

Worldwide Pollution Control Association

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INTEGRATED EMISSION CONTROL SYSTEMS

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2010 WPCA



INTEGRATED EMISSION CONTROL SYSTEMS



- Need to look at all new significant modifications to major plant systems from an integrated emissions standpoint.
- Not a new concept but significantly more complicated
- Driven by need to:
 - Resolve existing operations and environmental problems
 - Leverage potential operations & environmental benefits
 - Comply with existing & new environmental regulations
 - Comply with New Source Review (NSR) requirements
 - Save \$\$



EMISSIONS/ ENVIRONMENTAL ISSUES



Air Emissions

- SO₂
- NO_x
- Hg
- HCl/ Hf
- HAPS
- CO₂??

Water Issues

- NPDES

Coal Combustion Products

- Fly Ash
- Gypsum

Landfill Issues

- Leaching
 - Se, As, Al,
- Groundwater



COMMON OPERATIONAL ISSUES



Basic Plant Systems

- Boiler
 - Slagging
 - Fouling
 - Water Wall Corrosion
 - Bottom Ash pH
- Air Heater
 - Fouling
 - Corrosion
 - Heat Rate Limitations
- Ductwork & Fans
 - Corrosion
 - Fan Hp & Aux Pwr

Environmental Systems

- SCR Catalyst
 - Deactivation
 - SO₂/SO₃ Oxidation
 - Pluggage
- ESP Problems
 - Ash Resistivity
 - Corrosion
- FFDC Problems
 - Bag Blinding
 - Bag Failures
- FGD Issues
 - Alloy Corrosion (Chlorides)
 - Excessive Chloride Purge Stream



INTEGRATED EMISSION CONTROLS SYSTEMS



- How to Achieve?
- Examples of IECS
- Audience Input



Background for Duke's IECS 'Plans'

