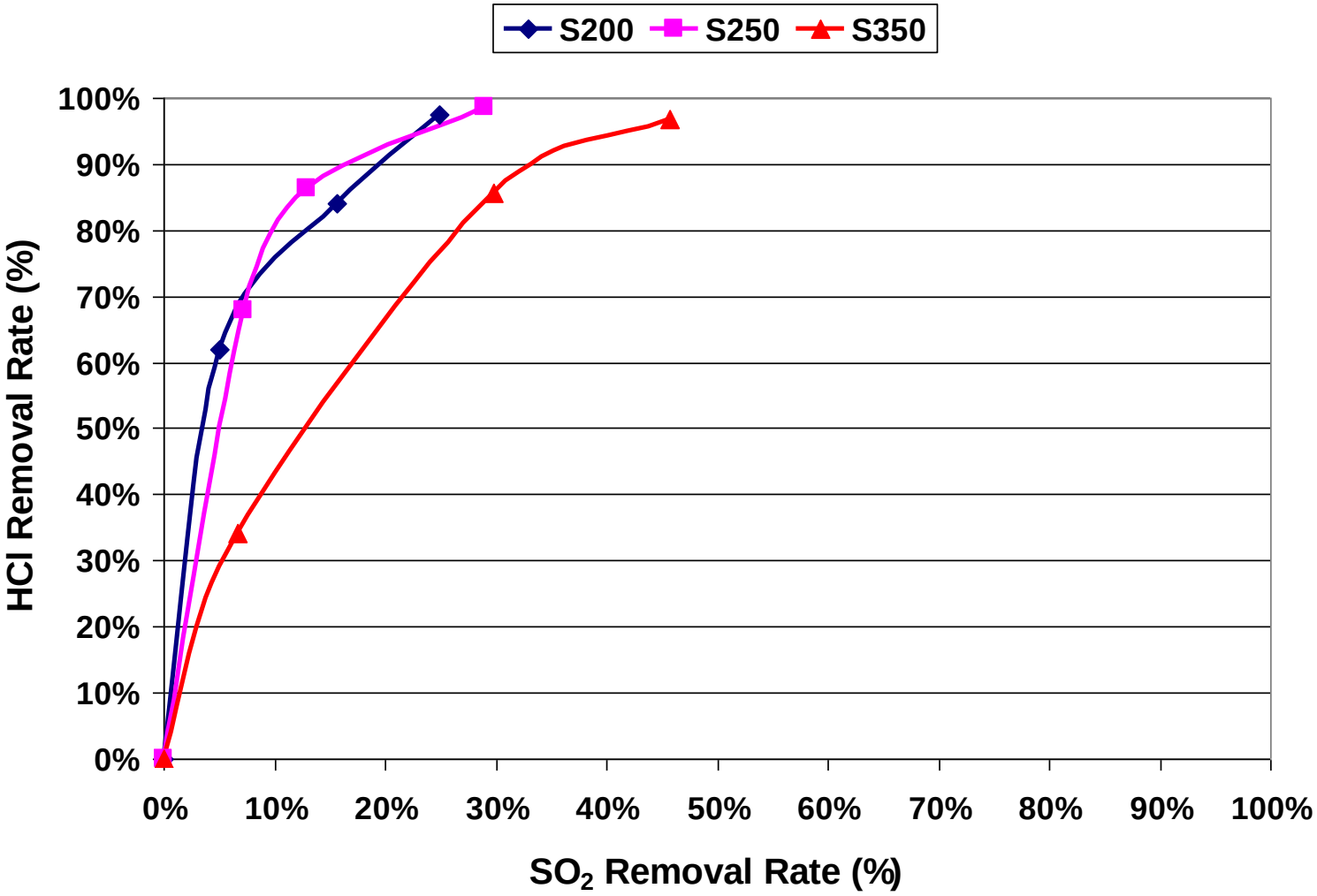
HCl Removal with Sorbent Injected at Baghouse Inlet



HCl Removal vs. SO_2 Removal - ESP



HCl Removal vs. SO_2 Removal – Baghouse



DTE St. Clair

Tested trona and pre-milled sodium bicarbonate

- HCl removal to MATS standard (85% removal) at total acid gas NSR of less than 0.45 for both milled trona and pre-milled sodium bicarbonate with hot side addition.
  - –Trona performed a bit better than expected from our data likely due to increased residence time and mixing through the air heater.
- At the NSR needed to remove the HCL to compliance levels trona also removed about 15% of the SO2 present while bicarbonate removed about 25% of the SO2 at those conditions
- Removal efficiency for HCl was about the same for trona and bicarbonate
- PAC addition does not affect HCl removal
- DSI for HCl can affect mercury removal in some cases especially when used in hot side applications.
  - –some NO_2 generation was confirmed and was absorbed on carbon
  - –less NO_2 generation occurred at lower temperature
  - –HCl removal prior to the air heater could also impact mercury oxidation
- Trona injection cold side was less effective for HCl control
  - –trona benefits from higher temperatures
  - –shorter residence time and lack of mixing through the air heater work against better removal

DSI and Mercury Impacts

- SO_3 removal will improve mercury adsorption on fly ash and carbon
- HCl removal shifts the balance between oxidized and elemental mercury
  - –Oxidized mercury is more easily captured
  - –Sorbent injection hot side has a greater impact on this balance as mercury is oxidized across the air heater
  - –Increased PAC injection or use of BPAC are options when mercury adsorption is affected by DSI
  - –Sodium sorbents can react with halogen products that are added in the furnace and reduce their effectiveness to oxidize mercury
- NO_2 formation can impact carbon performance
  - –NO_2 is adsorbed by carbon
  - –DSI can convert some NO to NO_2 most evident on hot side additions where there is no NO_x control
    - NO_x reduction mitigates the impact of NO_2 formation

Summary

- Trona and sodium bicarbonate are cost effective options for HCl control.
- SO_2 control is achievable with the same system.
- Particle size is key for optimum results.
- HCl mitigation can impact mercury capture and it is important to consider where the sorbents are added.
- Additional information at www.solvair.us

Mike Wood, SOLVAir Business Manager
mike.wood@solvay.com

Marco Riccio, Technical Engineer
marco.riccio@solvay.com

Michael Atwell, Market Development Manager
michael.atwell@solvay.com

Stan Carpenter, Regional Sales Manager
stan.carpenter@solvay.com

Mark Evans, Regional Sales Manager
mark.evans@solvay.com

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SOLVAY

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