

FGD Services

Offered By

Reagent Technology Services

A division of Mississippi Lime Company

McIlvaine Hot Topic Hour
January 26, 2012

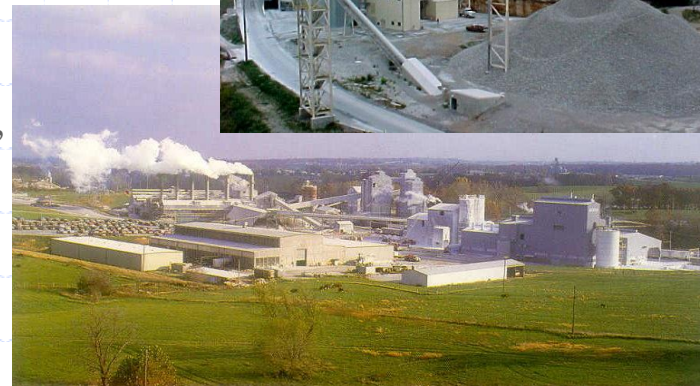
Contact:
Greg Andersen
314 543-6301
geandersen@mississippilime.com

Presentation Topics

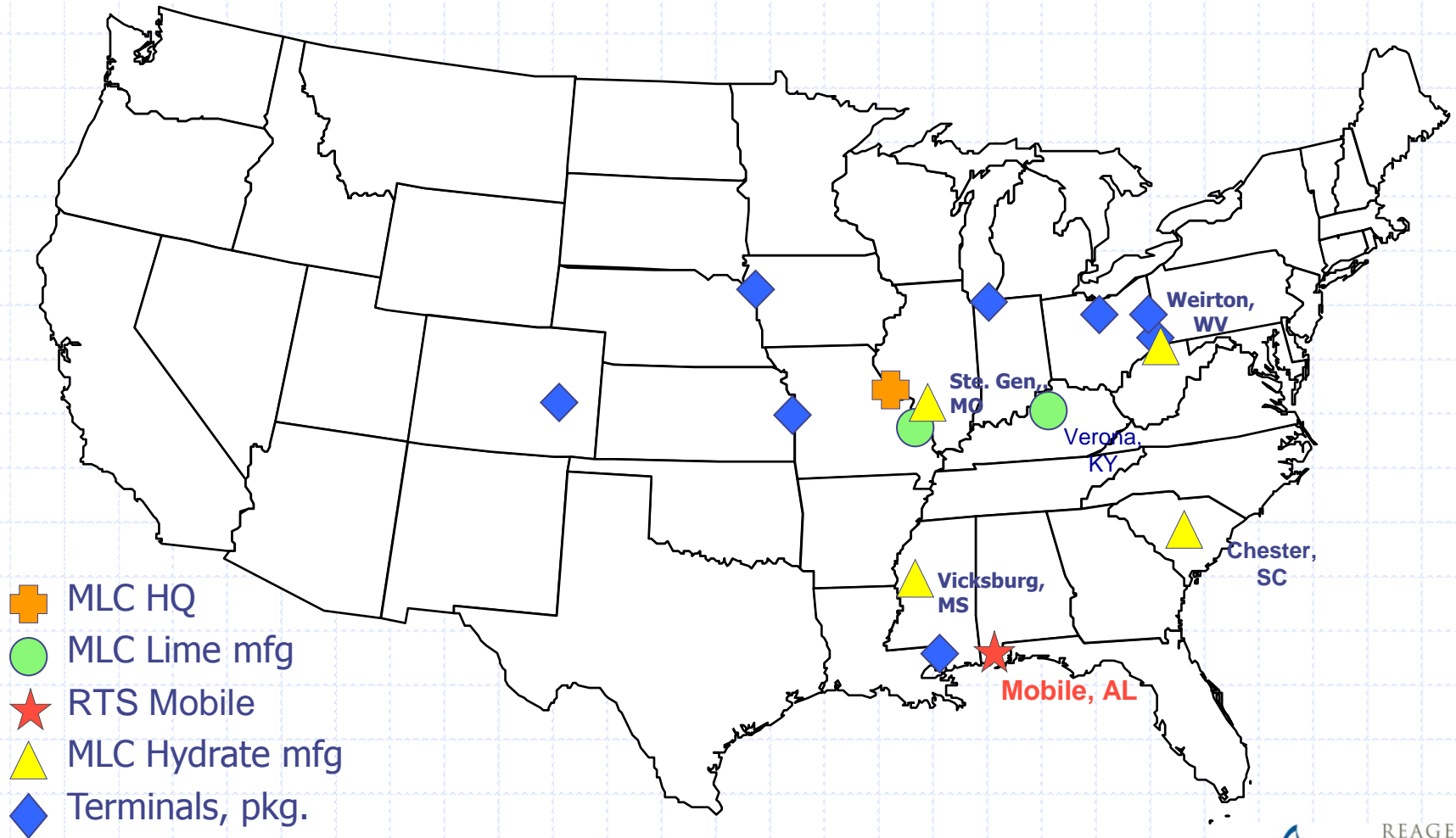
- ◆ Mississippi Lime / Reagent Technology Services
- ◆ Pulverized limestone economics
- ◆ Example
- ◆ Pulverized limestone benefits

