

URS



The GMCS Hg Control System

Provided by W.L. Gore and URS

Supported by EPRI

Presentation to:

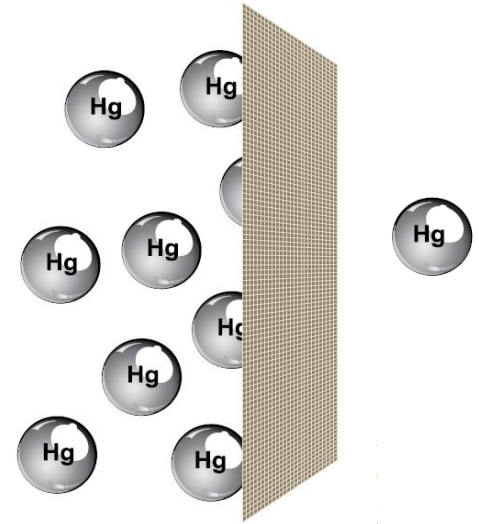


Web Forums

August 2, 2012

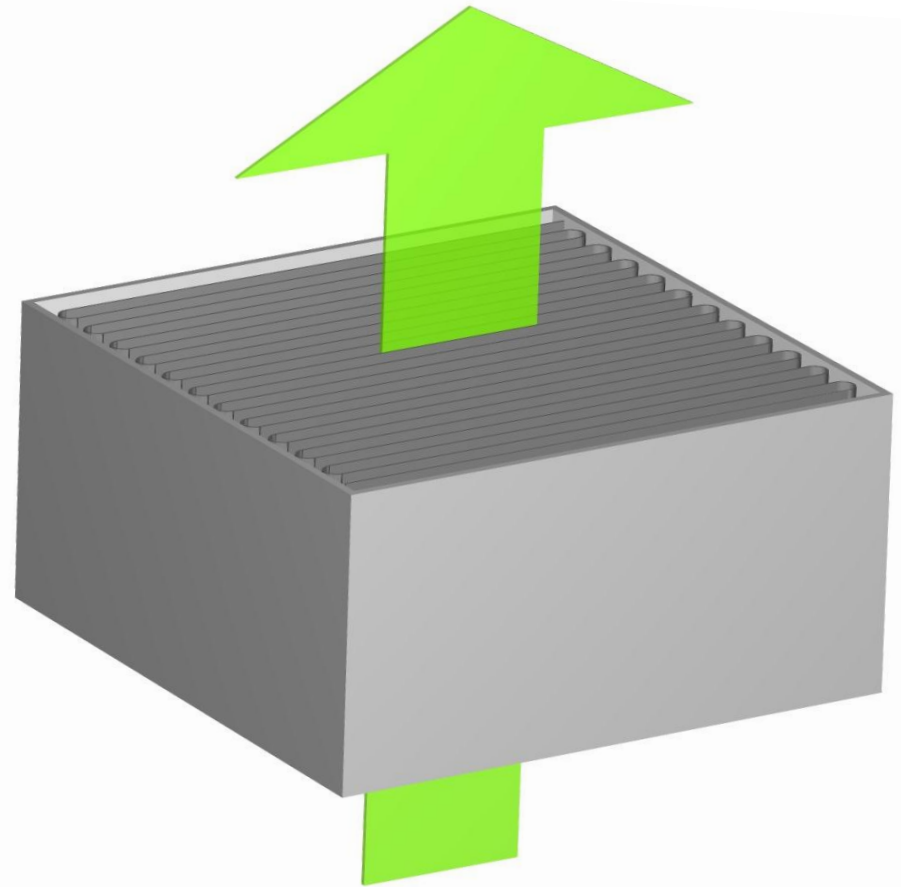
Presentation Outline

- ✓ Summary
- ✓ Technology Overview
- ✓ Experience
- ✓ Performance
- ✓ Installation Approach
- ✓ Path Forward



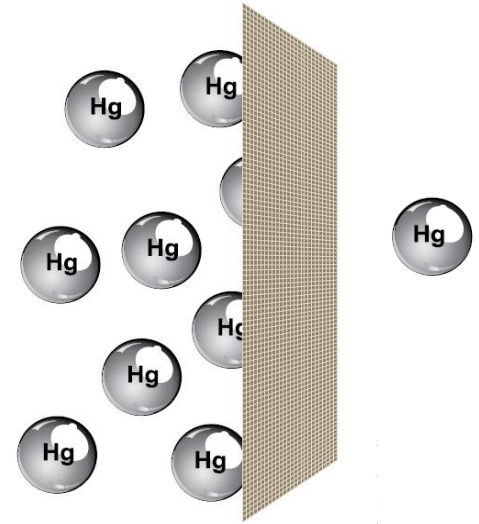
Gore SPC Hg Control System

- ✓ Passive fixed bed device
- ✓ Performance
 - ✗ 90+ percent Hg removal
 - ✗ 60+ percent SO₂ 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.



