Worldwide Pollution Control Association

IL Regional Technical Seminar

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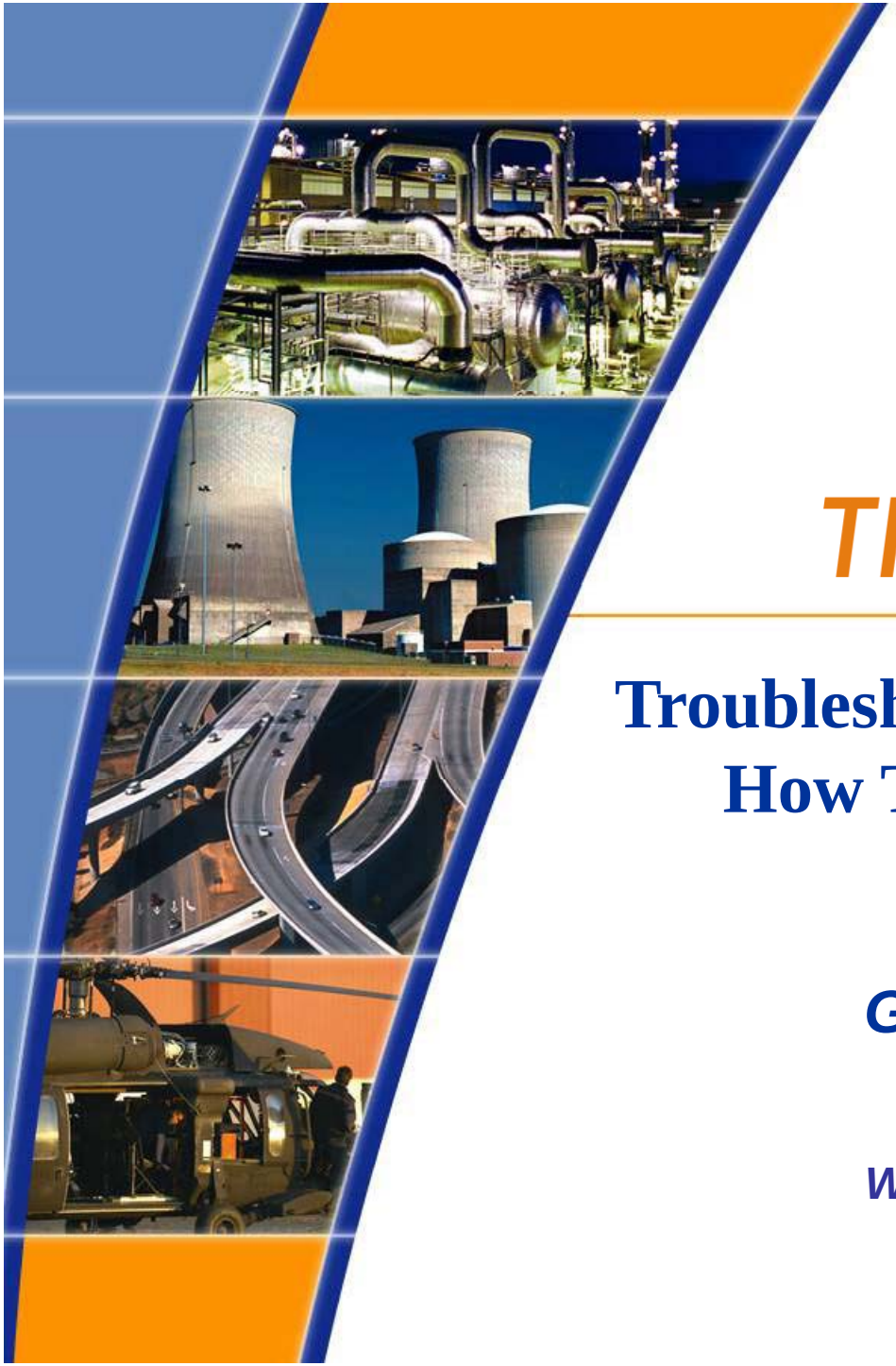

THE NEW URS

Troubleshooting Process Problems – How To Identify and Correct

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Presentation To:

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Problem Areas To Be Discussed

- Scaling and solids buildup
- Mist eliminator fouling
- Limestone blinding
- Poor SO_2 removal
- Poor reagent utilization
- Poor gypsum byproduct quality

Causes of Scaling and Solids Buildup

- Chemical (high gypsum relative saturation)
- Wet-dry interface and recirculation of slurry
- Poor reagent utilization

Causes of Scaling in FGD Systems

High Gypsum Relative Saturation:

- High relative saturation usually result of poor chemistry control:
  - ✓ Poor oxidation control
  - ✓ Low slurry density and insufficient seed material
- Scaling in ME may result from poor quality wash water (water saturated or nearly saturated with gypsum)

Causes of Scaling in FGD Systems

Wet/dry Interface:

