

Reinhold Environmental Ltd.



2008 APC Round Table
& Expo Presentation

July 13-15, 2008, in Savannah, GA

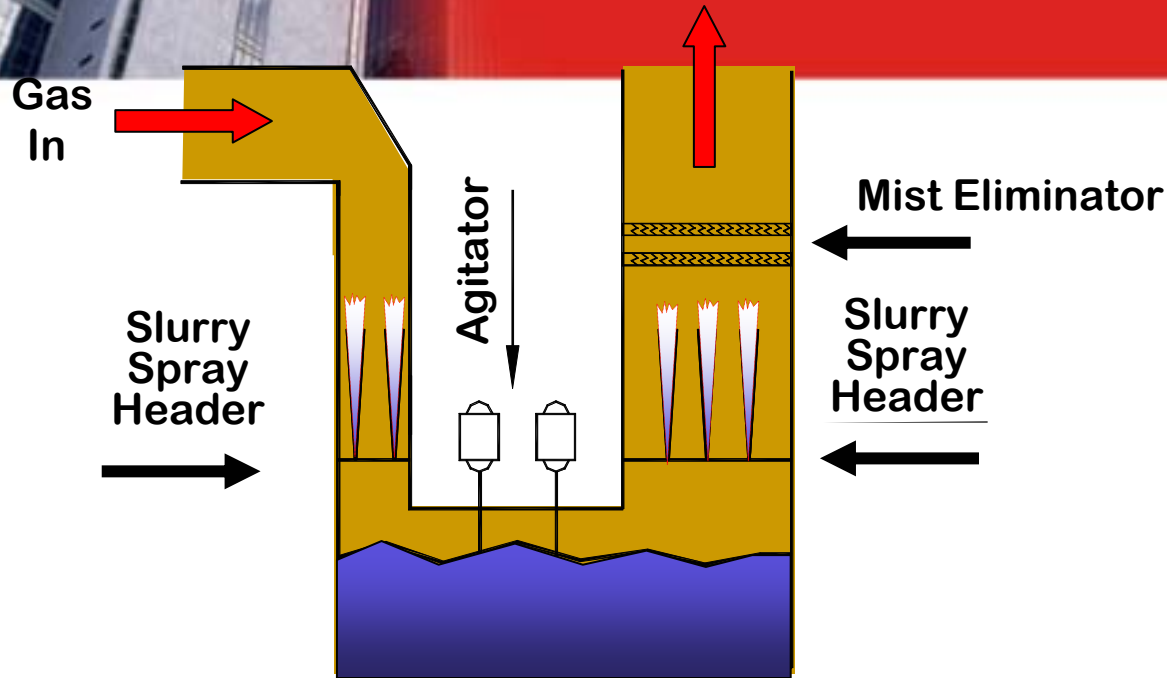
A photograph of a modern office building with a glass facade and a stone-clad section. The words "SOUTHERN COMPANY" are visible on the stone section, along with a red logo consisting of three triangles. The sky is blue with some light clouds.

CAMR Repeal Impacts & Future Research Needs

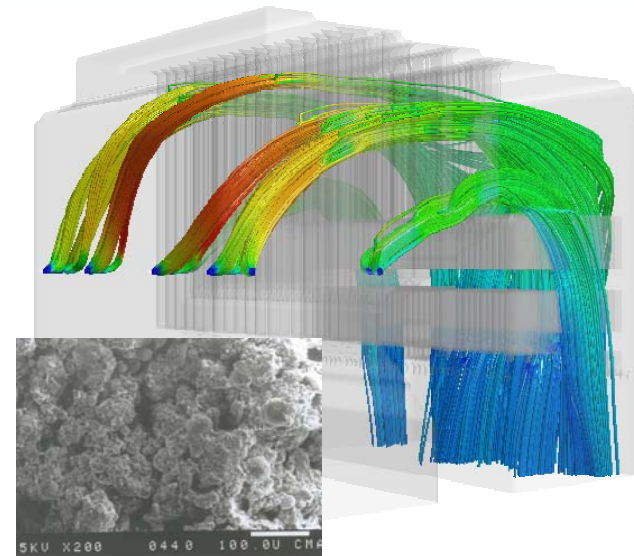
**APC Roundtable Table Expo
Reinhold Environmental
July 15th, 2008**