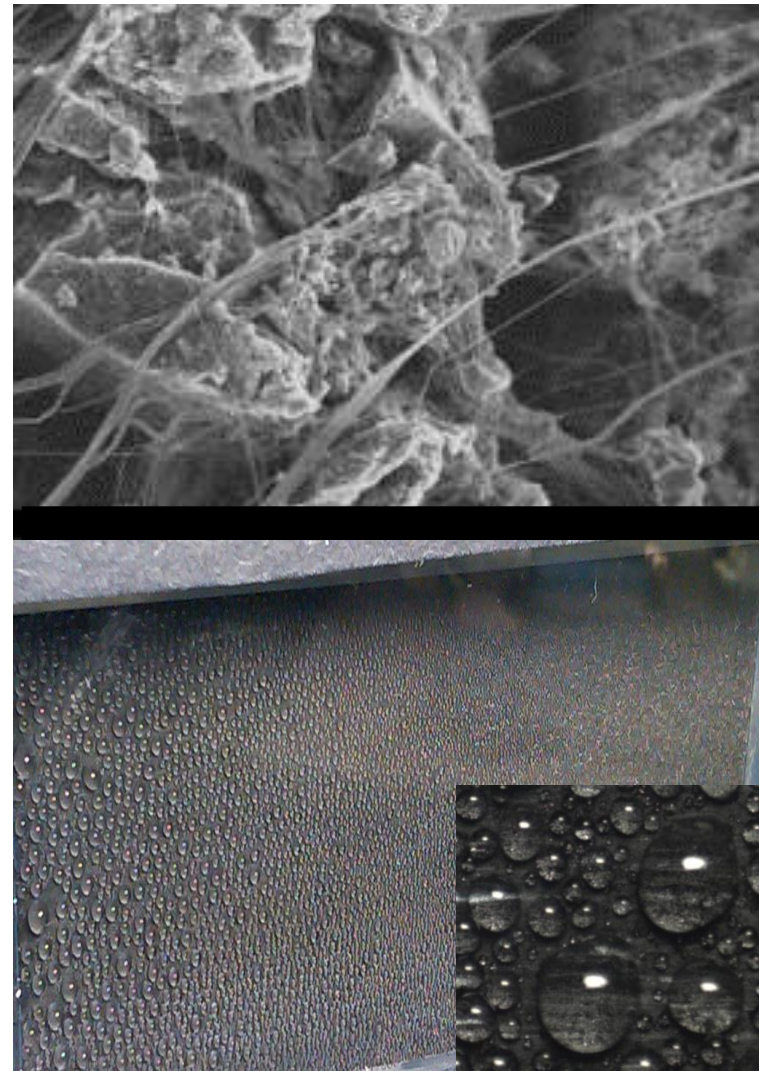
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Gore SPC Hg Control technology

- ✓ 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
 - ✗ SO₂ 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

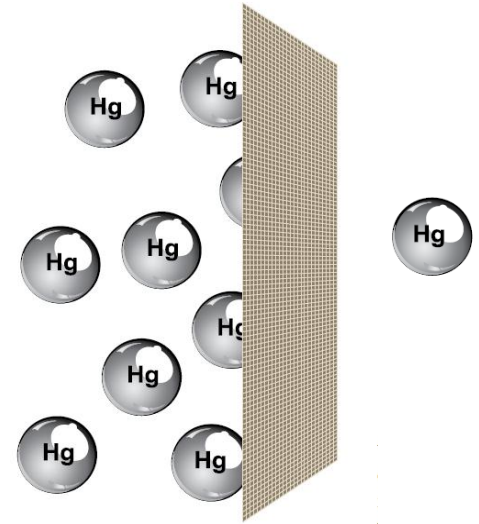
Hg is strongly
bound to
SPC material

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

Gas Flow

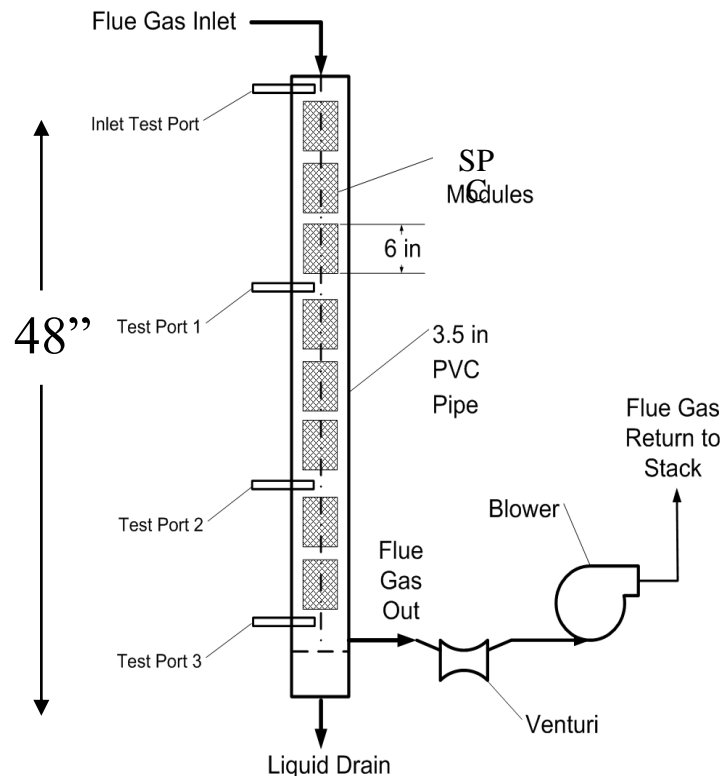
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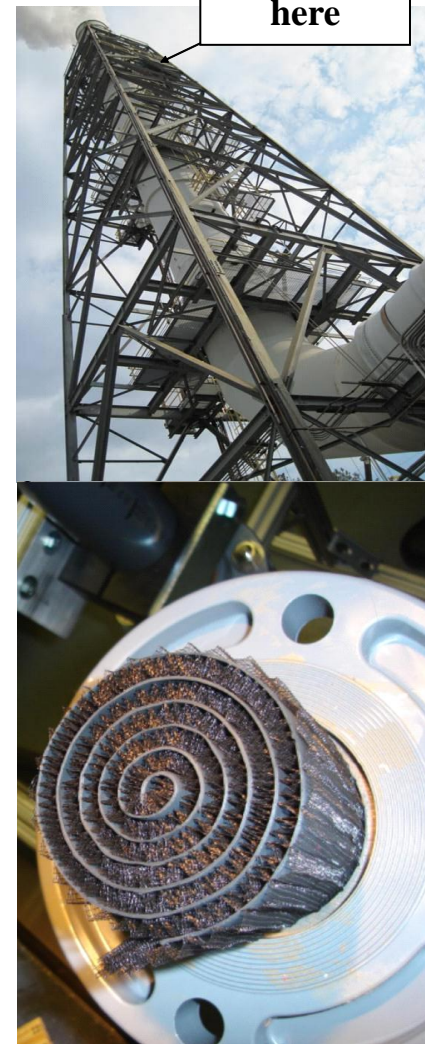


