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11th Annual

NO_x-Combustion Round Table

**NO_x Emissions, Combustion, Biomass,
CO₂, SO₃, Mercury**

Show Guide
2012

SCR Catalyst Manufacturer



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Plate & Honeycomb Catalysts

Catalyst Management & Services

Applications

- Lignite, PRB, Bituminous
- Biomass
- Waste to Energy
- High & Low Dust, Tail End



Performance

- High NO_x Reduction
- Long Catalyst Life
- Low SO₂ Conversion
- Robust Construction

Services

- Catalyst Management
- Testing & Inspection
- Field Support
- Spent Catalyst Disposal



Visit Us
at Booth
#37

Johnson Matthey Catalysts LLC

1121 Alderman Drive, Suite 204
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678-341-7520

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2012 NO_x-Combustion PCUG Conference



The 11th Annual NO_x-Combustion/PCUG Conference is presented by Reinhold Environmental (www.reinholdenvironmental.com)

Hosted by American Electric Power

Special thanks to the Conference Sponsors and Utility Host



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2012 NOx-Combustion Round Table

February 13, 2012 - Monday - NOx-Combustion Round Table

Registration - Continental Breakfast & Breaks in expo from 7:00 to 5:30 (Hayes Grand Ballroom)

O&M Training Classes 8:30-11:45

8:00-9:30	Training Class 1 (Hayes Grand Ballroom D-E) Update on MATS & CSAPR by Brian Higgins, Nalco Mobotec	Training Class 2 (Meeting Room 20) Regeneration vs New Catalyst by Mike Mattes, CoalLogix and Nancy Stephenson, Cormetech	Training Class 3 (Meeting Room 21) Dry Sorbent Injection, SO ₃ Formation Throughout the Process by Doug Ritzenhaler, AEP	Training Class 4 (Meeting Room 22) NOx Burner Tuning - T fired by Jim Jordan, Alstom Power
9:30-10:15	Training Class 5 (Hayes Grand Ballroom D-E)	Training Class 6 (Meeting Room 20) Catalyst Management by Kyle Neidig, Hitachi	Training Class 7 (Meeting Room 21) How Does the Choice of Fuel Effect Emission AND Boiler Performance--A Tutorial by Tony Wideman, DTE	Training Class 8 (Meeting Room 22) NOx Burner Tuning - Riley by Steve Black, Babcock Power
10:15-11:45	Misconceptions of Catalyst Performance by Ken Jeffers, Johnson Matthey Catalysts			
11:45-1:00		Lunch in Exhibition Hall (Hayes Grand Ballroom)		
1:00 - 2:30	Welcome/Presentation of Round Table Award by Susan Reinhold..... Keynote Speech by Mark McCullough EVP - Generation at AEP			
2:45-3:45	Panel I (Hayes Grand Ballroom D-E) Challenges of Designing and Operating PRB-Fired SCR Units Chairman: Ken Jeffers, Johnson Matthey Catalysts / Panelists: Bill Medeiros, Babcock Power; Jim Chaney, Ameren, Ed Healy, Southern Company; Betty Hansen, B&W; Jeremy Freeman, Cormetech; Tony Favale, Hitachi	Panel II (Meeting Room 30) Mercury Panel Chairman: Brandon Looney, Southern Company and Su Liu, SRI / Panelists: Connie Senior, ADA-ES, Mike Rini, Alstom; Peter Jin, Hitachi; Steve Niksa, Niksa Energy Associates		
3:45-4:30	Panel III (Hayes Grand Ballroom D-E)	Break in Exhibition Hall (Hayes Grand Ballroom)		
4:30-5:30	Catalyst Strategy in Regard to SO₃ Formation Panel Chairman: Mark Thomas, Mark Thomas & Associates Consulting, LLC / Panelists: Kyle Neidig, Hitachi, Mike O'Connor, Duke Energy; Chao Lin, AEP; Cindy Khalaf, Johnson Matthey Catalysts	Workshop 1 (Meeting Room 21) Risk Management Plans - Guidance Update by Mike Boozer, ChemReport	Workshop 2 (Meeting Room 22) SNCR/SCR & the Benefits of Combustion Optimization by Roger Glickert, Steag Energy	
5:30-6:30	Reception in Exhibition Hall			