**Mark S. Berry
Environmental Controls R&D Manager**

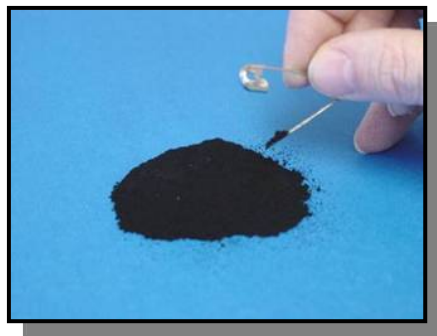
CAMR Compliance Strategy



Co-Benefits with WFGD



High Temperature Sorbents

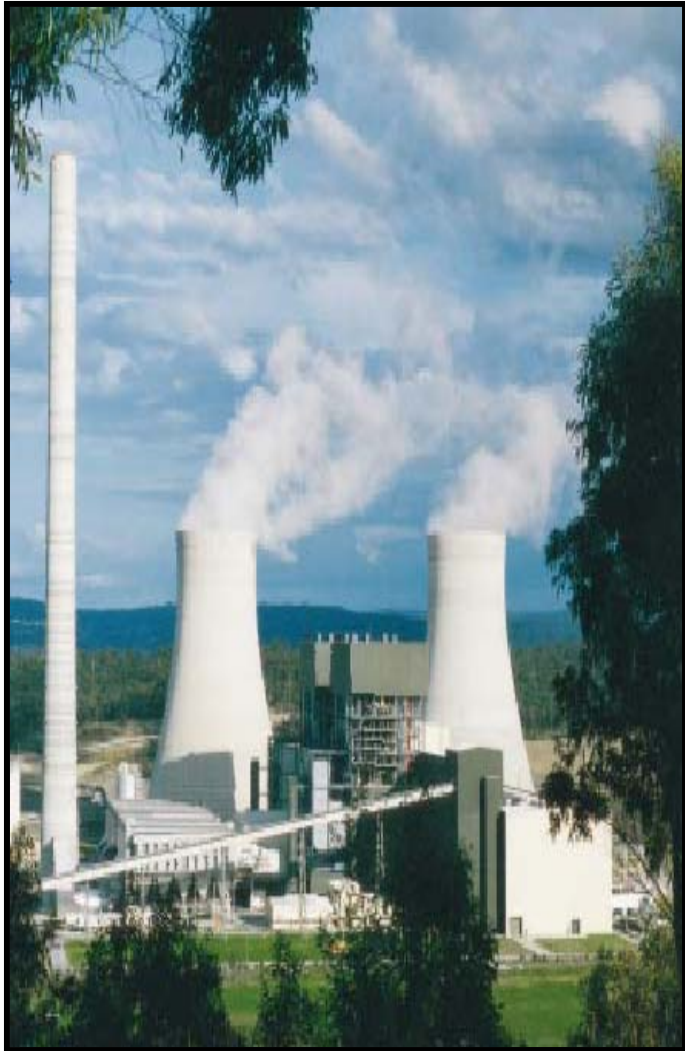


Activated Carbon Injection

Electrostatic Precipitators
Fabric Filters



Clean Air Mercury Rule (CAMR)



- **Vacated by the D.C. Circuit Court**
- **Judicial Review Process Underway**
 - Industry reviewing options
 - Environmental stakeholder options
- **EPA Response awaited**
 - **Extreme Uncertainty**
 - **Hg MACT**
 - best performing 12% of source category
 - 2018 CAMR levels???
 - Removals at every source
 - **HAPS MACT**