Plant Yates Demonstration (2010)

- ✓ One year test
 - ✗ Stayed clean, never manually washed
 - ✗ Maintained Hg and SO₂ removal
 - ✗ Saturation of sorbent composite material not reached



We are here



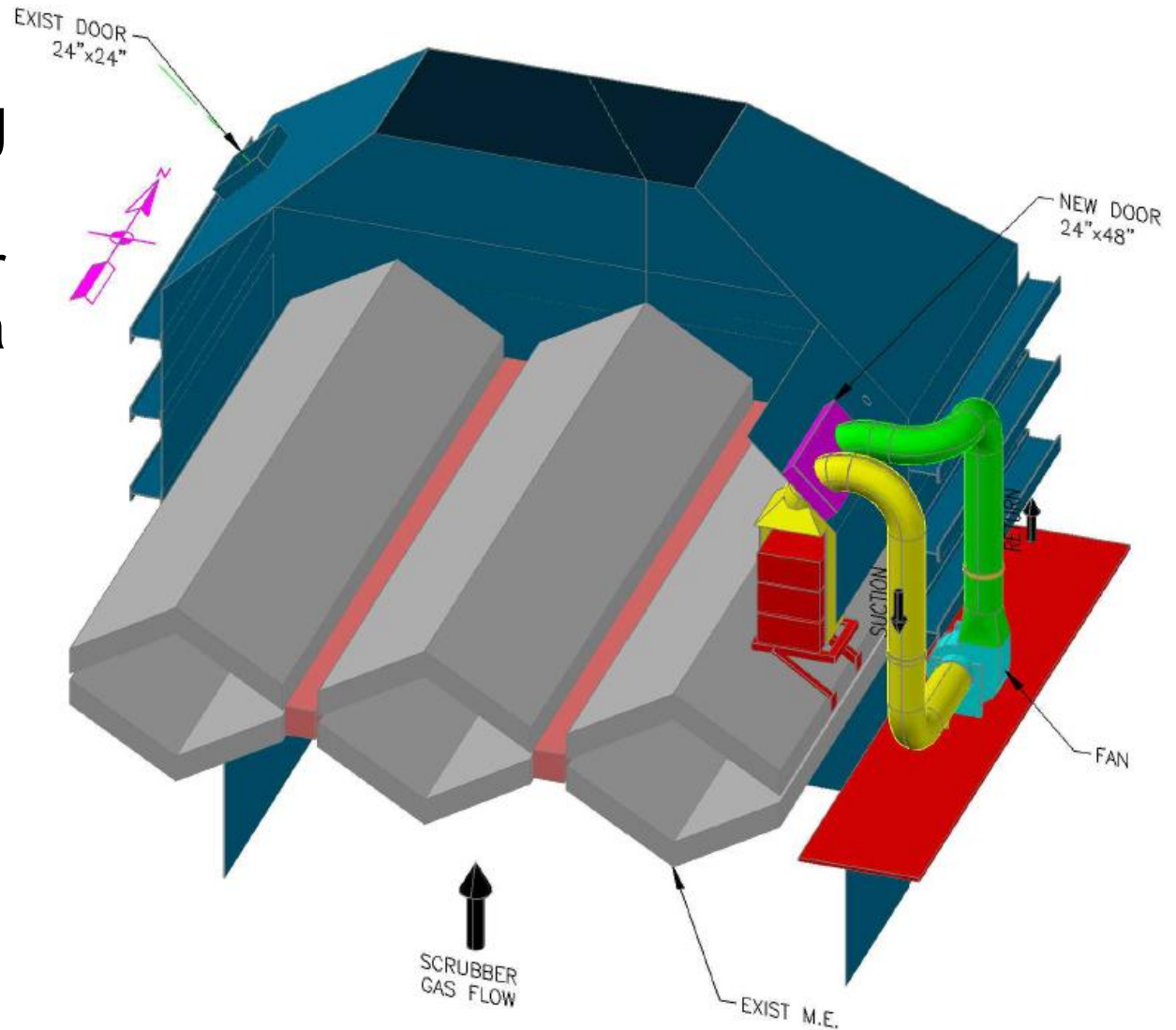
Gorgas Pilot Plant

- ✓ 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 SO₂ 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