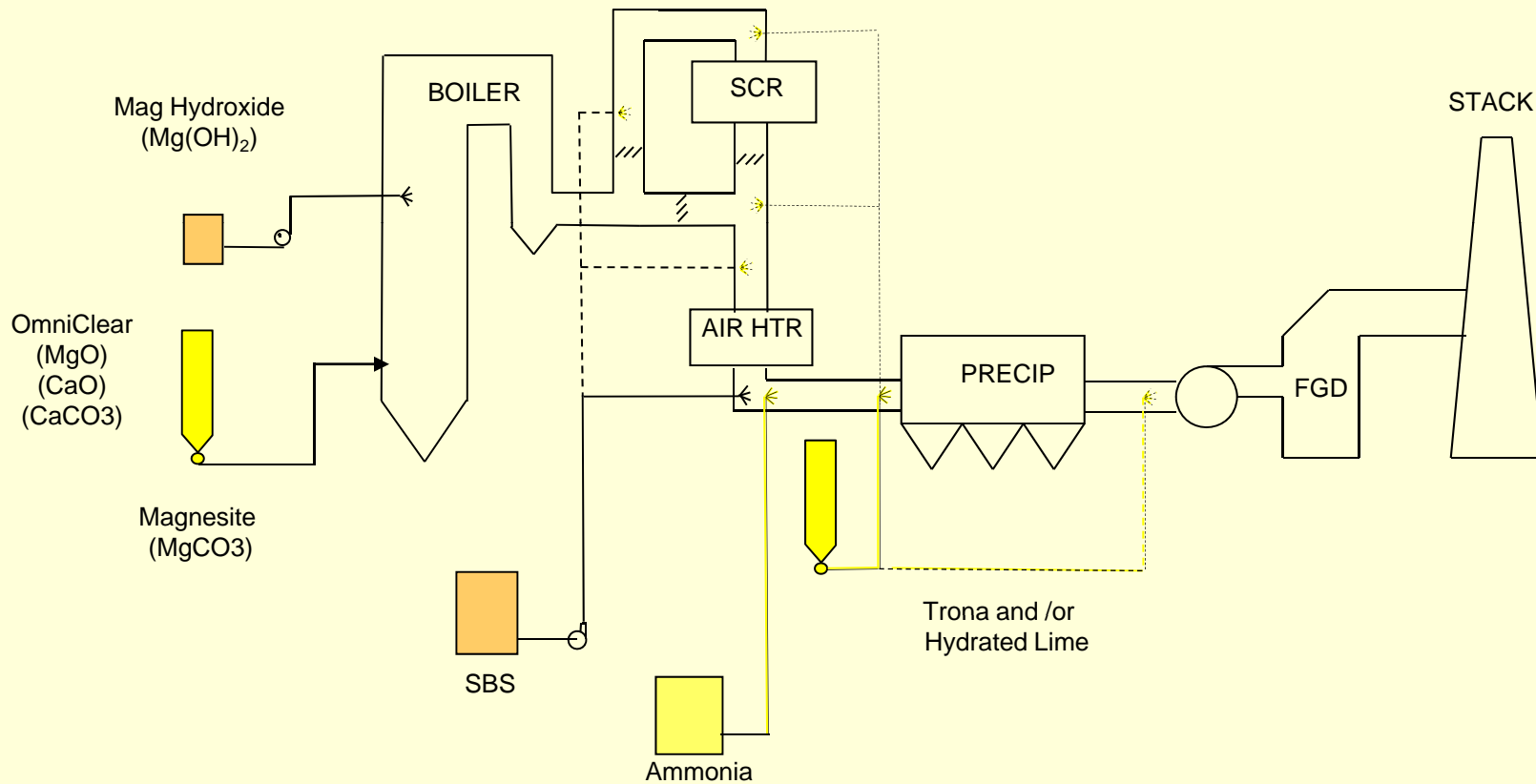


SO₃ Mitigation efforts required a comprehensive evaluation of:

- Negative Side Effects
- Co-Benefits
- 1999 Initiated efforts to mitigate SO₃ plume at Zimmer
- 2000-2004 Tested various reagents from fuel additives to DSI & Slurry injection at FGD Inlet
- 2004 & 2005 installed permanent SO₃ mitigation systems
 - Hydrated Lime
 - Trona
 - SBS/ Soda Ash
 - Furnace Mag Hydroxide Slurry Injection
 - Dual Reagent Systems
- 2006 thru 2010 Additional Reagent Testing for SO₃/ Co-Benefits
- 2010 DSI Testing (Trona, SodiumBicarb, Hydrated Lime) for SO₂ removal w/FFDC