Hg MACT Emission Levels

MACT 2004

EPA Proposed Standards

Bituminous 2.0 lbs. / TBtu

Sub-bituminous 5.8 lbs. / TBtu

Lignite

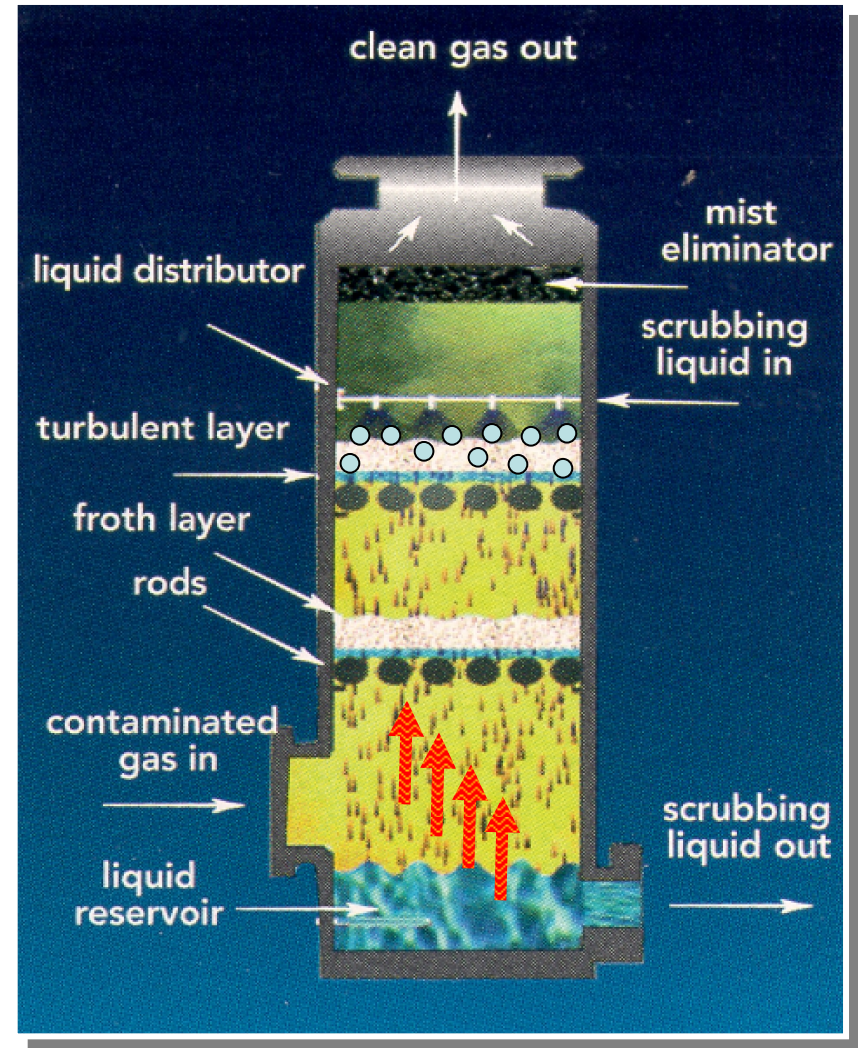
All Lignite 9.2 lbs. / TBtu

- Unlikely to get these levels again
- New MACT Stakeholder Working Group?
- New Information Collection Request?
- New Subcategories
- Comply with new MACT: 2013 - 2016



What are the Needs?

- Improve understanding of Hg Co-benefit control with SCR / WFGD
- Improve Hg control in units with WFGD only
- **Improve the Hg removal efficiency of ACI into ESPs**
- **New technology to improve Hg removal efficiency at lower costs**