Mississippi Lime Corporate Overview

- ◆ Private company founded in 1907
- ◆ Largest lime production facility in North America located in Ste. Genevieve, Missouri
- ◆ Integrated producer
 - ◆ Ground & precipitated calcium carbonate (CaCO_3)
 - ◆ Calcium oxide (CaO)
 - ◆ Calcium hydroxide ($\text{Ca}(\text{OH})_2$)
- ◆ Headquarters in St. Louis, Missouri
- ◆ Production facilities
 - ◆ CaO – Missouri, Kentucky
 - ◆ $\text{Ca}(\text{OH})_2$ – Missouri, West Virginia, Mississippi, South Carolina
- ◆ RTS Division

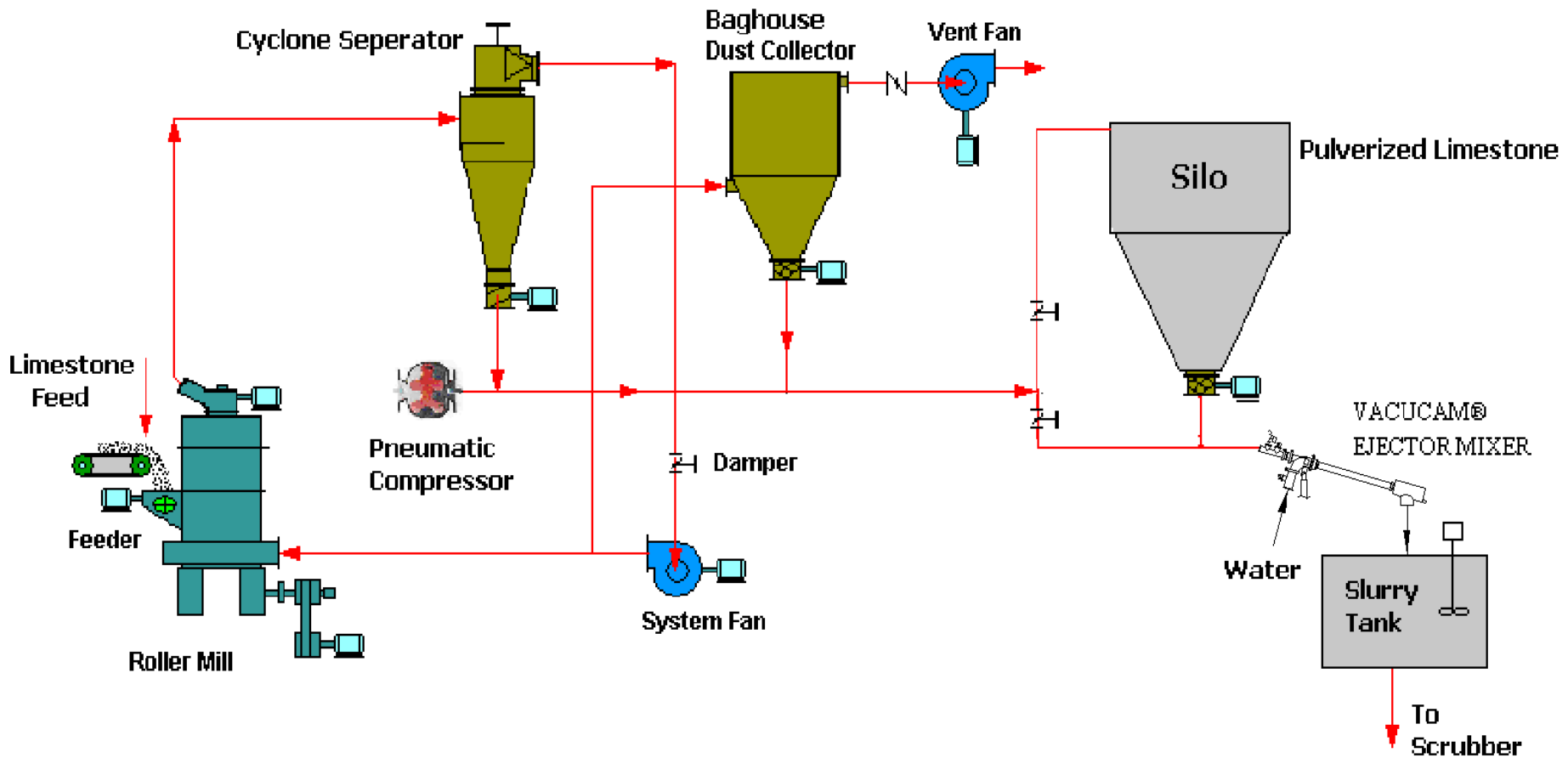


Mississippi Lime Geographic Overview



- ✚ MLC HQ
- MLC Lime mfg
- ★ RTS Mobile
- ▲ MLC Hydrate mfg
- ◆ Terminals, pkg.

Pulverized Limestone Preparation Using a Dry Mill



Capital Cost Benefit

- ◆ Sargent and Lundy 2006 Flue Gas Desulfurization Technology Report
 - Reagent preparation system includes:
 - ◆ Single belt conveyor from below grade hopper
 - ◆ 2 day silos with 2 ball mills
 - ◆ Associated slurry handling equipment
 - Reagent preparation system was approximately 10% of the total process cost of a wet limestone scrubber system
- ◆ \$500M FGD project would have \$50M in capital associated with the reagent preparation system
- ◆ This capital would be eliminated by purchasing pulverized limestone

Operating Cost Benefit

Operating Cost	Wet Ball Mill		
	Value	Units	\$/ton
Electric Energy Grinding	23.8	kwh/ton	\$0.83
Electric Energy Ancillary Equipment	4.1	kwh/ton	\$0.14
Grinding Media	22	grams/ kwh	\$0.68
Labor	6	FTE	\$3.00
Maintenance			\$0.60
Total Cost Savings			\$5.25

Assumes \$0.035/kwh electricity cost

Economic Decision

- ◆ For a 100,000 ton/year pulverized limestone requirement, the price could be \$15-20/ton higher than crushed limestone
- ◆ Key question for a utility:
 - Is it worth paying an extra \$1.5-2.0 M /year to save \$50M capital costs and ~ \$525k operating costs?

Plants Selecting Dry Pulverized Limestone

<u>Utility</u>	<u>Plant</u>	<u>Size (MW)</u>
NIPSCO	Bailly	615
NIPSCO	Schahfer	1,688
TVA	Bull Run	950
