

REINHOLD ENVIRONMENTAL Ltd.



**2013 APC Round Table
& Expo Presentation**

July 8-9, 2013, in St. Louis, MO / Hosted by Ameren

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DSI & ACI System Design and Performance for Continuous Emissions Compliance

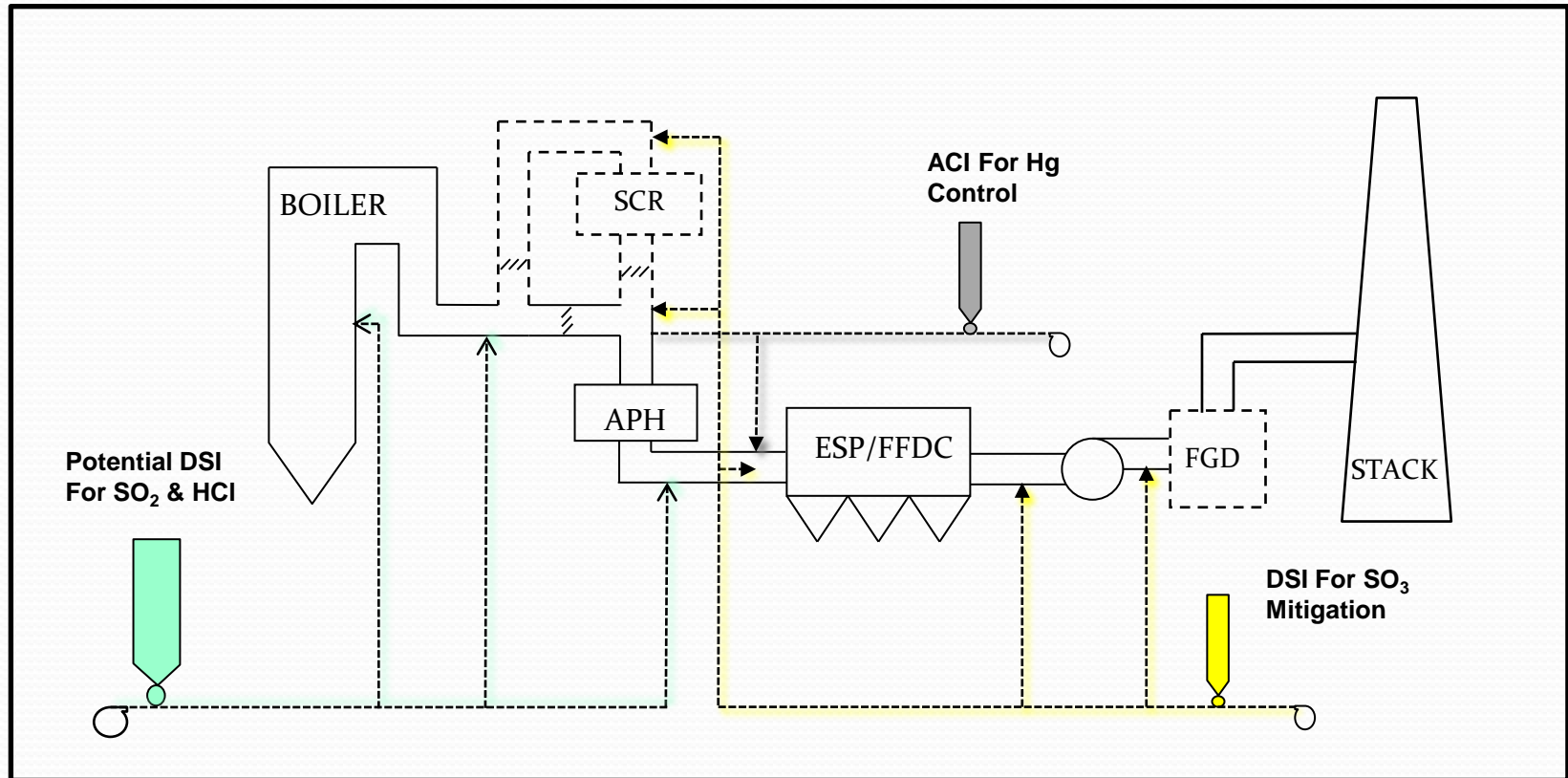
2013 APC Conference
Mark Thomas & Associates Consulting, LLC