Improve AC Capture by ESP

Challenge

Small PM increases (<0.003 lb/MBtu) can trigger NSR for 500 MWe plant



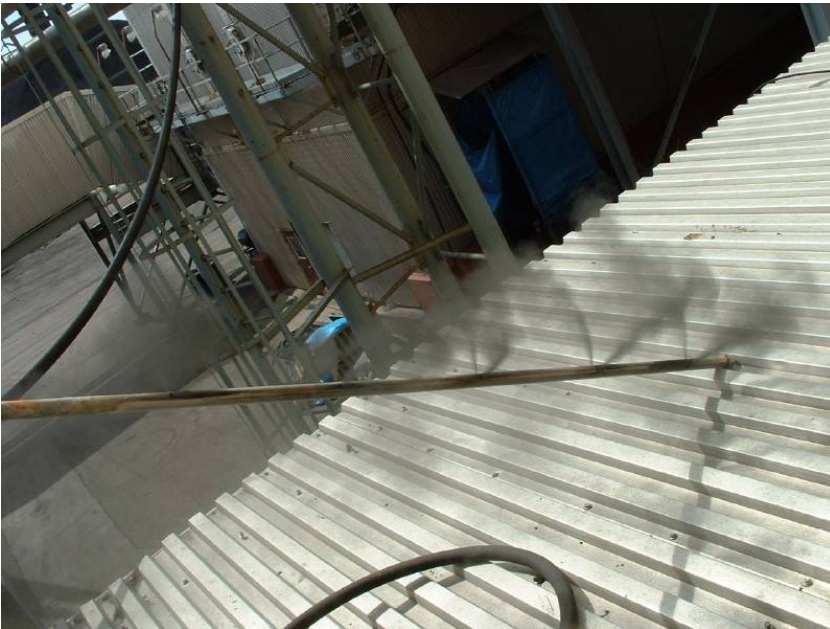
Response

- Conduct extensive PM measurements (M5 and M17) at various field sites (ESP and fabric filter) over time
- Develop low cost counter-measures (PMScreen, ESP advanced power supply, prevent reentrainment)
- Reduce sorbent amounts needed

Improve Carbon Effectiveness

Challenge

Improve sorbent effectiveness, reduce sorbent use and cost



Response

Develop and evaluate promising approaches

- On-site grinding to reduce sorbent size and agglomeration
- Injection before APH, maximize contact time
- Optimize sorbent injection design and mixing
- On-site production/direct injection
- Carbon re-use
- Novel sorbents

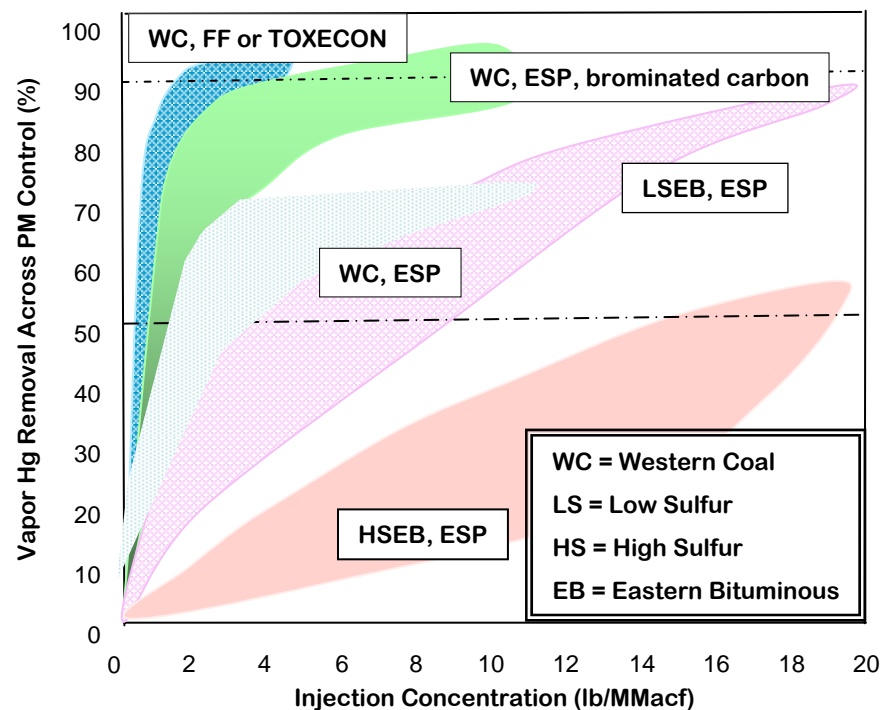
Combat Effect of SO₃

Challenge

Improve sorbent effectiveness in the presence of SO₃

Response

- Alkali injection
- Sorbent injection before SO₃
- Alternatives to SO₃ for ESP gas conditioning
- SO₃ tolerant sorbent