February 14, 2012 - Tuesday - NOx-Combustion Round Table

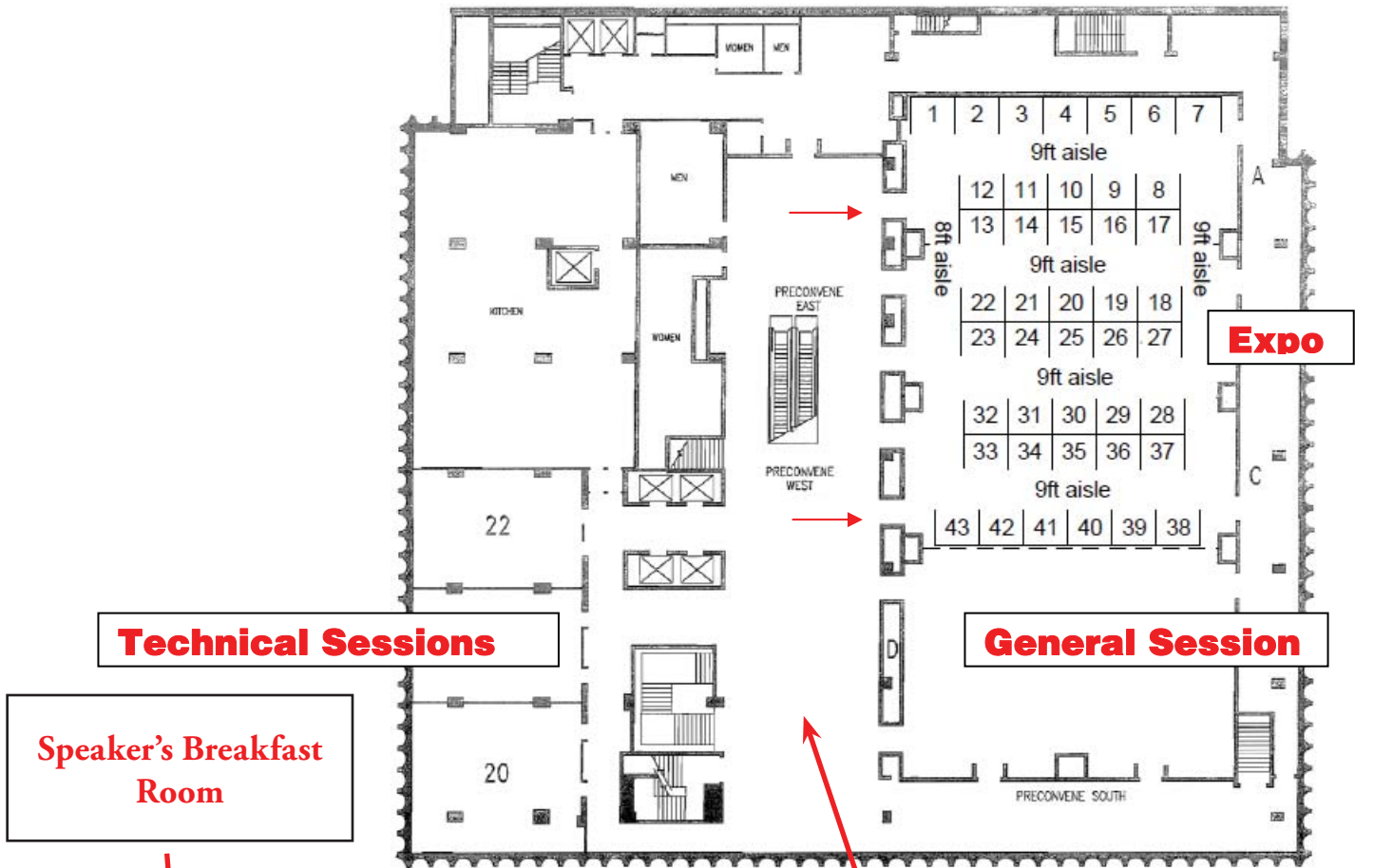
Registration & Continental Breakfast (Hayes Grand Ballroom)

7:00 - 8:30	Workshop 3 (Hayes Grand Ballroom D-E)	Workshop 4 (Meeting Room 20)	Workshop 5 (Meeting Room 21)	Workshop 6 (Meeting Room 22)
8:30 - 9:30	Lab Testing in Support of SCR Catalyst Management by Scott Hinton, WS Hinton Assoc	SCR Catalyst Deactivation Mechanism for PRB-Firing Coal Utility Boilers by Chris Bertole and Jeremy Freeman, Cormetech	SO₃ Mitigation in Front of SCR by Steven Wells, URS	Mercury Control in the Boiler by Connie Senior, ADA-ES
9:30 - 10:30	Workshop 7 (Hayes Grand Ballroom D-E)	Workshop 8 (Meeting Room 20)	Workshop 9 (Meeting Room 21)	Workshop 10 (Meeting Room 22)
10:30 - 11:30	The Thrills & Chills of SCR Field Testing A SCR Catalyst Supplier's Perspective by David Repp, Johnson Matthey Catalysts	Duck Creek - Fixing the SCR Reactor by Jim Chaney, Ameren and Mark Ehrnschwender, Steag Energy	SCR's and Air Heater Plugging Causes, Prevention, and Cures for ABS Problems by John Guffre, Paragon Air Heater Tech.	NOx Control in Reduced Load Environment by Richard Thompson, FERCO
11:30 - 1:00	Workshop 11 (Hayes Grand Ballroom D-E)	Workshop 12 (Meeting Room 20)	Workshop 13 (Meeting Room 21)	Workshop 14 (Meeting Room 22)
1:00-2:00	SCR Co-Benefits by Ed Healy, Southern Company Tony Favale, Hitachi	SCR Gas Flow Modeling by Bill Gretta, ENERActive Solutions Rob Mudry, Airflow Sciences	DSI for HCl by Michael Thiel, Nol-Tec	Impact of SCR Technology on Fuel Flexibility by David Capozzella, Fuel Tech
2:15-3:15	Workshop 15 (Hayes Grand Ballroom D-E)	Workshop 16 (Meeting Room 20)	Workshop 17 (Meeting Room 21)	Workshop 18 (Meeting Room 22)
3:15-4:15	Squeezing the SCR Turnip by Darren Hanby, AEP	Maximizing Your SCR System's Fuel and Dispatch Flexibility by Greg Holscher, Ceram	HCL Measurement and Mitigation by Chetan Chotani, Green Energy	NO Oxidation and Capture with Wet/Dry Scrubber by Bob Crynack, FMC and Sterling Gray, URS
4:15 - 5:15	Workshop 19 (Hayes Grand Ballroom D-E)	Workshop 20 (Meeting Room 20)	Workshop 21 (Meeting Room 21)	Workshop 22 (Meeting Room 22)
6:00 - 10:00	Do's and Don'ts of Catalyst Handling / Operation by Hans Hartenstein, Steag Energy Services	Living Through Regulatory Purgatory by Noel Rosha, Ceram	Improving SCR/SNCR Performance with the Latest Continuous Monitoring Techniques by Ken Greaves, Cemtek	Regeneration for Biomass Unit Catalyst by Ron Barnett, Steag Energy

Conference Eventfree to all attendees and their families
Columbus Blue Jacket Game.....buses leave at 6:00; Dinner at 6:30 at Nationwide Arena (AAA Sky Terrace)

Conference Floor Plan

Renaissance Columbus Downtown Hotel Hayes Grand Ballroom, Meeting Rooms 20-22 & 30