- New Regulations will require significant DSI & ACI Systems improvements
 - Most Current DSI Systems Primarily Designed for SO₃
 - Many new DSI systems being considered for SO₃, Hg/PAC Support
 - Some New DSI Systems being considered for SO₂ & HCl removal
 - Many current ACI systems will need to meet higher removal targets

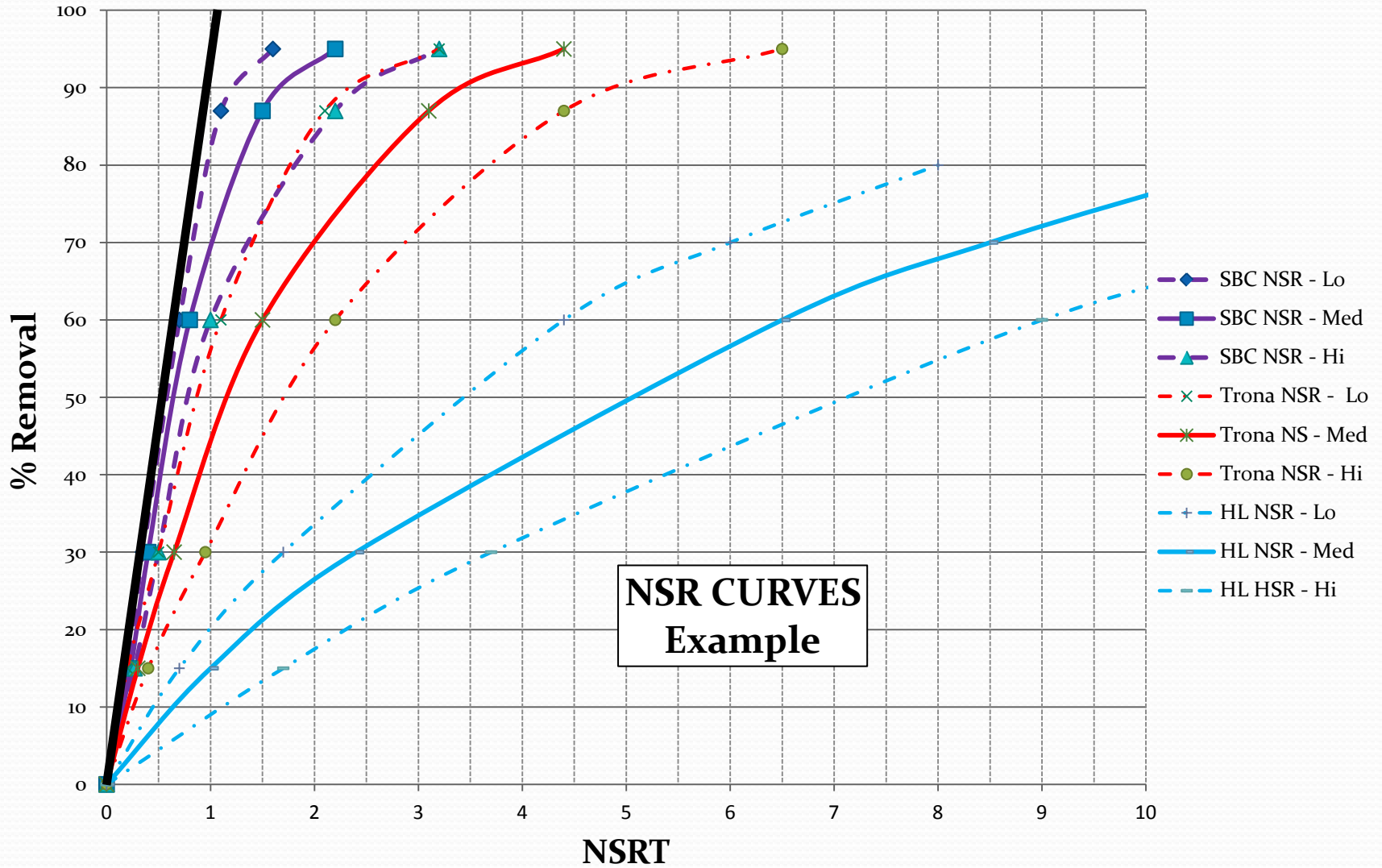
DSI System Performance Improvements

- Need for higher removal efficiencies & higher sorbent feed rates
- Need more efficient DSI Sorbent utilization
- Need more consistent DSI System operation & simplified maintenance
- Need for equipment redundancy
- Need 'Guaranteed' Sorbent delivery & supply