Disruptive Carbon Technologies

Challenge

Improve Hg removal with carbon at lower overall cost and provide more options

Response

- High mass transfer structures with smaller physical footprint
- Technologies geared for older plants where baghouse retrofit cost are prohibitive
- Polishing approach
- Any approach: High removal level required



Honeycomb



Carbon Cloth



Plates

Activated Carbon Specification Development



Bulk density

Moisture, ash, fixed C

Particle size distribution

BET surface area

Iodine number

Pore size distribution

Volatile matter

- Needed to develop consistency in procurement of carbon
- Difficulty in different measures of carbon effectiveness by carbon manufacturers
- Quick onsite test needed to evaluate shipments for performance consistency
- Vendor guarantee is not sufficient for certainty of regulatory compliance

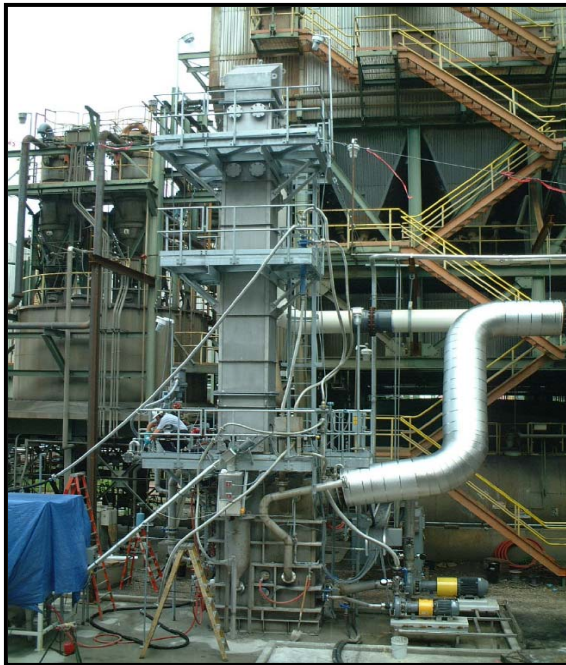
Special Applications

Challenge

non-traditional
approaches to carbon
injection

Challenge

- High Temperature applications
- Non-SCR Co-benefit locations
 - ACI Into Scrubbers
- Other Pollutant removal





Carol Browner ~ 12/20/2000

EPA Administrator

“Based on the available information, the Administrator finds that regulation of HAP emissions from coal- and oil-fired electric utility steam generating units under section 112 of the CAA is appropriate and necessary. As a result, this notice adds coal-and oil-fired electric utility steam generating units to the list of source categories under section 112(c) of the CAA.”



Hazardous Air Pollutant HAPS MACT

- **Understand emissions by Coal Type / Env. Equipment**
 - 188 individual pollutants
 - Particulate Phase Trace Metals (As, Pb, Mn...)
 - Volatile Inorganics (Hg, Se, HCl, HF)
 - Organic Compounds
- **Real-time Measurement Techniques / Surrogates**
- **Removal Technologies (Best Performers??)**
- **Control Levels / Predictions**





Food for Thought

- Significant Hg removal technology progress made since 2000. More needed!
- Lack of significant funding source for needed research
- Turn roadmap consensus for Hg technology development into cohesive effort
- Will final regulation just include Hg or all HAPS?

Silver Sands Beach Bar
Patio & Club *Our Menu*

Appetizers

- Coconut Shrimp served with mango sauceUS\$6.00
- Conch Fritters with jerked mayonnaiseUS\$5.00
- Chicken Wings with blue cheese dressingUS\$4.00
- Appetizer Combo.....US\$7.00

Soups

- Silver Sand's Special Conch SoupUS\$2.00
- Soup of the day.....US\$1.50

Salads

- Tossed Green Salad with house dressingUS\$2.50
- Fried Chicken SaladUS\$4.50

Sandwiches

- Jerk Chicken Sandwich served on coco breadUS\$4.00
- Vegetarian coco bread sandwichUS\$3.50