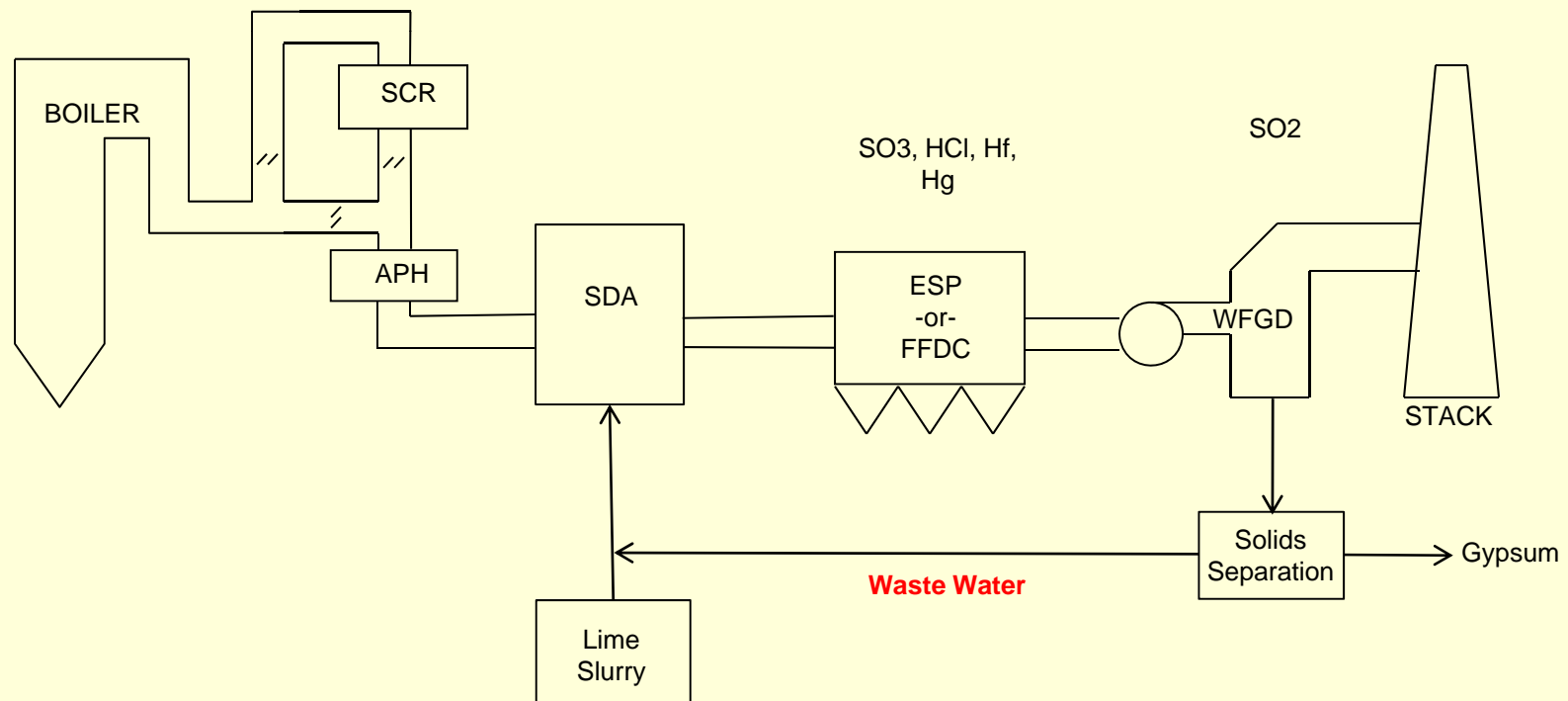


SO₃ MITIGATION STRATEGIES





Duke Cliffside AQCS





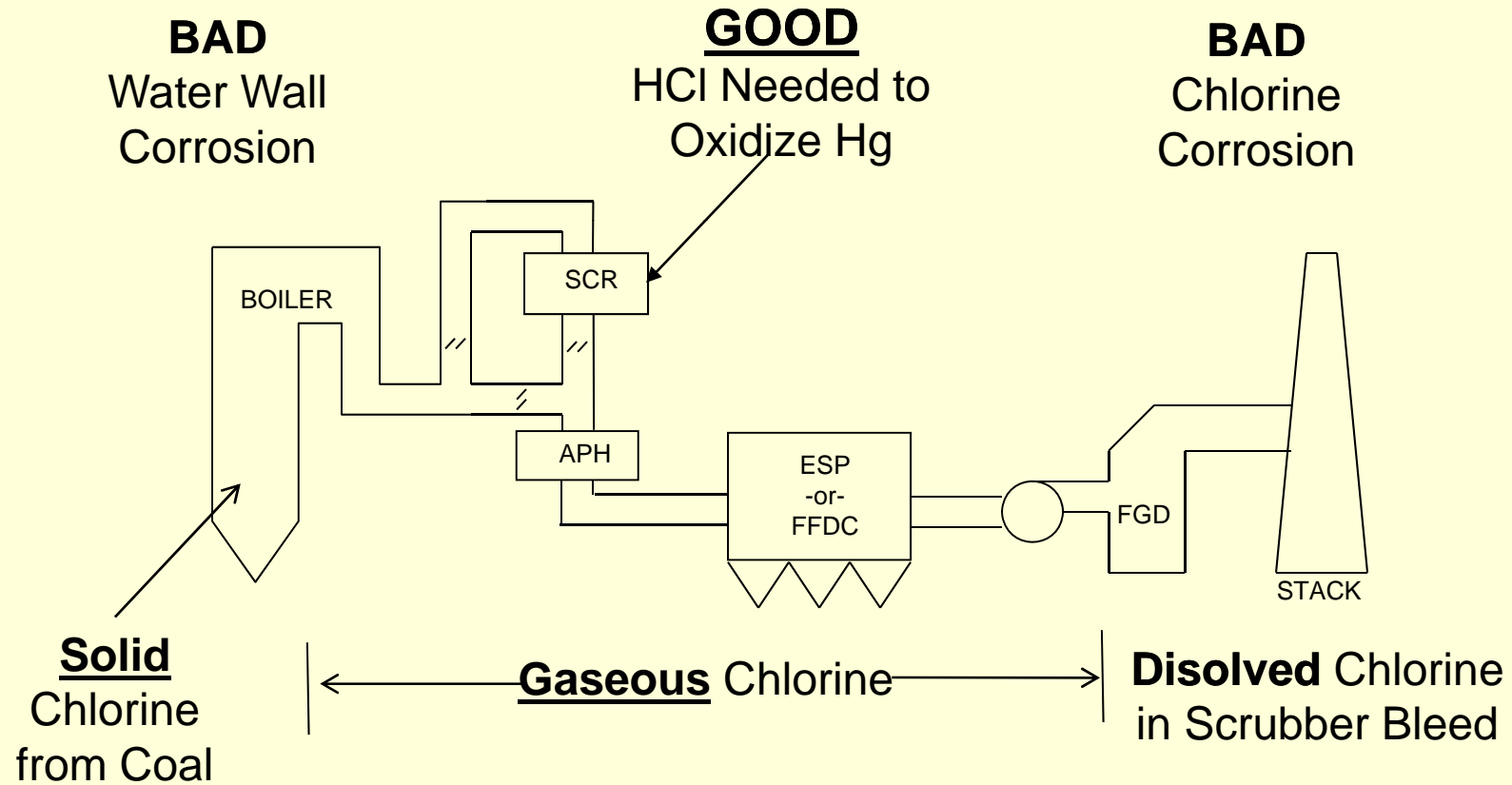
Examples of IECS Co-Benefits