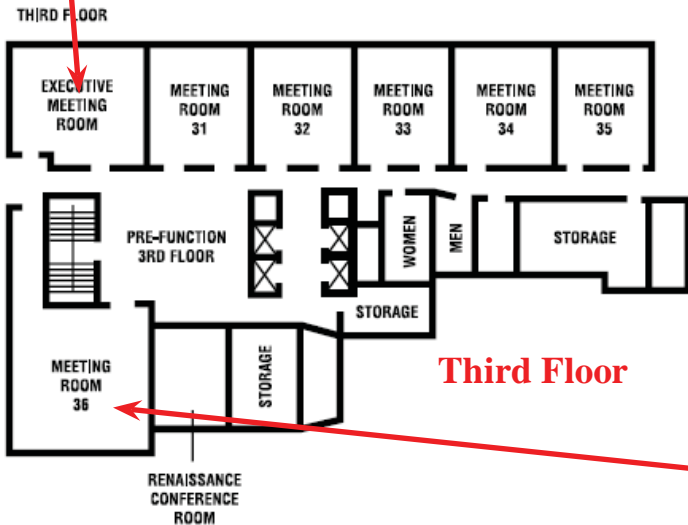


Technical Sessions

General Session

Speaker's Breakfast Room

Registration Desk
 Sunday: noon to 5:00 pm
 Monday: 7:00 am to 5:30 pm
 Tuesday: 7:00 am to 5:30 pm



Third Floor

Panel II: Mercury Room 30



Topsøe DeNO_x catalysts

– number one in biomass SCRs

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Designed for durability

Topsøe's unique DNX[®] catalyst

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- shaped to avoid plugging
- high activity, also at low temperature

Proven performance on biomass

- high-dust co-combustion
- high-dust 100% biomass
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Topsøe has supplied more than 1,000 catalyst installations for air pollution control

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Workshops and Panels

Monday: February 13, 2012

8:00 to 9:30 am

Training Class 1: “Update on MATS & CSAPR” by *Brian Higgins, Nalco Mobotec* (Hayes Grand Ballroom)

This Training Class will review the details, schedule, and changes from previous rules for the final CSAPR and MATS (UMACT) rules. Brian will also discuss compliance strategies, considering both rules together.

Training Class 2: “Regeneration vs New Catalyst” by *Mike Mattes, CoaLogix; Nancy Stephenson, Cormetech* (Room 20)

When the SCR management action involves a catalyst investment, we contemplate: New or Regenerated? How to decide? Managing SCRs for compliance and operational reliability is an increasingly challenging pursuit. We will explore how these catalyst alternatives may be better combined into an integrated, responsible approach to maintaining SCRs.

Training Class 3: “Dry Sorbent Injection, SO₃ Formation Throughout the Process” by *Doug Ritzenthaler, AEP* (Room 21)

This Training Class will discuss the methodology of testing the effectiveness of sorbents at power plants. Topics to be discussed include the critical parameters for a successful test: hose vs. pipe, pre-milled vs. in-line mill, etc. Additional topics of discussion include the role of CFD flow modeling, ESP conditioning, and assessing anomalies in test data. Finally, a review of the economics of the options will be discussed.

Training Class 4: “NO_x Burner Tuning – T-fired” by *Jim Jordan, Alstom Power* (Room 22)

This Training Class will cover the design and evolution of low NO_x tangential firing system. The presentation will include a discussion on experiences with combustion tuning of low NO_x T-fired units.

10:15 to 11:45 am

Training Class 5: “Misconceptions of Catalyst Performance” by *Ken Jeffers, Johnson Matthey Catalysts* (Hayes Grand Ballroom)

The concepts of theoretical required catalyst potential for NO_x reduction and installed catalyst potential will be compared. Development and proper use of catalyst performance correction curves will be discussed. The session will also include a demonstration of how catalyst lifetime projections are made for catalyst change-outs.

Training Class 6: “Catalyst Management” by *Kyle Neidig, Hitachi* (Room 20)

This Training Class will focus primarily on SCR Catalyst Management as well as other general information regarding SCR technology. Topics discussed in this training session will include setting and prioritizing catalyst management goals, general catalyst management equations, SCR inspections, catalyst pluggage, fuels impact on catalyst deactivation, catalyst sample testing and interpretation of the results, spent catalyst disposition, and more.

Training Class 7: “How Does the Choice of Fuel Effect Emission AND Boiler Performance” by *Tony Widenman, DTE* (Room 21)

The EPA is trying to regulate coal out of business, delivered coal prices keep escalating, the coal you need is sold out, NSR and CSAPR keep knocking at your door. Regardless, you still have to generate megawatts or shutdown. This tutorial is not going to solve any of the above realities, but it will attempt to show you how to improve your boiler performance and reduce emissions. Doing so may extend run-time by reducing forced outages and delaying the time before hitting the dreaded emissions tonnage limits. All of this can be accomplished by understanding the characteristics of your coal.

Training Class 8: “NO_x Burner Tuning – Riley” by *Steve Black, Babcock Power* (Room 22)

This Training Class will focus on how to maintain low emissions at the boiler outlet of wall fired boilers. Topics to be presented include key parameters affecting low NO_x combustion and the affects of mill, burner and boiler systems on emissions. The class will finish with a discussion of how to re-tune low NO_x burners.

Workshops and Panels

Monday: February 13, 2012

LUNCH in Exhibition Hall (11:45 to 1:00 pm)

1:00 to 2:30 pm

Welcome: “Presentation of Round Table Lifetime Achievement Awards” by *Susan Reinhold, Reinhold Environmental* (Hayes Grand Ballroom) The Round Table Awards will be given to Rick Collins, TVA and Rob Mudry, Airflow Sciences

Keynote Speech: “The Economic Solution to Environmental Challenges” by *Mark McCullough, AEP* (Hayes Grand Ballroom) Mark McCullough will discuss the sizeable challenge of meeting the numerous environmental rules facing the coal fleet across the country. How can compliance and cost issues be managed effectively as rules emerge, change, and are challenged in the courts?