Silver Sands Classics

FISH MEALMarket Price

- North Coast Steamed Fish
- Fried Fish
- Steamed Snapper rundown
- Curry Fish with medley of vegetables

Seafood

- Curried or Garlic ShrimpUS\$10.00
- Brown Stewed Sea Cat with vegetablesUS\$9.00
- Stewed Conch with vegetablesUS\$15.00
- Curried Crab with vegetablesUS\$9.00
- Grilled Lobster.....US\$19.00

Mike's Specials Of The Day

- Jerk ChickenUS\$5.00
- Jerk PorkUS\$6.00
- Curry GoatUS\$6.00
- Ham BurgerUS\$4.50
- Grilled Chicken BreastUS\$4.50
- Hot Dog.....US\$2.00
- Vegetarian MealUS\$7.00 & up

Vegetarian

- Vegetable curry with nutsUS\$6.00
- Steamed Callaloo with rice 'n' peasUS\$5.00

All Silver Sand's Classic items are served with a choice of White Rice or Rice 'n' Peas

Pizza (Your Choice!) With 2 Toppings, for onlyUS\$5.00
Additional Topping costUS\$1.00

Side Order

- Cole SlawUS\$2.00
- Rice 'n' PeasUS\$2.00
- White RiceUS\$1.00
- BammyUS\$2.00
- Coco BreadUS\$1.00
- French FriesUS\$2.00
- Fried PlantainUS\$1.00
- CrackersUS\$1.00
- FestivalUS\$1.50

Beverages

SODAS - Coke, Pepsi, Diet Pepsi,
Ting, Ginger Beer, Kola ChampagneUS\$2.00

JUICES - Orange, Pineapple, Fruit PunchUS\$2.50

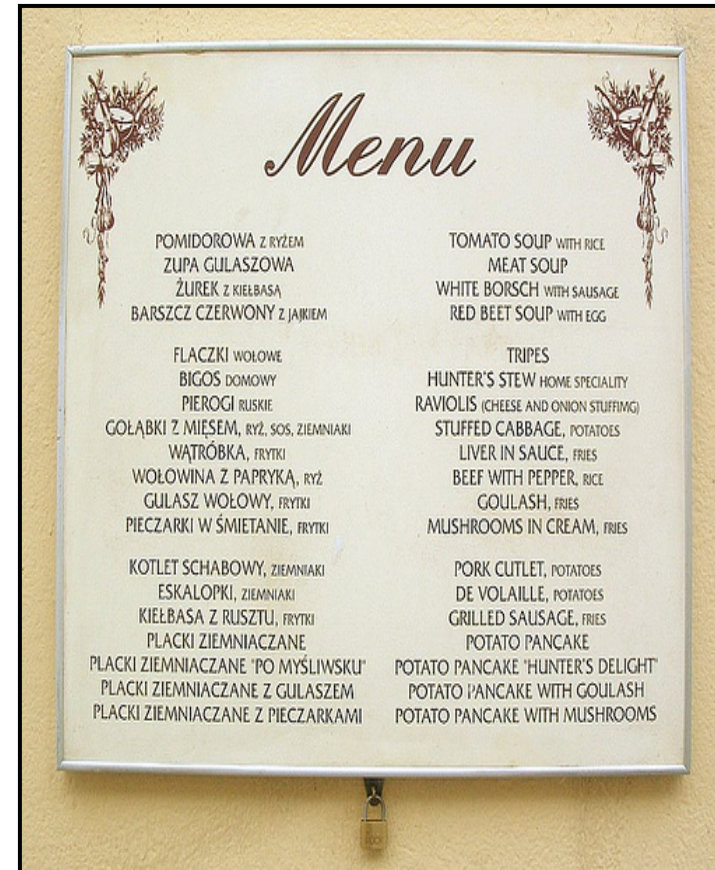
CocktailsUS\$3.00

Service Charge not included in price!



Food for Thought

- Uncertainty in regulatory timeline delays technology selection.
- Timeframe of regulation & technology implementation are out of phase.
- Financial recovery of installed technology hinges on regulation.
- Decision of technology cannot be made without considering potential global climate change legislation.





QUESTIONS