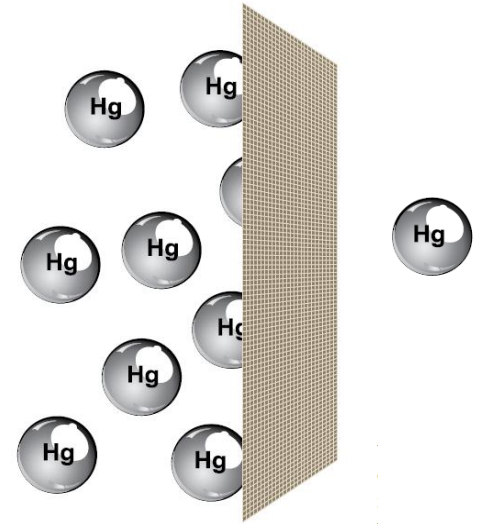


Coal Creek Results

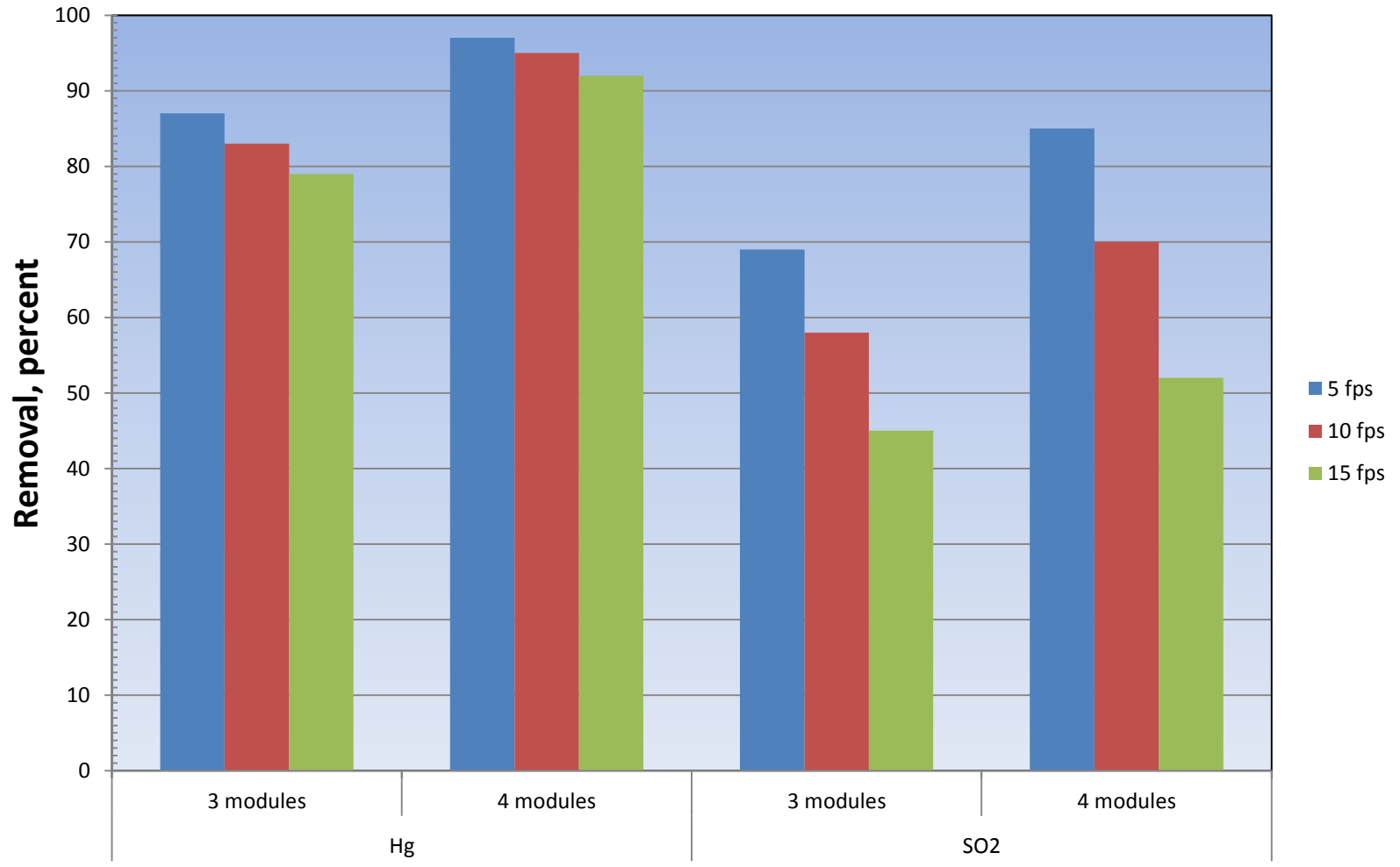
- ✓ 13 to 14 fps flue gas velocity
- ✓ 40 lbs / TBtu of Hg
- ✓ 3 Layers of modules
- ✓ Hg removal 85%
- ✓ SO₂ removal 63%
- ✓ Pressure drop 0.76 inches