2:45 to 3:45 pm

Panel I: “Challenges of Designing and Operating PRB-Fired SCR Units” *Chairman: Ken Jeffers, Johnson Matthey Catalysts / Panelists: Bill Medeiros, Babcock Power; Jim Chaney, Ameren; Ed Healy, Southern Company; Betty Hansen, Babcock & Wilcox; Nancy Stephenson, Cormetech; Tony Favale, Hitachi* (Hayes Grand Ballroom)

The first SCR system installed on a 100% PRB-fired unit began operation in February 2000, and to-date, there are over 50 such units in the US to include SCR. The nature of PRB fuel and fly ash have led to a number of operational challenges for high-dust SCRs including heavy catalyst plugging, fast catalyst deactivation, and reduced catalyst lifetime. This panel will discuss operating history, design considerations, and applying lessons learned for PRB-fired SCR units.

Panel II: “Mercury” *Chairman: Brandon Looney, Southern Company and Su Liu, SRI / Panelists: Connie Senior, ADA-ES; Mike Rini, Alstom Power; Peter Jin, Hitachi; Steve Niksa, Niksa Energy Associates* (Room 30)

This panel will focus on the impact combustion and SCR operation have on mercury control. Technology experts will discuss the role halogens addition and catalyst activity have on mercury control strategies aimed at meeting the Mercury and Air Toxics Standards.

4:30 to 5:30 pm

Panel III: “Catalyst Strategy in Regard to SO₃ Formation” *Chairman: Mark Thomas, Mark Thomas & Associates Consulting, LLC / Panelists: Kyle Neidig, Hitachi; Mike O’Connor, Duke Energy; Chao Lin, AEP; Cindy Khalaf, Johnson Matthey Catalysts* (Hayes Grand Ballroom)

Utilities and SCR designers must balance NO_x removal, catalyst life, and other factors with a catalyst’s inherent SO₃ formation capacity. This panel which includes audience input will explore catalyst management strategies from a SO₃ formation perspective. Utilities considering coals with higher sulfur levels will find this panel informative.

Workshop 1: “Risk Management Plans – Guidance Update” by *Mike Boozer, ChemReport* (Room 21)

Key elements of developing and maintaining a Risk Management Plan will be provided along with updated information on how these plans should be prepared and reported to EPA. The content will focus on ammonia use for SCR systems and combustion turbines. However, the information presented is applicable to all power generation facilities that utilize an RMP listed chemical above EPA’s threshold amounts.

Workshop 2: “SNCR/SCR & the Benefits of Combustion Optimization” by *Roger Glickert, Steag Energy* (Room 22)

SNCR’s and SCR’s are in wide spread use, however, the variety of operational and emission tests that can be used to optimize these two systems at different boiler load conditions and with various combinations of coal pulverizers in-service has changed over the years. With the current uncertainty in the legislation and the on-line mandates, there is increased interest in low cost short term NO_x reduction alternatives and increased removal concepts. This workshop will provide an insight in past and present techniques on how to get the most out of each system and combustion cycles.

****** RECEPTION in Exhibition Hall (5:30 to 6:30 pm) ******

Workshops and Panels

Tuesday: February 14, 2012

8:30 to 9:30 am

Workshop 3: “Lab Testing in Support of SCR Catalyst Management” by *Scott Hinton, WS Hinton Associates* (Hayes Grand Ballroom)

Various technical aspects and issues related to the laboratory testing of SCR catalyst samples for management purposes will be discussed. Included will be recommendations on test conditions, data interpretation, appropriate sampling procedures and frequency, and various pitfalls associated with data evaluation and catalyst management.

Workshop 4: “SCR Catalyst Deactivation Mechanism for PRB-Firing Coal Utility Boilers” by *Chris Bertole and Jeremy Freeman, Cormetech* (Room 20)

SCR catalyst installed on boilers firing Powder River Basin (PRB) coal typically experiences deactivation from calcium, phosphorus, and alkali compounds, the rate for which can vary for different units. We will discuss SCR catalyst design for PRB applications. From a mechanistic perspective, we will also present data from our field studies investigating the deactivation behavior of the SCR catalyst. These studies have provided an improved understanding of the nature of the deactivating calcium and phosphorus fly ash constituents entering the SCR and the impact that boiler combustion staging has on their deactivating potential.

Workshop 5: “SO₃ Mitigation in Front of SCR” by *Steven Wells, URS* (Room 21)

This workshop will present an overview of the available SO₃ mitigation technologies. We will discuss the advantages, disadvantages, and challenges associated with pre-SCR SO₃ mitigation. We will also present recent full-scale test data at two operating power plants demonstrating SO₃ removal; and will discuss the plants' experience in successfully reducing the SCR minimum operating temperature and improving SCR operational flexibility through SO₃ mitigation.

Workshop 6: “Mercury Control in the Boiler” by *Connie Senior, ADA-ES* (Room 22)

There's more than activated carbon, when it comes to mercury control in coal-fired boilers. The chemistry of mercury in the boiler and the interaction of mercury with other control processes, like SCRs, affect the performance of downstream mercury control from activated carbon injection or scrubbers. In this workshop, mercury control in the boiler will be discussed, including halogen injection, control of unburned carbon, and the impact of SCRs.

10:30 to 11:30 am

Workshop 7: “The Thrills & Chills of SCR Field Testing – A SCR Catalyst Supplier's Perspective” by *David Repp, Johnson Matthey Catalysts* (Hayes Grand Ballroom)

This workshop is an investigation into SCR field performance testing. Topics include general field testing guarantees, troubleshooting non-conforming SCR reactors, measurement techniques, and lessons learned. Specific examples from recent field performance testing experience will be highlighted.

