UCC Dry Sorbent Injection
HCl Removal
UCC Dry Sorbent Injection

SORBENT CHOICE
HCl Removal – Sorbent Choice

**Trona/SBC**

- Use when:
  - When also need SO$_2$ removal
  - Need very high removals (> 95%)
  - ESP can’t handle hydrated lime without a particulate increase
  - Ash sales not a concern

**Hydrated Lime**

- Use when:
  - Most economical choice when don’t also need SO$_2$ removal – selective
  - Need to preserve ash sales
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HCL REMOVAL WITH TRONA/SBC
HCl Removal with Trona for Eastern Bituminous

![Graph showing the relationship between Trona injection rate and % of removal of SO2 and HCl. The graph includes a line for SO2 removal and another for HCl removal, with SO2 removal increasing steeply with injection rate while HCl removal remains relatively constant at a high percentage.]
HCl Removal with SBC for Eastern Bituminous
HCl removal with Milled Trona for PRB

HCl versus SO2 Removal with Milled Trona

Removal, %

Injection rate, lb/hr
Multipollutant Removal with SBC for PRB
HCl Removal with Milled Trona, PRB Unit
Effect of Injection Location
HCl Removal with Trona – Effect of Milling

Trona Injection for HCl Removal
PRB Unit

Percent HCl Removal

Trona Injection rate (lb/hr)

Unmilled Trona
Milled Trona

85 86 87 88 89 90 91 92 93 94
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000

Confidential
Increasing Performance with Milling

Unmilled Trona

Milled Trona

30-50 μm

9 -15 μm
HCl Removal with Trona on a Biomass CFB

HCl Concentration vs. Trona Injection
Unmilled and Single Pass Mill vs. Air Classifying Mill

- Unmilled Trona
  - Median particle size
  - 30-40 microns

- Milled Trona
  - Median particle size
  - 12-15 microns

- Existing Air Classifying Mill
  - Median particle size
  - <12 microns

- Operating Permit
  - <5ppm HCl
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HCL REMOVAL WITH HYDRATED LIME
HCl Removal with Hydrated Lime on E. Bituminous ESP
HCl Removal with Hydrated Lime and Trona on PRB
UCC Dry Sorbent Injection

SUMMARY
Summary – HCl Removal with Trona/SBC

- When trona or SBC used, very high (>95%) HCl removal achieved
  - Injection rates determined by primarily by sulfur content of fuel
  - HCl removal 30 to 60% higher than SO2 Removal
- For PRB, generally low rates needed since low HCl baseline and low sulfur
- For eastern bituminous, higher rates needed due to higher HCl baseline and higher sulfur levels
- In-line milling with VIPER Mill® shown to reduce trona use by 30 to 50%
- Trona more effective at air heater inlet
Summary – HCl Removal with Hydrated Lime

• Very effective for PRB
  – Lower injection rates than trona/SBC since little reaction with SO₂

• Demonstrated to achieve very high removals for eastern bituminous
  – High rates needed with ESP, much lower with fabric filter
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Thank You