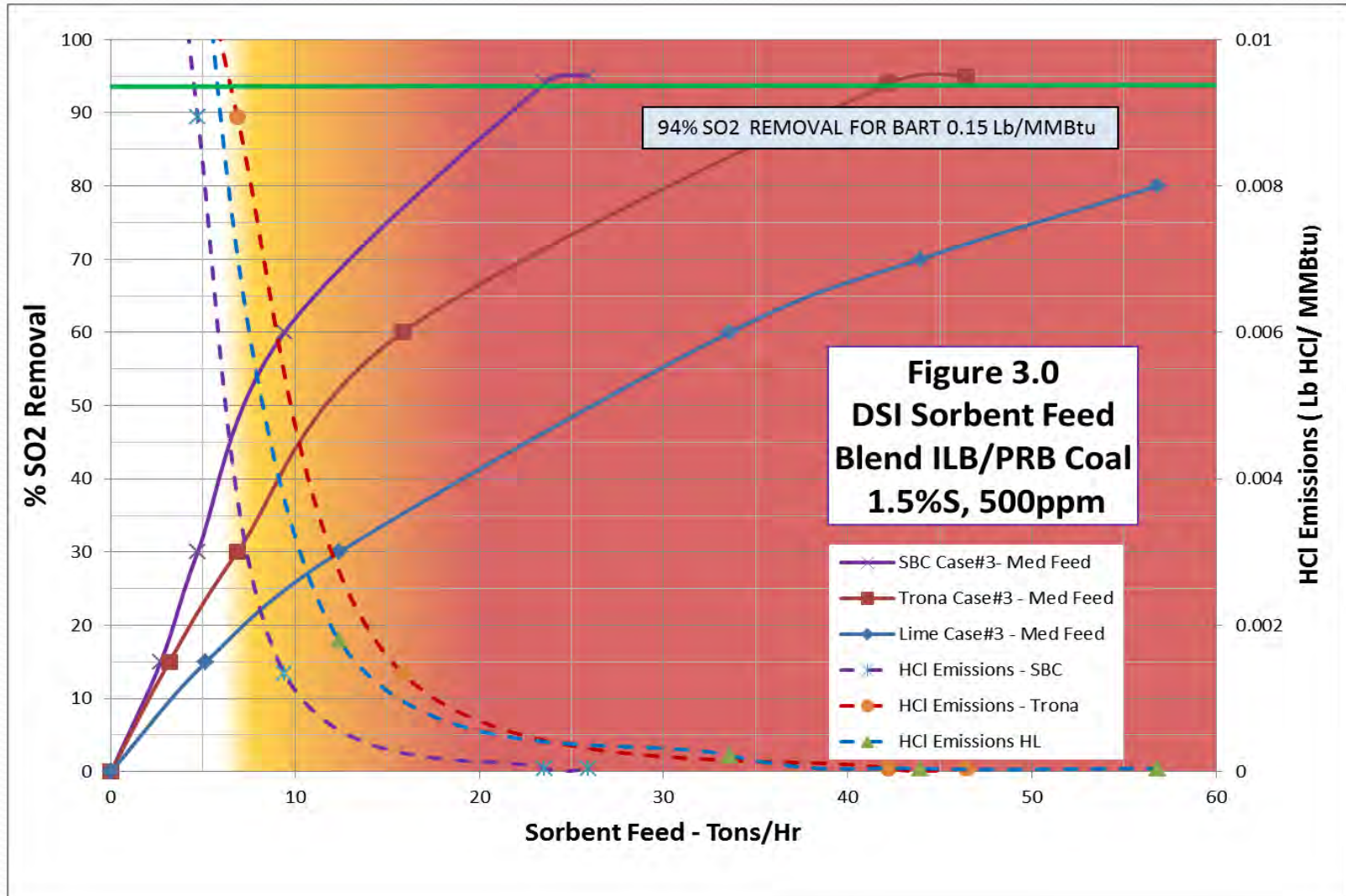
POTENTIAL DSI & ACI INJECTION LOCATIONS



DSI Performance – NSR Curves



DSI Performance Improvements



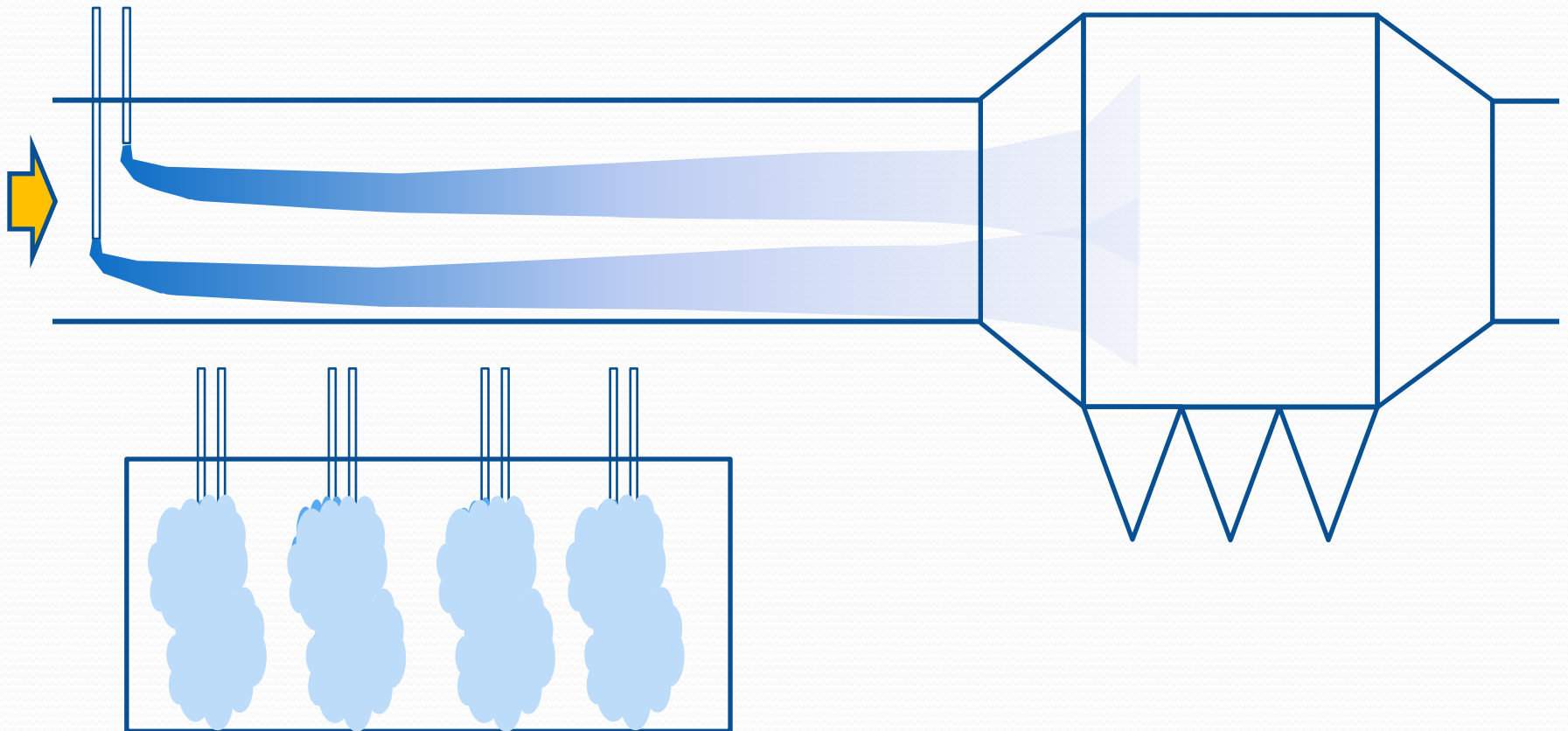
DSI MATERIAL HANDLING CHALLENGES

Rough Estimate of Truck and Rail Loading and Delivery Requirements							
<u>Unit Size</u>	<u>No. Units</u>	<u>Control</u>	<u>Feed Rate (T per hr)</u>	<u>Daily Feed (TPD)</u>	<u>#No Trucks/ Day</u>	<u>No Rail Cars/Day</u>	
<u>100</u>	<u>1</u>	SO ₂	1-5	24 - 120	1 - 5	0.2 - 1.2	
<u>100</u>	<u>1</u>	HCl	1-6	24 - 144	1 - 6	0.2 - 1.4	
<u>100</u>	<u>2</u>	HCl	2-12	48 - 288	2 - 12	.5 - 2.9	
<u>100</u>	<u>4</u>	HCl	4-24	96 - 576	4 - 24	1.0 - 5.8	