Workshop 8: “Duck Creek – Fixing the SCR Reactor” by *Jim Chaney, Ameren; Mark Ehrnschwender, Steag Energy* (Room 20)

The subject of this workshop is what can happen when one elects to increase the generation from a unit while ignoring the effects on the SCR. Even though the unit generation was increased on the order of 30 percent, no modifications were made to the SCR system. The reality of the increased generation resulted in significant catalyst damage and pluggage of 4.5 layers in less than 2 years. We will address the approach to correct the SCR performance and restore catalyst life.

Workshop 9: “SCR's and Air Heater Plugging Causes, Prevention and Cures for ABS Problems” by *John Guffre, Paragon Air Heater* (Room 21)

This workshop will focus on the most recent developments in combating air heater plugging and corrosion caused by ABS formation from SCR/SNCR operation. The discussion will include causes, prevention, and mitigation of ABS deposits as well some approaches to on-line cleaning to prevent un-desirable outages for water washing air heaters.

Workshops and Panels

Tuesday: February 14, 2012

10:30 to 11:30 am cont.

Workshop 10: “NO_x Control in a Reduced Load Environment” by *Richard Thompson, FERCo* (Room 22)

The current economy in combination with seasonal weather factors has caused some utility boilers to operate at reduced loads for much longer time periods than used in their annual NO_x emissions forecasts. Operation at low loads and high excess air levels causes some tangentially-fired units to produce NO_x emissions up to three times their normal full load emission rate. This workshop describes how the judicious application of combustion tuning and operational modifications has resulted in modified low- and mid-load boiler firing practices with NO_x emissions reductions of 20 to as much as 40 percent, but with only modest thermal performance impacts.

LUNCH in Exhibition Hall (11:30 to 1:00 pm)

1:00 to 2:00 pm

Workshop 11: “SCR Co-Benefits” by *Ed Healy, Southern Company; Tony Favale, Hitachi* (Hayes Grand Ballroom)

Complying with various state (and expected federal) requirements governing mercury removal from the stack gas of coal-fired power plants has usually been achieved by adding an expensive activated carbon injection system. Now there is another alternative: a catalyst that features higher mercury oxidation activity than conventional catalyst while maintaining the same SO₂ to SO₃ conversion activity – and all at a lower operating cost.

Workshop 12: “SCR Gas Flow Modeling” by *Bill Gretta, ENERActive Solutions; Rob Mudry, Airflow Sciences* (Room 20)

This workshop will provide guidelines and examples on how to best specify and perform gas flow model studies of SCR systems using computational fluid dynamics (CFD) and physical models. Advantages and disadvantages of each method will be discussed, with emphasis on flow, NH₃/NO_x, temperature and ash deposition/distribution.

Workshop 13: “DSI for HCl” by *Michael Thiel, Nol-Tec* (Room 21)

Is Dry Sorbent Injection technology suitable to provide adequate HCl mitigation to suffice the proposed EGU-MACT limit? When should DSI technology be applied? What type of units should use DSI technology? This workshop will address these questions in conjunction with new test data.

Workshop 14: “Impact of SCR Technology on Fuel Flexibility” by *David Capozella, Fuel Tech* (Room 22)

Fuel flexibility is one of the most important economic factors in today’s electricity generating market. SCR technology can limit this flexibility due to constituents of the fuel that can harm the SCR and/or downstream boiler equipment. This workshop will discuss the fuel impact and how fuel flexibility can be re-gained or even extended. This workshop will also address the technology and the design tools to implement it.

2:15 to 3:15 pm

Workshop 15: “Squeezing the SCR Turnip” by *Darren Hanby, AEP* (Hayes Grand Ballroom)

This workshop will present several proven and potential methods to get just a little more removal from your SCR.

Workshop 16: “Maximizing Your SCR System’s Fuel and Dispatch Flexibility” by *Greg Holscher, Ceram* (Room 20)

It is assured that SCR equipped plants will face an increased need for accommodating fuel switches and cycling. The purpose of this presentation will be to illustrate the catalyst design process and features necessary to assure the Owner sufficient reactor potential for the design coal as well as flexibility for various different coals, biomass, petcoke, or other fuels. Various catalyst chemical and mechanical design features necessary to assure flexibility will be discussed. Additionally, various fuel deactivation trends will be presented and correlated.

Workshop 17: “HCl Measurement and Mitigation” by *Chetan Chotani, Breen Energy* (Room 21)

This workshop will discuss a real-time HCl measurement device that is based on the Infrared Absorbance Spectroscopy principle and its application for continuous online HCl measurement. Data will also be presented from a project where HCl measurements were conducted during Lime injection for HCl mitigation.

Workshops and Panels

Tuesday: February 14, 2012

2:15 to 3:15 pm cont.

Workshop 18: “NO Oxidation and Capture with Wet/Dry Scrubber” by Bob Crynack, FMC; Sterling Gray, URS (Room 22)
Conventional NO_x reduction technologies, including SCRs and SNCRs, reduce NO_x to harmless N₂ which is released into the atmosphere. There are, however, several technologies that use a different approach to NO_x reduction. By oxidation of the NO_x, which is not water soluble, to forms that are water soluble, the N species can be captured in downstream wet and dry scrubbers. These technologies offer substantially lower capital cost solutions for NO_x reduction and higher reduction rates than SNCR. This workshop discusses one of the oxidation technologies available today, PerNO_xide, and presents technology and cost comparisons.

4:15 to 5:15 pm

Workshop 19: “Do’s and Don’ts of Catalyst Handling/Operation” by Hans Hartenstein, Steag Energy Services (Hayes Grand Ballroom)

Catalysts are subjected to a harsh environment, however; there are many ways to extend the lifespan of a catalyst. Two distinctly different aspects can play an important role in the maximization of catalyst’s mechanical integrity which can translate into extended lifecycles: Operational issues and Handling/Storage issues. This workshop will address the actual effects on the catalyst material relating to catalyst storage (after the catalyst is spent), handling / transportation of catalyst (reactor to storage/regeneration and then back into the reactor), pluggage, erosion and corrosion problems, etc.