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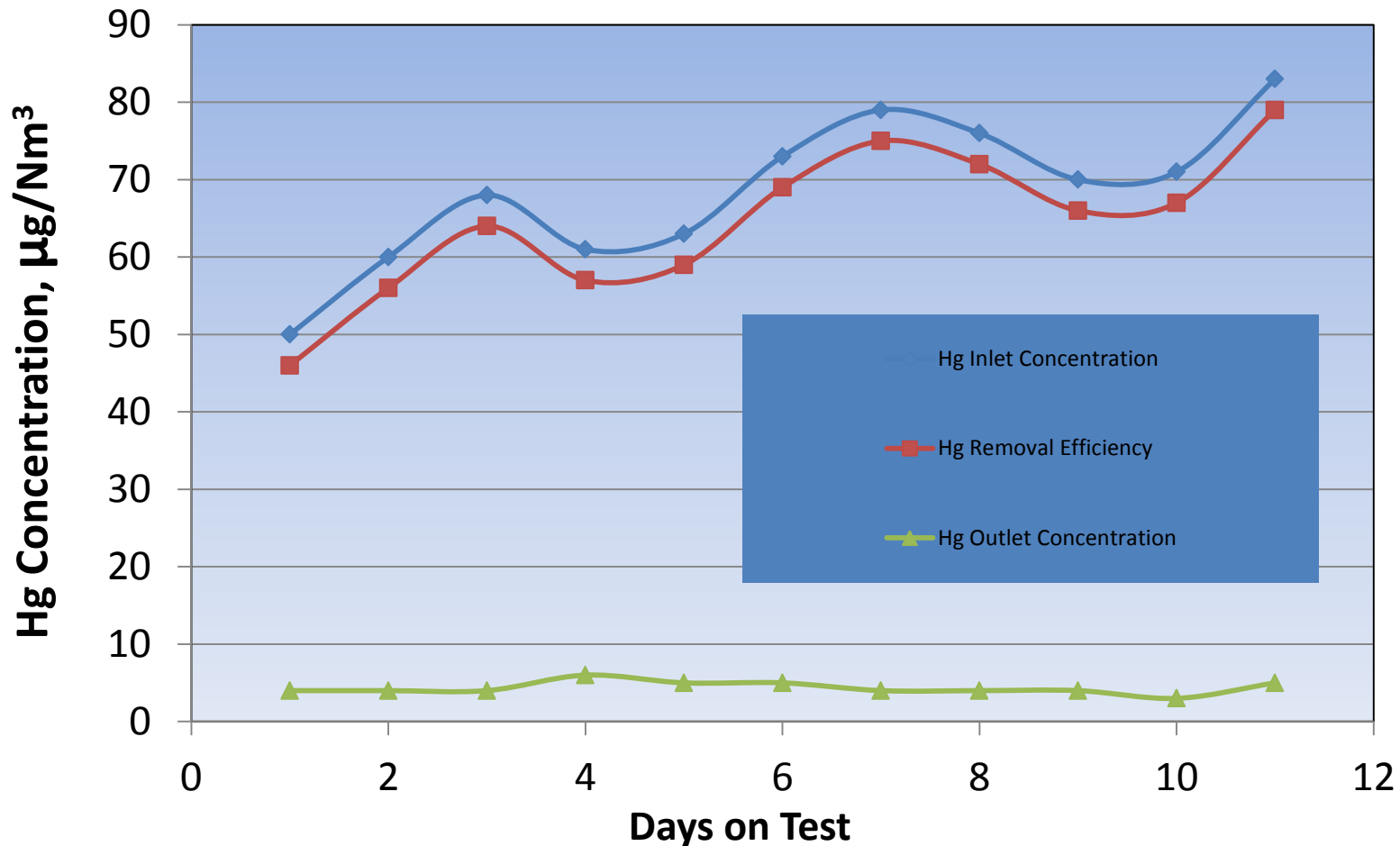
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Average Removal Efficiency

