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NESHAP Challenges and Solutions

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McIlvaine Cement MACT

- Recordings on free site
 - MACT Webinar February 12
 - MACT Webinar March 12
 - MACT Webinar March 19

- By-products and Fuels

- Environment

- Solutions for HCl, Mercury, THCs, Metal HAPs

- Future Posting to Free McIlvaine UPIS Cement Website



McIlvaine Cement MACT

February 12, 2010

MACT could require \$4.7 billion investment and add \$20/ton to the cost of cement.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (02-12-10)	MACT	Regulations 规章	PCA	O'Hara, Andy	Biography	Presentation	Webinar Recording
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Process modifications and the use of a circulating fluid bed absorber could be a lower cost alternative.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (02-12-10)	MACT	HCl	CDS	Gossman Consulting	Gossman, David	Biography	Abstract	Presentation	Webinar Recording
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Injection of sodium sorbents ahead of existing particulate control will reduce HCl, SO² and SO³.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (02-12-10)	MACT	HCl	Trona	Solvay	Kong, Yougen	Biography	Abstract	Presentation	Webinar Recording
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February 12, 2010

There are many variables in the raw materials and operations which result in a wide range of mercury emissions. There are other challenges to using activated carbon.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (02-12-10)	MACT	Mercury 水银 (汞)	Activated Carbon	EERC	Laudal, Dennis	Biography	Abstract	Presentation	Webinar Recording
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Mercury can be thermally removed from the kiln dust.

Cement Manufacturing 水泥生产.8	Air Quality 空气质量	Webinar (02-12-10)	MACT	Mercury 水银 (汞)	Thermal Desorption	Environmental Quality Management (EQM)	Hawks, Ron	Biography	Abstract	Presentation	Webinar Recording
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March 12, 2010

Inject this sorbent into the existing collector at the time of highest mercury emissions. CKD would be directed to the cement finishing process. The cement friendly sorbent would not affect the concrete quality.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-12-10)	MACT	Mercury 水银 (汞)	Activated Carbon	Albermarle	Landreth, Ron	Biography	Abstract	Presentation	Webinar Recording
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Mercury analysis in coal fired power generation is not nearly as complex as in cement plants. Early tests show mixed results on mercury capture in scrubbers.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-12-10)	MACT	Mercury 水银 (汞)	Reaction Engineering	Senior, Constance	Biography	Abstract	Presentation	Webinar Recording
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One way to reduce CO² emissions is to replace limestone with slag or other calcium sources which are not carbonate compounds.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-12-10)	CO2 二氧化碳	Penta Engineering	Young, Gerald	Biography	Abstract	Presentation	Webinar Recording
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MACT Mass particulate monitors using the beta gauge principle allow accurate measurement of particulate in wet stacks.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-12-10)	MACT	CEMS	Altech	Morrell, Seth	Abstract	Presentation	Webinar Recording
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March 19, 2010

Cement companies will need an accurate and cost effective method for determining emissions to meet trading and regulatory requirements. Rockwell has software solutions which can be coordinated with process optimization for maximum value.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (3-19-10)	CO2 二氧化碳	Optimization Software	Rockwell Software	Hovan, Rich	Biography	Presentation	Webinar Recording
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The best chance for the industry is likely to be in post regulation law suits rather than revision in the rule. The fundamental approach used by EPA to use HAP regulations to achieve reductions in PM and SO² is flawed.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-19-10)	MACT	Regulations 规章	Brace and Giuliani	Alonso, Rich	Biography	Presentation	Webinar Recording
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With the use of PM as a surrogate for toxic metals, there is the need for precise measurement at very low emission rates and throughout the full campaign. The beta gauge has been proven to be accurate, cost effective and reliable in measurement through all aspects of operation.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-19-10)	MACT	PM CEMS	MSI	Clapsaddle, Craig	Abstract	Presentation	Webinar Recording
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March 19, 2010

AE&E has both SCR and scrubber installations on European cement plants. Mercury can be captured with addition of bromine. There are alternatives to thermal oxidization for THC removal.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-19-10)	MACT	APC	AE&E VonRoll	Hug, Donald	Abstract	Presentation	Webinar Recording
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Activated carbon can remove the organics as well as the mercury. A secondary baghouse is needed .

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-19-10)	MACT	Mercury 水银 (汞)	Activated Carbon	ADA-ES	Sjostrom, Sharon	Biography	Abstract	Presentation	Webinar Recording
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A strong case is made for using a multi-metal CEMS for both mercury and other toxic metals rather than dedicated mercury CEMS and PM CEMS. Cost is competitive. PM is not a reliable surrogate. Toxicity of individual metals varies by several orders of magnitude.

Cement Manufacturing 水泥生产	Air Quality 空气质量	Webinar (03-19-10)	MACT	CEMS	Multi Metal	Cooper Environmental	Cooper, John	Presentation	Webinar Recording
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By-Products and Fuels

- Can gypsum from limestone scrubber be used in cement product
- Burn more PVC and make 30% hydrochloric acid
- Why not burn hazardous waste if you are going to make a big APC investment
- Co-locate ethanol plants and use the waste biomass to fuel the kiln
- Make steam from the thermal oxidizer exhaust
- Use oxyfiring and capture CO₂
- Vary fuels to maximize ability to meet MACT

- Avoid converting an air to water problem
- Avoid converting an air to soil problem
- Consider ambient PM and ozone future limits
- NO_x control can be synergistic
- HCl and mercury could be tough to meet and even measure



HCl Capture

Technology	Classification
Wet limestone scrubber	Highest efficiency but biggest investment
Circulating dry scrubber and add on filter	Not quite as efficient, but there is no water pollution and you can capture metals
Dry injection with sodium or lime with existing device	Least expensive but also least efficient
Two stage with acid capture	Expensive, but acid by product and mercury eliminated so no worry about mercury in gypsum



Mercury Capture

Technology	Classification
Activated carbon injection with add on dust collector	Efficient but expensive and requires handling to avoid combustion
Scrubber additives	Efficient to the extent mercury is oxidized. Need to prevent re-emission. Also need wastewater treatment
Process desorption	Inexpensive but efficiency questions. Could be applicable where mercury in feed is low
Carbon bed	Most efficient and will remove THCs but expensive and poses maintenance/combustion problems
SCR plus scrubber	Oxidize in SCR and then capture in scrubber. But logical only if you need high NOx removal as well
Circulating dry scrubber	Could utilize ACI as well as lime to capture Hg and HCl but at what efficiency



THCs and Organic HAPs

Technology	Classification
Regenerative thermal oxidizer	Expensive but efficient and does recover heat
Catalytic or straight thermal	Less expensive but does not recover heat
Two stage catalytic	SCR plus organics in one vessel similar to European waste incinerators. Solution only if NO _x reduction also needed
Activated carbon injection	Could be low cost solution to capture THC along with mercury with just one ACI injection point
Carbon bed	Very efficient but expensive. However it would remove other contaminants as well



Metal HAPS

Technology	Classification
Membrane bags for existing collector	Will improve efficiency but metals will keep vaporizing from CKD
Secondary baghouse	Efficient and can capture mercury and THC
High energy scrubber	May not be efficient enough at reasonable energy expenditure but would capture HCl and SO ₂ as well
Wet precipitator	Very efficient but costly. Could be installed in top of limestone scrubber. Will also capture condensibles

Cement Manufacturing Process

Gas Treatment (Options)