Workshop 20: “Living Through Regulatory Pergatory” by Noel Rosha, Ceram (Room 20)

The objective of this workshop is to discuss the history of the four OPG Nanticoke and Lambton SCR systems. Since 2005 these units have been managed considering a government imposed shutdown. This has presented numerous challenges, as the stations balanced SCR performance with reduced capital and O&M expenditures. The SCR reactors at these units include both plate and honeycomb catalyst from three different suppliers. Current plans also include converting these SCR equipped plants to natural gas operation, presenting a whole new set of challenges.

Workshop 21: “Improving SCR/SNCR Performance with the Latest Continuous Monitoring Techniques” by Ken Greaves and Tim Kuiken, CEMTEK Environmental (Room 21)

The increased usage of SCR/SNCR systems for NO_x control and the need to optimize combustion are increasingly important due to both economic and regulatory requirements in today’s power plant environment. This workshop will explore optimizing combustion and improving control processes with the use of close-coupled NO_x & CO monitoring for fast response time and tunable diode laser monitoring technology for NH₃ and HCl analysis.

Workshop 22: “Regeneration for Biomass Unit Catalyst” by Ron Barnett, Steag Energy (Room 22)

The importance of renewable energy has grown over the last years significantly; in addition, the utilization of biomass fuel has steadily increased. Current legislation is requiring SCR’s on the biomass units. To be able to remove deactivated non-standard sized/oversized catalyst modules from a biomass fueled facility that operates an RSCR (regenerative selective catalytic reduction) system, at low gas temperatures with high NO_x (Nitrogen Oxide) removal efficiency. The first biomass catalyst regeneration and recalcination took place in 2011 with a patented regeneration process. The results from the regeneration provided an enhancement in the NO_x removal performance of the biomass unit, from the original catalyst chemical properties. This workshop will provide insights in the logistical challenges as well as the need for a state-of-the-art regeneration process and facility to overcome the obstacles associated with RSCR catalyst.

6:00 to 10:00 pm

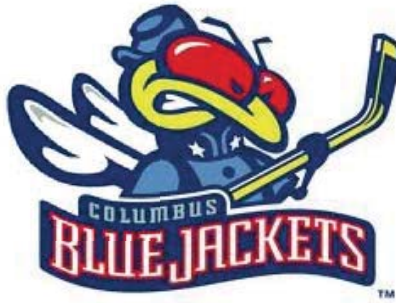
Conference Event at the Columbus Blue Jacket Game

Free to all attendees and their families

Buses leave for the Nationwide Arena at 6:00pm from the Renaissance Hotel



Seats in
AAA Sky Terrace Box



Come watch...
Columbus
Blue Jackets



All
NO_x-Combustion/PCUG
attendees and families
are invited for dinner and
the game.

Transportation is included.



Conference Event on 2/14/12

Nalco Mobotec Ensures Power Producers Reach Their Tightening Air Emission Targets



Combustion Optimization

- ◆ ROFA® induces turbulence and rotation to reduce NO_x, CO, and PM emissions
- ◆ Rotamix® Advanced SNCR for NO_x
- ◆ Boiler tuning services to ensure combustion efficiency
- ◆ Enable biomass co-firing or conversion

Fireside Chemical Addition

- ◆ Allows burning of a wider variety of coals reducing dispatch costs
- ◆ Address slag, fouling and corrosion challenges

Mercury Emissions Control

- ◆ Increase mercury oxidation
- ◆ Reduce mercury re-emissions
- ◆ Control mercury concentrations in wastewater discharge

Duct Sorbent Injection (DSI)

- ◆ Mitigation of acid gases including HCl, SO₂, and SO₃
- ◆ Computerized Modeling to optimize sorbent usage

CASE STUDY:

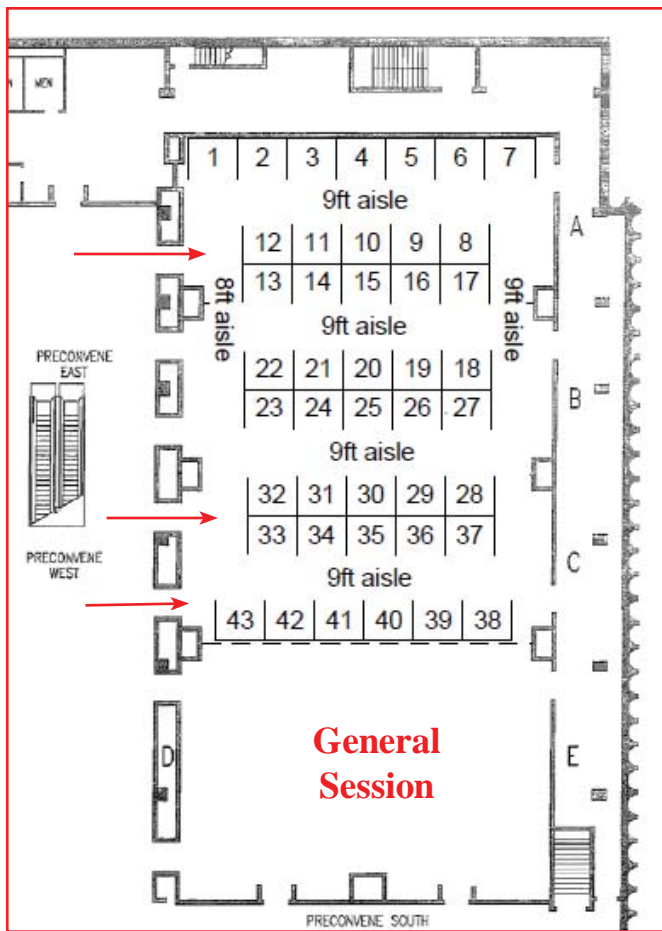
With the implementation of Nalco Mobotec technology, a 380 MW power plant became the lowest NO_x producing tangential-fired pulverized coal unit in Poland.