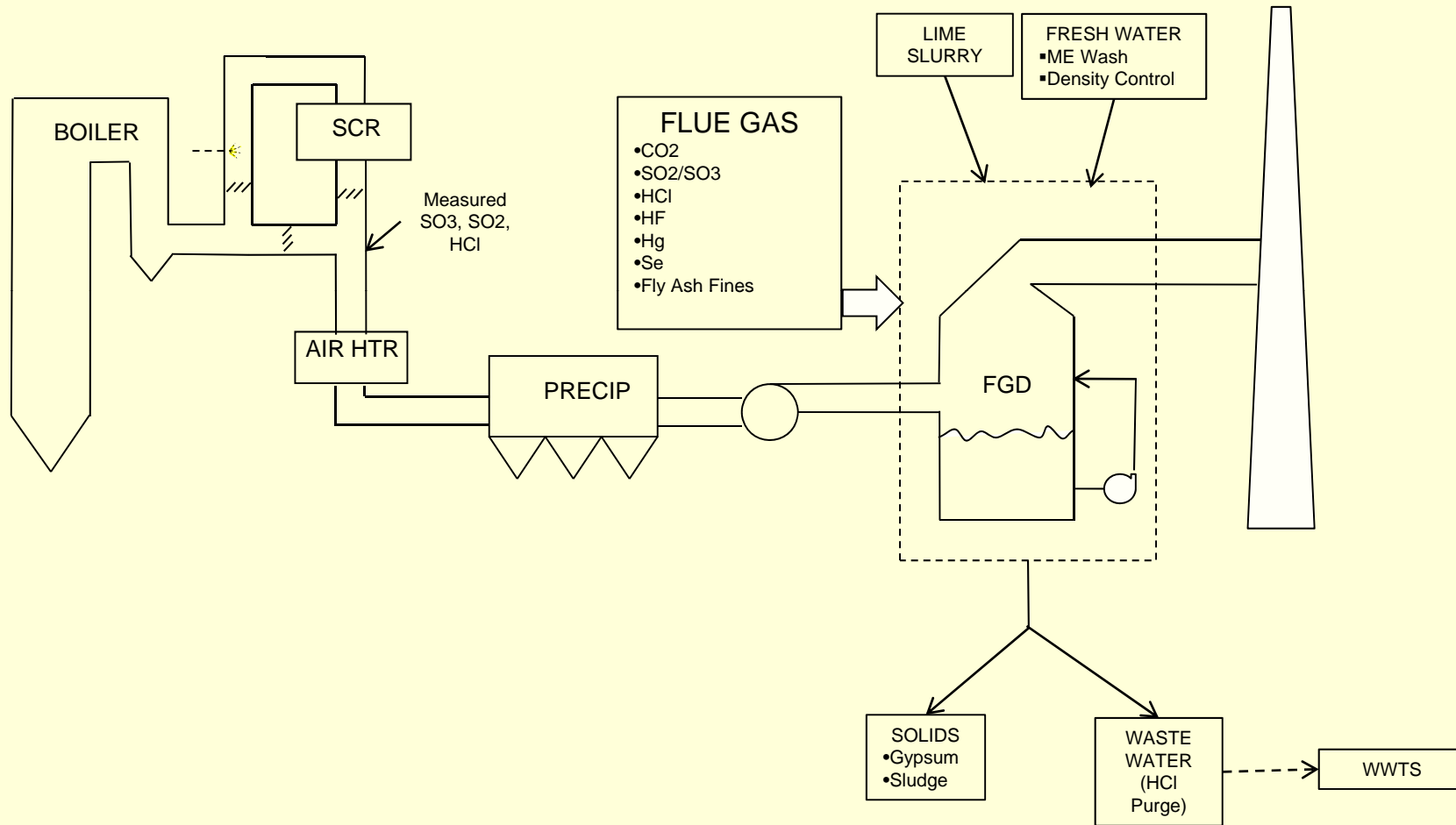


- EPRI Toxecon (ESP + FFDC)
- SCR Catalyst Hg Oxidation
- Switch to FGD Inhibited Oxidation with Fixation
- Chlorine Removal
- SO₃ Mit Pre-APH
- SO₃ Mit Pre-SCR