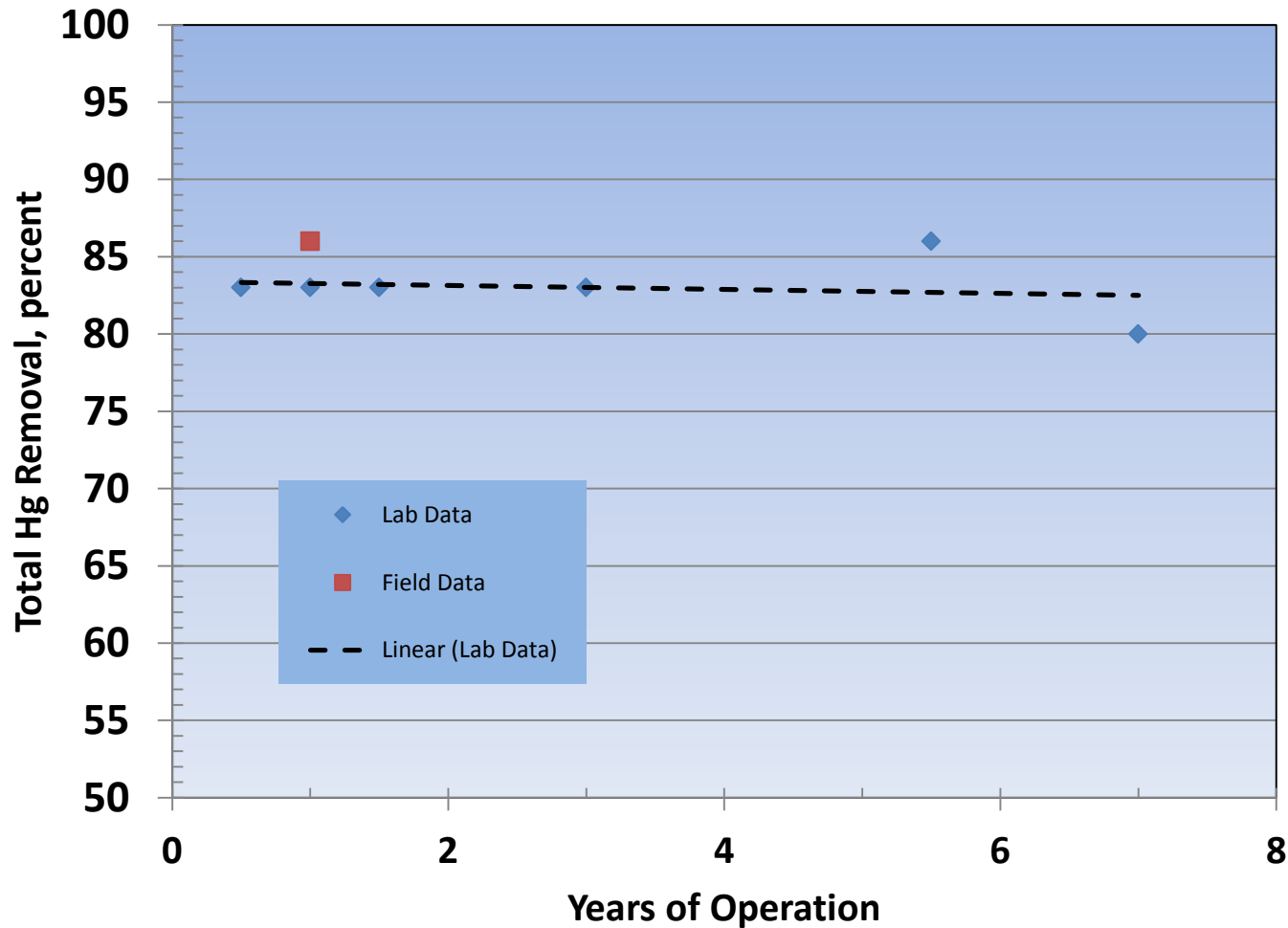


Insensitive to Variable Inlet Concentrations



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

Lifetime Projections¹



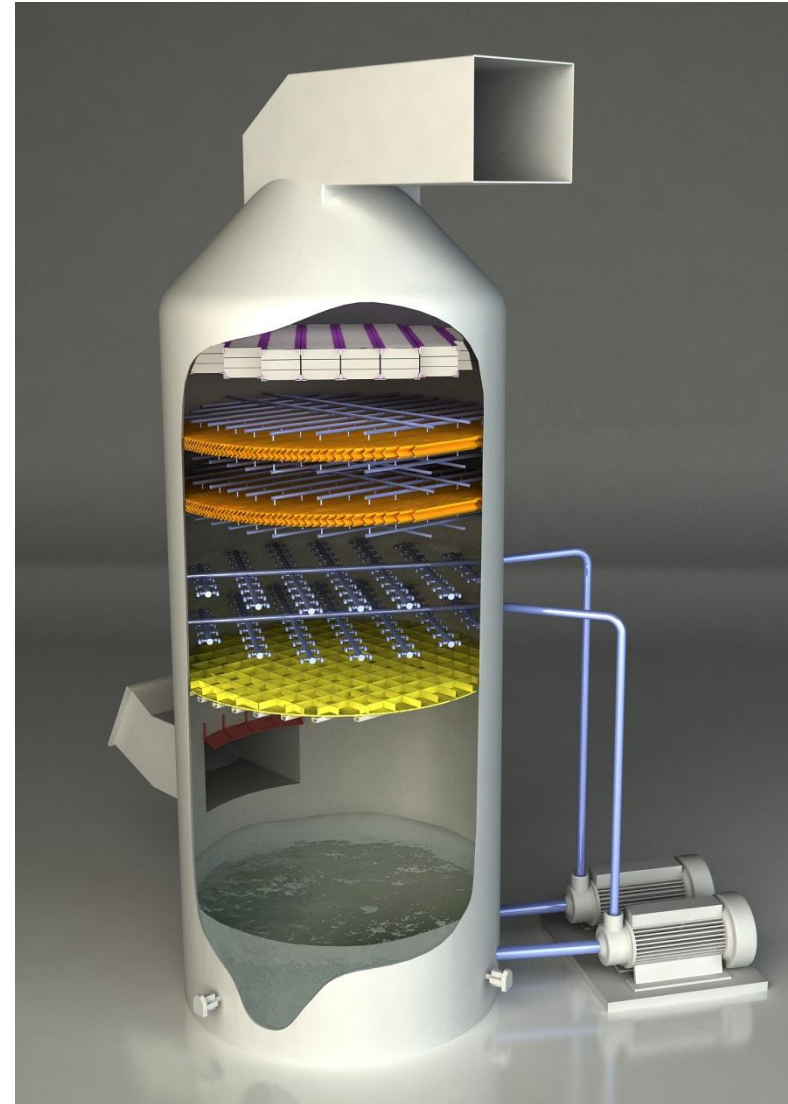
¹. Site specific, depends on Hg concentration, number of GMCS modules and pounds of SPC per module

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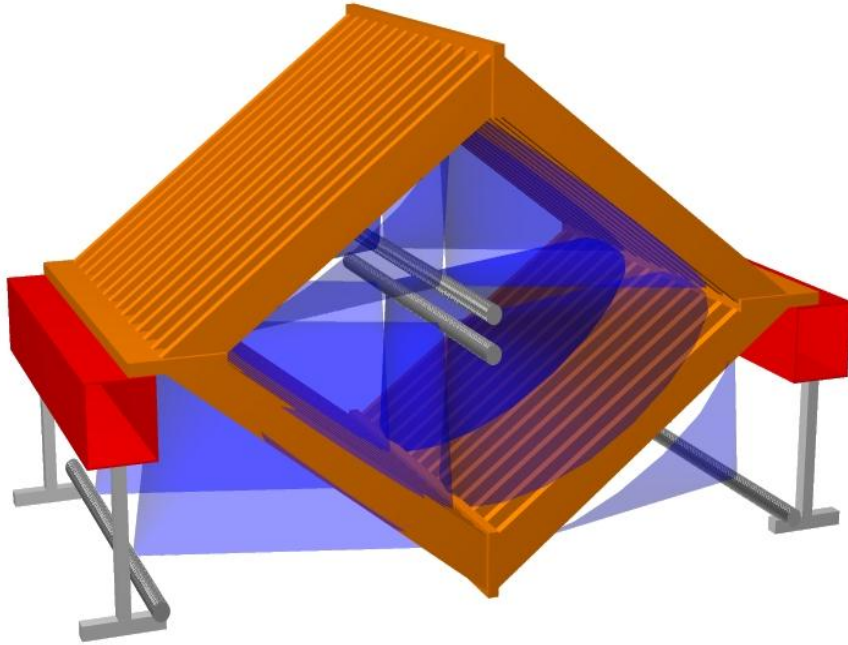
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Installation in a Wet FGD Scrubber