ROFA and Rotamix technologies reduced NO_x emissions 59%, equating to 2.6 million tons of emissions per year. Plant production levels were maintained while achieving the most stringent NO_x limits required by the European Union.

Attend Training Class 1 "Update on MATS & CSAPR" led by Nalco Mobotec's Dr. Brian Higgins – Monday 8:00- 9:30 in the Grand Ballroom D-E.

www.nalcomobotec.com

2012 NO_x-Combustion Exhibitors



Exhibition Hall
in
Hayes Grand Ballroom

All food is in the Expo

Hours
Monday: 7:00 to 6:30
Tuesday: 7:00 to 5:15

Treasure Hunt Visa Cards
picked in Expo on Tuesday at 3:30

CoaLogix.....	1 & 2
Cemtek.....	3
Mississippi Lime.....	4
Control Analytics.....	5
Southern Research Institute.....	6
Alstom Power.....	7
Enertech.....	8
ENERACTIVE Solutions.....	9
FoxEquipment.....	10
Air Monitor Power.....	11
RE Consulting.....	12
M&C Tech Group.....	13
Nol-Tec Systems.....	14
Ceram.....	15
ChemReport.....	16
Fuel Tech.....	17
Babcock Power.....	18
Cormetech.....	19
Sealze.....	20
Krishnan & Associates.....	21

TheBabcock&WilcoxCompany.....	22
FERCo.....	23
NoNOx Components (Integrated Global Services).....	24 & 25
GE Energy.....	26
Greenbank.....	27
URS.....	28
FMC Corp.....	29
Kirk Key Interlocks.....	30
Airtek.....	31
Haldor Topsoe.....	32
Kiewit/TIC.....	33
Wahlco.....	34
Acoustic Cleaning Systems.....	35
Nalco Mobotec.....	36
Johnson Matthey Catalysts.....	37
Breen Energy.....	38
Adaptive Resources.....	39
Hitachi Power Systems / America.....	40
Steag Energy Services.....	41 & 42
Airflow Sciences.....	43

2012 NO_x-Combustion Exhibitors

Acoustic Cleaning Systems, Inc.....35

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Acoustic Cleaning Systems, Inc. is a manufacturer of sonic horns / acoustic cleaners for variety of utility and industrial applications. Applications include boilers, ESP's, baghouses, SCR reactors, and ductwork and material handling applications. ACS also specializes in repair and replacement parts for all major brands of sonic horns.

Adaptive Resources.....39

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Adaptive Resources is a leading provider of Automation and Control Systems to the Power Industry. We are certified systems integrators for Rockwell Automation / Allen-Bradley PLCs and PlantPAX System and Wonderware HMI system. We have experience with PI Data Historian, Siemens and other industry leading automation systems. We specialize in providing automation systems to OEM suppliers such as Sorbent Injection Systems, Sootblowers and others.

Airflow Sciences Corporation.....43

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Since 1988, AirTek has been a leading provider of services to air pollution control equipment users. These services include field service engineering, consulting services, construction management, maintenance, outage and repair services, new construction, major rebuilds, and the supply of spare parts. We are an experienced provider of catalyst change out, catalyst cleaning, and general maintenance services to users of NO_x removal systems having completed projects totaling approximately 5000 MW to date. Let us put our experience to work for YOU!

Alstom Power.....7

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Alstom Power manufactures, erects, commissions and services pollution control systems for utility, IPP and process industry plants. This includes SCR systems for NO_x control, FGD systems, ESPs, fabric filter systems and monitoring, and mercury control. Alstom's capabilities comprise new equipment, retrofit projects, replacement and upgrade components, inventory and rebuild programs, performance enhancement, technical and field service support, construction and commissioning.

Air Monitor Power.....11

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Air Monitor Power provides coal mass flow and airflow measurement solutions for combustion optimization and boiler diagnostics. Air Monitor Power offers high accuracy systems and field testing services for all PA, SA, OFA, individual burner air and individual coal pipe mass flows. Our proven solutions for all coal-fired boiler types help improve overall plant performance while reducing NO_x and CO emissions.

Babcock Power.....18

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Through its various subsidiaries, Babcock Power, Inc. is a leading worldwide supplier of technology, equipment, and aftermarket services for heat exchangers, HRSGs, steam generators, and environmental products for the power generation, industrial, biomass, solar, petrochemical, refining and waste-to-energy markets.

The Babcock & Wilcox Company.....22

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B&W is an international leader in the design, manufacture, service and construction of steam generating and environmental equipment. Technologies include SCR systems, low NO_x burners, FGD systems, fabric filters, electrostatic precipitators, and mercury control and carbon capture solutions. B&W also provides environmental equipment upgrades, replacement parts, and emissions monitoring systems and service.

Breen Energy Solutions.....38

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Breen Energy Solutions (BES) provides products & services associated with Sorbent Systems for Acid Gas Management. Our technology-independent approach allows us to demonstrate and optimize plant-unique solutions for control of acid gas emissions, air heater fouling and tube slagging. Products/services include: wet/dry sorbent demonstrations (SO₂, SO₃, HCl & FLGR), Instruments (SO₃, HCl, Sorbent flow) and SO₃ SCR Tuning and control. Our sorbent demonstration group is experienced in Trona and Hydrated Lime injection for SO₂, SO₃ and HCl control. Our services include monitoring and mitigating changes in superheat/reheat slag patterns associated with migration to higher sulfur coal. Breen is an industry leader in deployment of permanent Fuel Lean Gas Reburn (FLGR) systems for multi-pollutant control of both NO_x and SO₂. This natural gas-based technology is particularly effective in helping units meet the imminent requirements of CSAPR.

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CEMTEK Environmental provides a single source for reliable, accurate, and cost effective Continuous Emissions Monitoring Systems (CEMS). We specialize in CEMS and process instrumentation design, integration, field services and spare parts. CEMTEK's experience includes all Source and Ambient sections of 40 CFR Part 50, 51, 60, 63 and 75 monitoring and reporting requirements as well as Particulate Monitoring (PM), Mercury and HCL CEMS. Process Monitoring includes inlet & outlet NO_x probe model 8000, inlet scrubber SO₂ & NH₃ slip model 7000. Please contact us at 800-400-0200 for a quote on CEMS Equipment, CEMS field service or CEMS spare parts.

