POWER PLANTS – FGD
LIMESTONE SLURRY PROCESSES
w/ PULVERIZED LIMESTONE
&
DSI PROCESSES TO SCRUBBER and/or
IN-FURNACE TREATMENTS

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TRADITIONAL PROCESS [Crushed Limestone] FOR LIMESTONE UNLOADING, HANDLING, STORAGE & SLURRY PREP [Ball Mills]

- Limestone Supplier delivers crushed limestone to Power Plant
- Power Plant
  - Unload & mechanical convey to storage
  - Mechanical transfer to multiple day bins feeding Ball Mills
  - Operates Ball Mill processes
  - Slurry to storage tanks
  - Feed slurry to Scrubber
Limestone Supplier:
- Produces pulverized limestone with roller mills.
- Provide logistics for supplier storage and regional distribution
- Deliver and unload pulverized limestone to Power Plant silo.

Power Plant
- Supervision monitors automated slurry making process
VACUCAM® Ejector Mixer

- High Performance
- High Wetting/Dispersion Efficiency
- Operates under high vacuum for exposing maximum surface area of liquid to dry product
- No moving parts
- No maintenance
1. Single Pass Process Direct Into Slurry Storage Tank
POWER PLANT-LIMESTONE SLURRY PROCESS
SINGLE PASS PROCESS DIRECT INTO SLURRY STORAGE
POWER PLANT-LIMESTONE SLURRY PROCESS
SINGLE PASS PROCESS DIRECT INTO SLURRY STORAGE
Dual Silo Feed to Dual Mixer System
Pulverized Limestone Storage
Two silos w/ Dual Cone Outlets
VACUCAM® LIMESTONE SLURRY PROCESS
DUAL EJECTOR MIXER SINGLE PASS IN-LINE SLURRY DIRECT TO SLURRY STORAGE

Limestone From Silo

Water Supply

30%+ Slurry to Storage Tank
POWER PLANT
Process Options

1. Single Pass Process Direct Into Slurry Storage Tank

2. Single Pass In-Line Process to Remote Slurry Storage Tanks
Single Pass In-Line Process to Remote Slurry Storage Tanks
Limestone Slurry Process
Dual Domes & Slurry Processes
DUAL DOME STORAGE
PULVERIZED LIMESTONE
Limestone Slurry Process
Dual Domes & Slurry Processes
Limestone Slurry System w/ Dome Storage Supply

Plan View at Base Level

Plan View At Apex w/ Floor Overlay

Conical Floor w/ elevated Vault
~22,800 sTons @90 pcf (Combined)

FLS Fully Fluidized Floor

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Limestone Slurry Process in Dome Vault
VACUCAM® DUAL EJECTOR MIXER PROCESS W/ LIMESTONE SUPPLY HOPPER W/ SLURRY TRANSFER PUMP
LIMESTONE SLURRY PROCESS IN VAULT OF DOME
LIMESTONE SLURRY PROCESS
IN VAULT OF DOME
POWER PLANT
Process Options

1. Single Pass Process Direct Into Slurry Storage Tank
2. Single Pass In-Line Process to Remote Slurry Storage Tanks
SINGLE PASS LIMESTONE PROCESS FOR DIRECT PH CONTROL TO SCRUBBER &/or DIRECT LIME INJECTION IN-FURNACE FOR SO2 /Hg REMOVAL
ACTIVATED CARBON INJECTION DIRECTLY INTO SCRUBBER AND/OR IN-FURNACE TREATMENT FOR SO2 AND/OR Hg REMOVAL
Slurry Production Process for Inexpensive, In-furnace Mercury and SO2 Removal

- Slurry production systems using the VACUCAM® Ejector Mixer for efficient slurry production of lime or limestone powders for slurry feed to scrubbers.
- I think the output of the VACUCAM® Ejector Mixer could be injected directly into the furnace to reduce SO2 similar to the LIMB process. (See next slide.)
- The technology could also be used to extract pulverized coal from coal transfer pipes, mix it with water and oxidizing chemicals, and inject it into the furnace to produce halogenated, activated carbon for mercury capture.
- Because this is similar to systems that have already been proven, I believe this inexpensive technology has the potential to remove 90% of mercury and 50% of SO2 in the flue gas.
Figure 4  The LIMB process at the Edgewater Station.
Figure 7  Effect of humidification on SO₂ removal.
In-Furnace Hg Capture
w/ Activated Carbon Produced In-Situ from Pulverized Coal and Mixing with Water and Oxidizing Chemicals
Advantages:

- The VACUCAM® Mixing Systems has no moving parts, therefore maintenance would be low.
- The activated carbon is produced in-situ, so there is no capital cost for storage or injection systems.
- The cost of activated carbon would be very low, since it is the cost of coal plus the energy to pulverize it.
- The footprint of the system would be very low.
- The system could be fine-tuned on-line to optimize lime, carbon, and halogen feed based on feedback from on-line analyzers.
MATRIX OF DRY SORBENT HANDLING AND INJECTION TREATMENT OPTIONS FOR APC
FEATURES******BENEFITS
OF THE VACUCAM® SLURRY MIXING PROCESS

- Direct In-Line single pass mixing. No moving parts.
- Produces high quality slurry mix w/ rapid and maximum surface area contact to maximize reaction
- Direct Injection – no slurry storage required.
- Totally enclosed mixing system – NO dust
- Small footprint required
- Minimal maintenance—very reliable—no scheduled maintenance downtime required
- High quality slurry mix provides maximum contact and reaction rate while maximizing process yield.
- Very low energy usage-save 50-90%
- Minimal dust control required
- Minimize real estate requirements
- Easily automated and fine tuned to optimize chemical [lime, carbon, halogen] additions with direct feedback from on-line analyzers
Questions and Answers

Thank you ...............