TVA	Kingston	1,600
Southern Company	Gorgas	1,221
Southern Company	Gaston	900
Southern Company	Hammond	800
Southern Company	Crist	970
Southern Company	Barry	750
Southern Company	Daniel	1,100
Southern Company	Miller	2,800
Ameren	Sioux	1,000
Ameren	Newton	1,200
Minnesota Power	Boswell	370
Total MW		15,964

- Expectation that other plants will be announced in the next 6 – 12 months
- Primary reason is that the capital reduction more than offsets the additional cost of receiving pulverized limestone
- Supply is/will be in either trucks or railcars, although barge is a viable option as well
- Some utilities plan to inject dry pulverized limestone directly into absorber vessel

A Real Life Example - Mobile



Mobile, Alabama Limestone Grinding Facility

- ◆ Strategically located to minimize delivered cost of pulverized limestone to three FGD systems
- ◆ Limestone sourced from 3rd party
- ◆ Pulverized limestone delivered by truck
- ◆ More than 100% redundancy at milling operation
- ◆ Installed capacity is greater than 500,000 tons per year
- ◆ Plant started up in 3Q 2009

Benefits of Pulverized Limestone Supply Alternative

- ◆ Major reduction in capital expenditures
 - ◆ Reduction in O&M costs
 - ◆ Reduction in parasitic power consumption – small but real equivalent baseload capacity addition
 - ◆ Equal or better reliability
 - ◆ Simplified on-site footprint and design
 - ◆ Several viable location alternatives
 - ◆ Improved reagent quality control and flexibility
 - ◆ Opportunity to eliminate need for utility's inventory
 - ◆ Capacity is custom designed to meet plant's limestone requirements
- ◆ Bottom Line: Limestone supplied at lower net cost

Reliability

- ◆ Limestone mine maintains crushed stone storage
- ◆ Milling plant maintains crushed stone storage
- ◆ Redundant milling capacity
- ◆ Redundant milled product storage capacity at milling plant and Utility
- ◆ Key spare parts inventory
- ◆ Inherent reliability of equipment and design

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