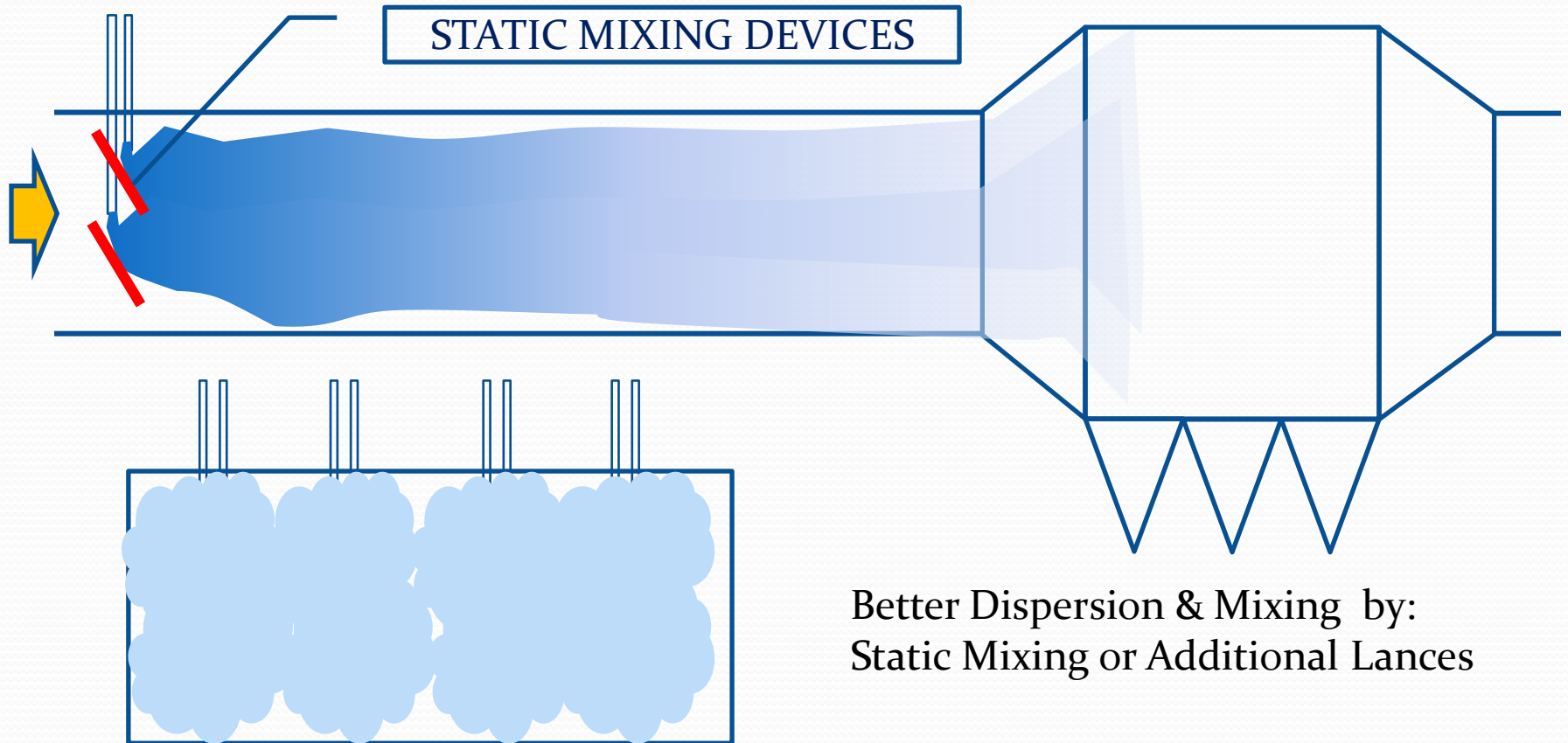
Better Dispersion & Mixing Critical for improved performance

- Sorbent Utilization can be reduced by >50%
- Target Removal % can be improved
- Same Principle for ACI and DSI
- Good DSI Dispersion for SO₃ Prior to ACI injection reduces PAC injection requirements
- Good sorbent dispersion can minimize ESP impacts

Dispersion & Mixing - Current Systems



Dispersion & Mixing - Improved Systems



System Design Considerations

- Single Sorbent vs Dual Sorbent
- Single Silo vs Multiple Silos
- Feed & Convey Systems
- Mixing & Distribution
- Redundancy
- Simplification!