- Occurs in area of absorber where hot flue gas is quenched
- Scaling results from fluctuations in gas flow and gas distribution. Causes areas along duct walls or other internal structures to vary from wet to dry
- If slurry is carried back into this area, it may dry and accumulate as a hard scale composed of calcium sulfate, and/or fly ash

Causes of Scaling in FGD Systems

Wet/dry Interface:

- Scaling as result of a wet/dry interface is eliminated by:
  - ✓ Modifying the physical design of the absorber inlet to eliminate the flow disturbance
  - ✓ Controlling the location of the wet/dry interface by modifying the way flue gas is quenched
  - ✓ Typically not a problem with new FGD systems

Scaling and Solids Buildup - Summary

Steps to Correct:

- Control process chemistry within design limits
- Ensure that inlet flue gas is quickly and completely quenched
- Modify absorber inlet design to eliminate flow disturbances and gas recirculation
- Maintain reagent utilization within design range

Mist Eliminator Pluggage

- Chemical causes
  - ✓ Poor reagent utilization
  - ✓ Poor quality wash water
- Mechanical causes
  - ✓ Poor design of wash system
  - ✓ Broken or plugged wash system
  - ✓ High gas velocity
  - ✓ Non-uniform gas flow and liquid loading distribution

Mist Eliminator Pluggage

- Indication
  - ✓ Increase in pressure drop
  - ✓ Visual observation during inspection
- ME pluggage can:
  - ✓ Result in increased gas velocity through ME and liquid carryover into outlet duct and stack
  - ✓ Cause stack rainout and particulate emissions
  - ✓ Damage ME due to weight of solids

Inhibited Dissolution of Limestone

- Limestone must dissolve in scrubber to provide alkalinity
- Certain dissolved chemical species can significantly slow or stop the dissolution of limestone
- Inhibition - Slowing of dissolution (e.g., high levels of chloride or magnesium)
- Blinding - Significant slowing or stopping of dissolution

Limestone Blinding

- Limestone blinding can result from high concentrations of dissolved sulfite (in-situ forced oxidation process) or aluminum and fluoride
- Either sulfite or aluminum-fluoride will react with calcium on surface of limestone particle to block dissolving site
- Aluminum-fluoride blinding often initiated by high concentration of inlet fly ash
- Sulfite blinding initiated by incomplete oxidation

Poor SO_2 Removal as Result of Chemical Problem

Cause	*Analytical Indication*	*Corrective Action*
Insufficient Limestone In Scrubber	Low carbonate measured in scrubber solids	Increase pH set-point
Malfunctioning pH Monitor	Poor agreement during pH calibration check	Make repairs to pH monitor system
Sulfite Blinding	Poor reagent utilization along with elevated levels of soluble sulfite	Verify operation of oxidation air system. Correct as required
Aluminum Fluoride Blinding	Poor reagent utilization along with elevated levels of aluminum and fluoride	Improve particulate removal upstream of scrubber
Poor Limestone Quality or Off-Spec Grind Size	Sieve analysis, composition analysis	Modify grind circuit and/or obtain better limestone

Poor SO_2 Removal as Result of Mechanical Problem

Cause	*Indication*	*Corrective Action*
Plugged Spray Header(s) or Spray Nozzle(s)	Low recycle flow As indicated by flow meter or motor amps	Clean during outage
Broken Spray Header	Indication from flow meter or motor amps. Observed during inspection	Repair during outage
Loss of Recycle Pump Capacity	Low recycle flow as indicated by flow meter or motor amps	Repair during outage

Poor Reagent Utilization

Cause	*Analytical Indication*	*Corrective Action*
Malfunctioning pH Monitor	Poor agreement during pH calibration check	Make repairs to pH monitor system
Sulfite Blinding	Poor reagent utilization along with elevated levels of soluble sulfite	Verify operation of oxidation air system. Correct as required
Aluminum Fluoride Blinding	Poor reagent utilization along with elevated levels of aluminum and fluoride	Improve particulate removal upstream of scrubber
Poor Limestone Quality or Off-Spec Grind Size	Sieve analysis, composition analysis	Modify grind circuit and/or obtain better limestone

Poor Gypsum Byproduct Quality

- High acid insoluble (inerts) fraction
  - ✓ Verify operation of particulate control device upstream of scrubber
  - ✓ Optimize operation of process hydroclones to maximize concentration of inerts in overflow
  - ✓ Increase liquid purge rate
- Poor reagent utilization
- Low sulfite oxidation
  - ✓ Verify operation of oxidation air system

Poor Gypsum Byproduct Quality (cont.)

- High moisture
  - ✓ Verify operation of primary and secondary dewatering system
  - ✓ Purge fines from process
  - ✓ Check filter cloth for blinding. Clean or replace as required
  - ✓ Increase temperature of filtercake wash water
  - ✓ Verify system chemistry
    - × High level of limestone
    - × High level of acid insolubles
    - × Presence of crystal modifier (e.g., Fe)


Questions?