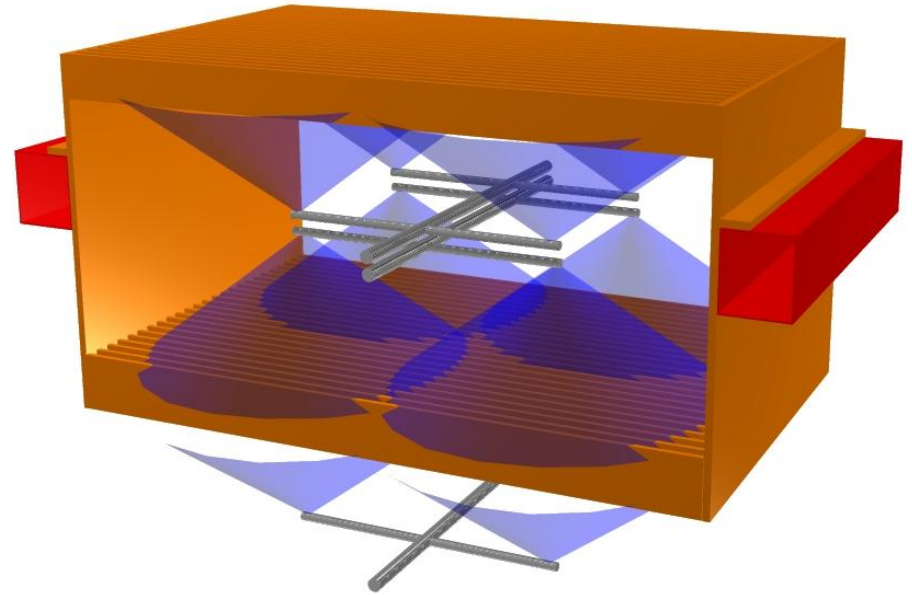
- ✓ Wet FGD Installation
 - ✗ Downstream of mist eliminator
 - ✗ Sulfuric acid weeping may be key to why the SPC modules stay clean
- ✓ Proposed installation approach
 - ✗ Use second ME support grid to hold SPC modules
 - ✗ Use the first ME support grid to support a dual layer ME
 - Munters DV210
 - 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