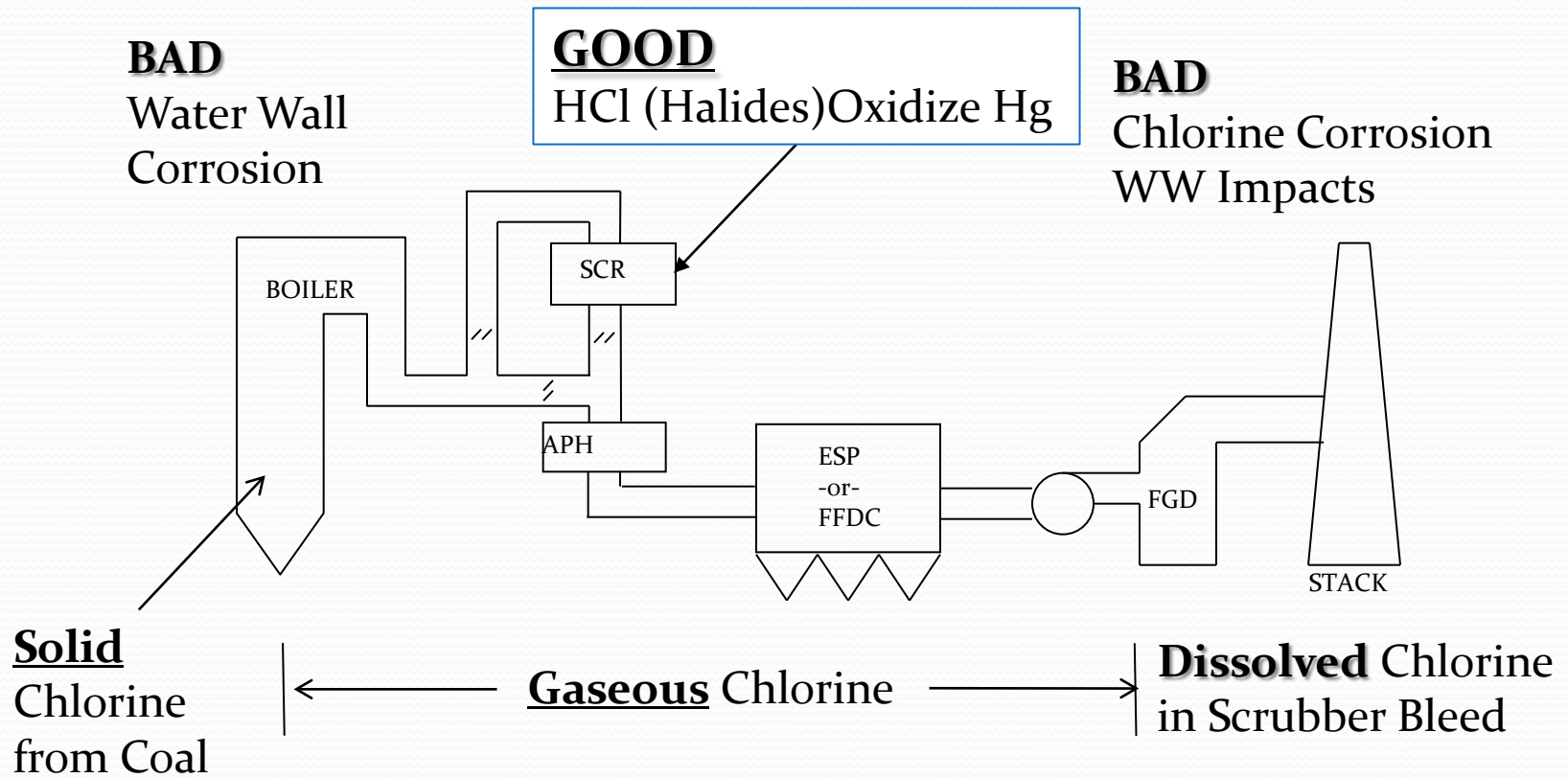
DSI System Performance Improvements

- Integrated Environmental Control / BOP Analysis
 - Corrosion
 - APH Pluggage
 - SCR Turndown
 - Baghouse Protection
 - HAPs/ HCl/Hf effects on FGD
 - Arsenic Mitigation/ Catalyst Protection
 - Potential SCR Catalyst Degradation
 - Furnace Slagging
 - Plume Opacity
 - Ash Sales
 - Ash Disposal
- Consider Potential Co-Benefits