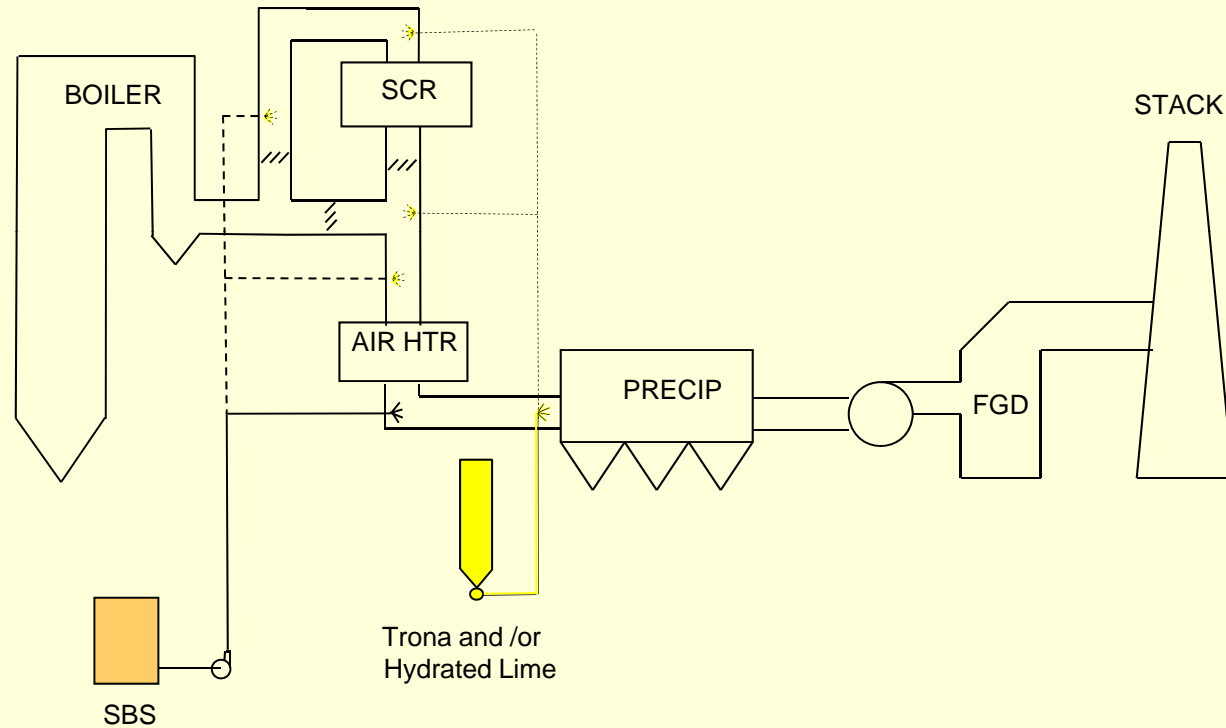
Chlorine Impacts







HCl/ SO3 MITIGATION STRATEGIES





Concerns with HCl Mitigation



- Higher Reagent Usage Rates
- ESP Impacts
 - Low SO₃ Levels >> High Ash Resistivity
 - Increased Mass Loading/ Maldistribution
- Fly Ash Impacts
 - Fly Ash Sales
 - Landfill Leaching & Structural Issues
- SCR Impacts
 - Catalyst Deactivation
 - Reduced Hg Oxidation



Questions For Audience



- Does your company do comprehensive IECS evaluation for environmental projects?
 - In-house? Department or Taskforce?
 - Role of A&E's, Consultants, Vendors?

- What Examples do you have of IECS & what are tradeoffs?

- What obstacles to proceeding with IECS ideas?

- Examples of where failure to consider IECS impacts led to significant problems?

- How does your company plan to deal with air, water, ccb, etc?
 - Hg, HCl, Hf, Se, As, Al...