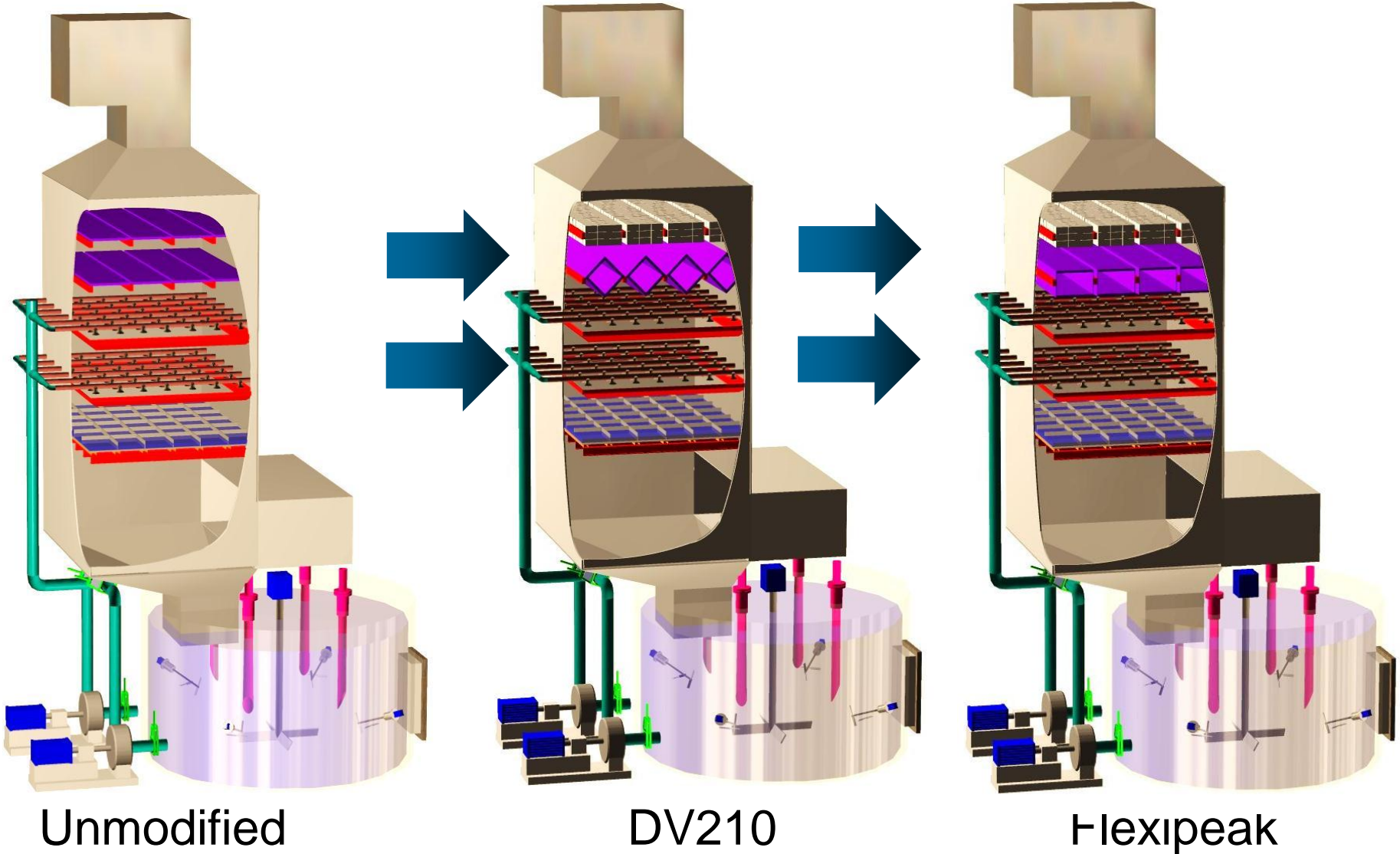


Munters DV210

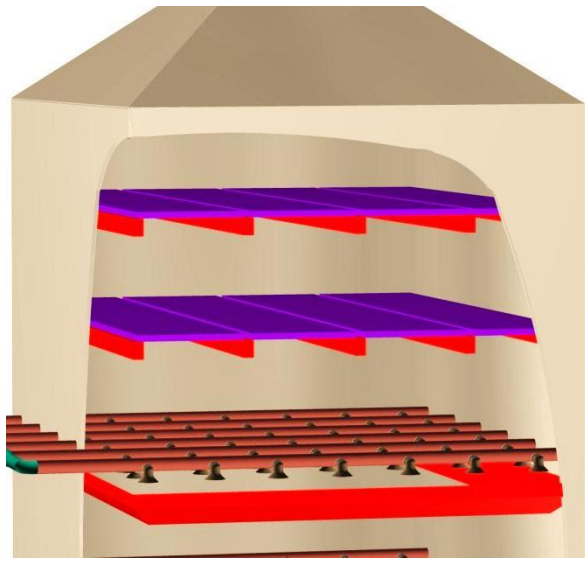


Koch Flexipeak

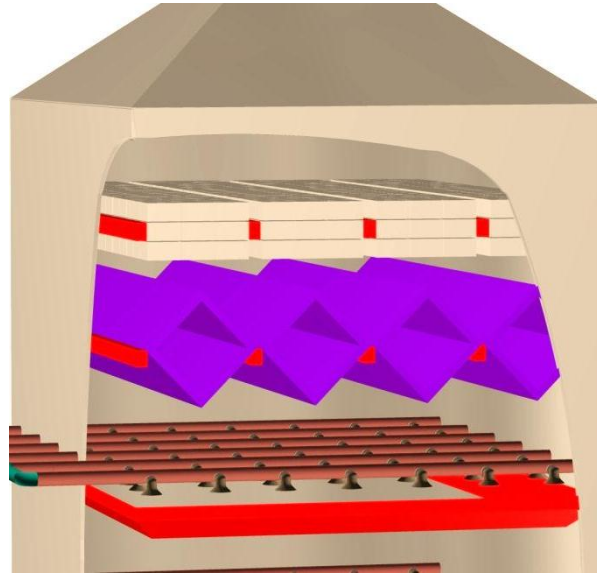
Typical Installation



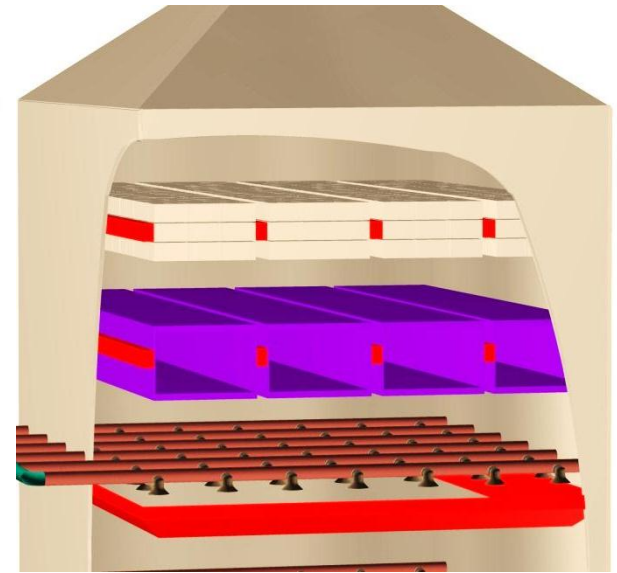
Installation Close-Ups



Unmodified



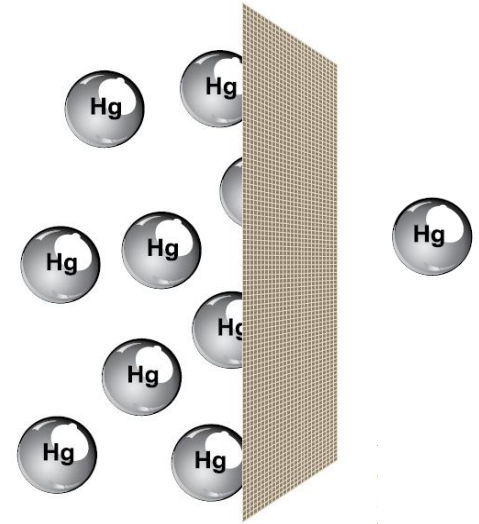
DV210



Flexipeak

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- ✓ 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