The GMCS Hg Control System
Provided by W.L. Gore and URS
Supported by EPRI
Presentation to:
McILVAINE Web Forums
August 2, 2012
Presentation Outline

✓ Summary
✓ Technology Overview
✓ Experience
✓ Performance
✓ Installation Approach
✓ Path Forward
Gore SPC Hg Control System

✓ Passive fixed bed device

✓ Performance

✖ 90+ percent Hg removal
✖ 60+ percent SO$_2$ removal
✖ Not sensitive to Hg concentration
✖ Not sensitive to Hg speciation
✖ No boiler additive injection
✖ No activated carbon injection
✖ No impact on the fly ash quality
✖ No impact on gypsum quality
✖ No concerns regarding Hg reemission
✖ Fuel flexibility
✖ Very low waste generation
✖ Life expectancy 3 to 9 years.
Presentation Outline

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Gore SPC Hg Control technology

✓ Fixed Bed Sorbent Polymer Composite (SPC) material
  ✗ 1 ft wide tape of composite fluoropolymer membrane
  ✗ Modularized

✓ Unique physical-chemical nature of the SPC material
  ✗ Efficiently captures both elemental and oxidized mercury Hg
  ✗ SO$_2$ is converted into sulfuric acid and expelled to SPC material’s outer surfaces
  ✗ Very high capacity for mercury storage
  ✗ Does not require regeneration
Modular Structure

SPC material incorporated into discrete modules

Open-channel design provides low pressure drop

Hg is strongly bound to SPC material

Stack height determines mercury removal efficiency
(20 - 95+ percent Hg removal possible)

Gas Flow
Presentation Outline

✓ Summary
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Plant Yates Demonstration (2010)

✔ One year test
  ✗ Stayed clean, never manually washed
  ✗ Maintained Hg and SO$_2$ removal
  ✗ Saturation of sorbent composite material not reached
Gorgas Pilot Plant

- 3,000 cfm slip stream
- Post-scrubber installation
- Full-size modules, single stack of 4
- Start-up June 2012
- Demonstration of long-term stability of mercury and SO$_2$ removal post-scrubber
  - Planned operation for at least 1 year
NW Utility Pilot Plant

- Pilot plant installed during July outage
  - Will operate for six months to a year

- One module (out of four) demonstration starting March 2013

- Fullscale installation in 2014
Coal Creek Pilot

[Images of industrial equipment and workers]
Coal Creek Results

✓ 13 to 14 fps flue gas velocity
✓ 40 lbs / TBtu of Hg
✓ 3 Layers of modules
✓ Hg removal 85%
✓ SO$_2$ removal 63%
✓ Pressure drop 0.76 inches
Presentation Outline

✓ Summary
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Average Removal Efficiency

<table>
<thead>
<tr>
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<th>3 modules</th>
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<tbody>
<tr>
<td>Hg</td>
<td>80%</td>
<td>90%</td>
<td>80%</td>
<td>90%</td>
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<tr>
<td>SO2</td>
<td>70%</td>
<td>80%</td>
<td>60%</td>
<td>70%</td>
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- 5 fps
- 10 fps
- 15 fps
Insensitive to Variable Inlet Concentrations

Significant changes in mercury inlet concentrations do not require any adjustments or changes to the modules.
Lifetime Projections

1. Site specific, depends on Hg concentration, number of GMCS modules and pounds of SPC per module.
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Installation in a Wet FGD Scrubber

✓ Wet FGD Installation
  ✖ Downstream of mist eliminator
  ✖ Sulfuric acid weeping may be key to why the SPC modules stay clean

✓ Proposed installation approach
  ✖ Use second ME support grid to hold SPC modules
  ✖ Use the first ME support grid to support a dual layer ME
    ● Munters DV210
    ● Koch Flexipeak

✓ Modular design
  ✖ 2 to 4 layers
  ✖ Less than 1 inch of pressure drop

✓ Long life
  ✖ Last for multiple outage cycles
ME Options- One Support Structure

Munters DV210

Koch Flexipeak
Typical Installation

Unmodified → DV210 → Flexipeak
Installation Close-Ups

Unmodified

DV210

Flexipeak
Presentation Outline

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Path Forward

✓ Pilot plant status
  ✗ 2009 – Three pilot plants at cement plants
  ✗ 2010 – Plant Yates ex-situ
  ✗ 2012 – Gorgas ex-situ
  ✗ 2012 – NW Utility in-situ

✓ Commercial by 4 Qtr, 2012
  ✗ Seeking early adopter sites
  ✗ Attractive discounts will be offered

✓ One module demonstration
  ✗ 2013 (March) – NW Utility

✓ Project duration
  ✗ 6-8 months