DSI Impacts on Hg Emissions

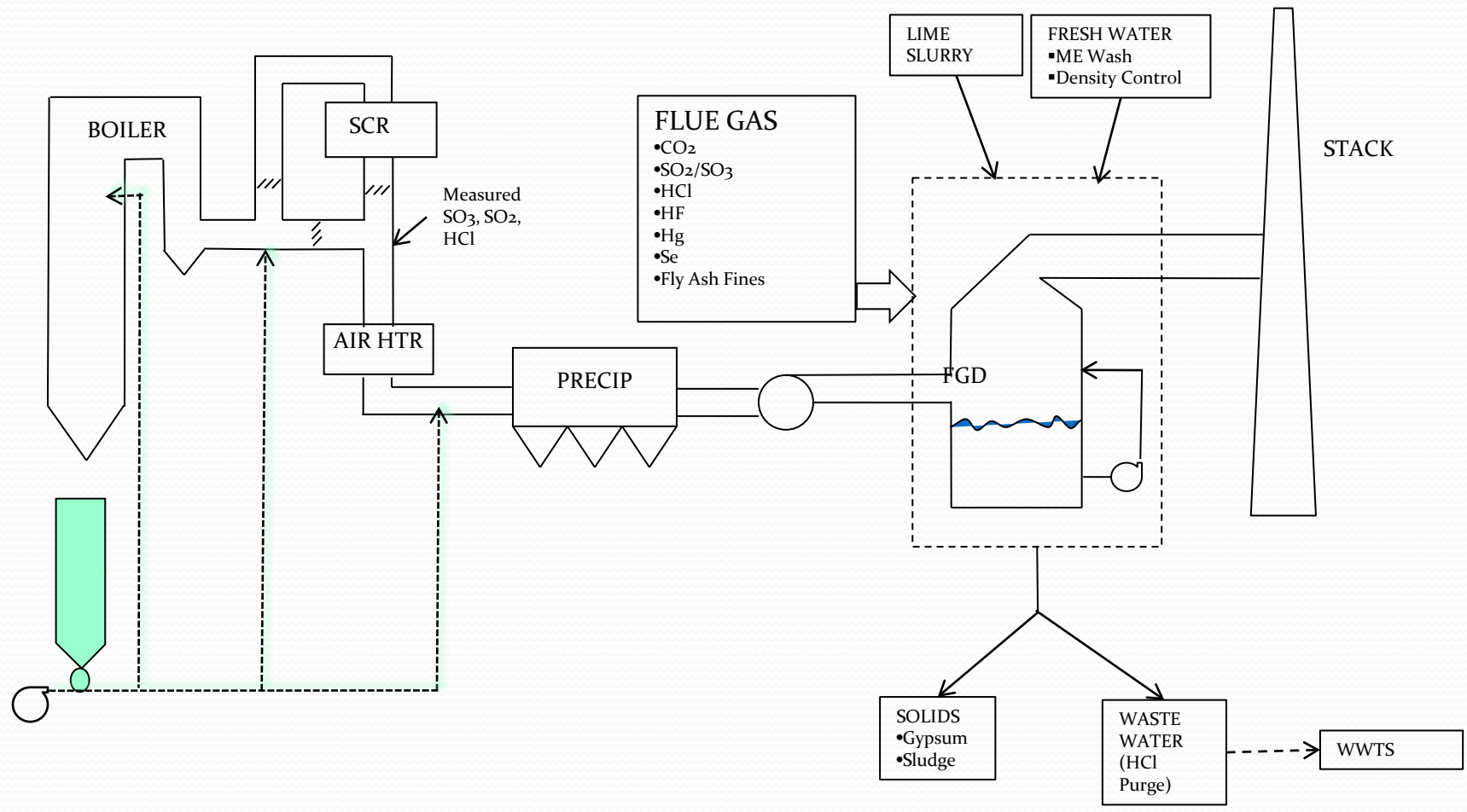
- Potential for Reduced Hg Emissions
 - Reduced SO₃ Levels at ESP >> Increased ESP Hg Capture
 - Reduced SO₃ Levels @ APH >> Potential to reduce APH Gas Out Temps >> Increased ESP Hg Capture
- Potential for Increased Hg Emissions
 - Reduced HCl Pre-SCR >> Reduced Hg Oxidation
 - Potential Impacts to Catalyst Hg Ox Properties due to Catalyst Poisoning or Blinding
- Final results contingent on many factors

Chlorine & Hg Effects



BENEFIT OF HCL REMOVAL w/ DSI

Basic FGD Mass Balance



Conclusion

- Know Objectives
- Know Options
- Design with Potential Future Developments Modifications in Mind – Think Ahead
- Spend \$ where needed
- Test to prove confirm if possible
- Use integrated/ holistic approach