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Leading manufacturer of homogeneous honeycomb DeNO_x catalyst since 1985. CERAM's experience base comprises over 650 DeNO_x applications for facilities burning either coal (bituminous and PRB), biomass, heavy fuel oil, petroleum coke, orimulsion, natural gas, and various waste byproducts. CERAM also provides comprehensive SCR system and catalyst management services including AIG tuning, catalyst testing, reactor inspection, catalyst management planning and SCR operations evaluation/troubleshooting.

ChemReport, Inc.16

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ChemReport, Inc. is a full service environmental, health and safety consulting firm with 18 years of experience serving the needs of the power generation industry specializing in Risk Management Plans (RMP), Off-site Consequence Analysis (OCA), Process Hazard Analysis (PHA), compliance audits and employee training.

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SCR-Tech, a CoaLogix company, is the leading provider of catalyst management services and regeneration technologies for selective catalytic reduction (SCR) systems used by coal-fired power plants to reduce nitrogen oxides (NO_x) emissions. The company offers a wide variety of services including SCR management, AIG tuning, catalyst testing, inspection services, catalyst supply and regeneration. CoaLogix has regenerated more cubic meters (m³) of catalyst than anyone in the world and is American owned and operated. Regenerated SCR catalyst can be supplied in weeks, not months from SCR-Tech's large inventory located in Charlotte, NC.

Control Analytics, Inc.5

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CONTROL ANALYTICS, INC. provides experienced sales, service, and systems integration expertise for analytical instruments and systems. Our capabilities include the integration, maintenance and troubleshooting of process gas, flue gas, ambient air, pure water and wastewater monitoring systems as well as Mercury CEMS applications. Calibration and contract service agreements are offered through our experienced service department.

CORMETECH19

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Cormetech, Inc. is recognized as a premier developer, manufacturer and supplier of catalysts and supportive services for Selective Catalytic Reduction (SCR) systems, supplying proven solutions for NO_x reduction, low SO₂ to SO₃ conversion, and Mercury Oxidation with guaranteed solutions backed by laboratory testing, engineering analysis and proven field performance. Cormetech's customers receive catalyst management solutions that effectively manage the system investment for the truly lowest lifecycle cost. Total Solution services include catalyst regeneration services in cooperation with CoaLogix, Inc., a proven supplier and process technology for catalyst reuse.

ENERACTIVE Solutions9

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ENERACTIVE Solutions is an independent, full service energy consulting, engineering, and project development company specializing in the analysis, design, development, and installation of energy efficiency and system optimization projects. ENERACTIVE Solutions, Power Plant Solutions Division provides SCR system optimization services including catalyst management, AIG tuning, field testing, flow modeling, inspection and consulting services.

Enertechnix8

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Enertechnix's line of high-performance infrared imaging cameras and gas temperature measurement tools enables performance engineers and operations managers to maximize combustion efficiency and minimize unplanned boiler and furnace outages, thereby improving heat rate and reducing carbon footprints.

FMC Corporation PerNO_xide29

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FMC is the exclusive licensee of a novel NO_x control technology patented by NASA. Hydrogen peroxide (H₂O₂) is injected into the ducts ahead of the air pre-heater and converts the NO to NO₂, which is more readily captured by existing downstream pollution control equipment. Low capital, low maintenance, and modest chemical costs make this a cost effective technology for NO_x reductions of greater than 50%. Moreover, the technology is flexible and scalable to meet changing requirements for any size boiler and low-cost site demonstrations can easily be performed to validate the technology. As a leading global supplier of hydrogen peroxide, FMC offers unparalleled supply reliability, as well as a full complement of technical services to support the safe and efficient use of its products.

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FERCo is an engineering services and R&D company specializing in combustion and emissions control. Founded in 1984, the company provides research, pilot-scale development, and full-scale evaluation services to industry and government in the area of applied energy and environmental systems. FERCo also specializes in the development of advanced measurement systems for the utility industry, such as CatalysTraK™ (formerly KNOxcheck®), a system to measure catalyst activity in situ.

FoxEquipment.....10

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Fox Equipment designs, engineers and manufactures utility-grade dampers and expansion joints for the power-generation industry. We fabricate in our Fox captive 65,000 sq ft facility in Green Cove Springs, FL and at 25,000 sq ft Paragon Metals in Cincinnati where our Ohio office resides also. Our markets include coal fired power plants, Combined Cycle Natural Gas units, HRSR's, Oil & Gas Refineries, Steel, Concrete, Chemical and process industries.

Fuel Tech, Inc.....17

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Fuel Tech, Inc. provides multi-pollutant emission control and advanced combustion technologies. This includes: optimization services, low NO_x burners and Over-Fire Air systems, chemical injection programs designed to improve boiler efficiency, and modeling services to provide solutions for power plant systems. Products include: NO_xOUT® and HERT™ SNCR systems, ASCR™ Advanced SCR systems, ULTRA™ process used to generate on-site ammonia for SCR, sorbent injection systems to control SO₂, flue gas conditioning systems, and TIFI® Targeted in Furnace Injection programs to reduce slagging, SO₃ and CO₂ emissions, while improving boiler performance.

GE Energy.....26

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GE Energy's Filtration team serves utility plants with integrated and flexible emissions control technology and services for fabric filtration systems. GE evaluates your entire process and applies the right filtration solution to help improve the performance of your existing equipment and minimize O&M costs. Our portfolio also include the Powerwave® line of acoustic cleaning systems for baghouses, ESPs, boiler tubes, heat transfer surfaces, SCRs, and material handling. The ecomagination certified Powerwave®+ impulse cleaning system can potentially improve flow rate, increase heat rate and reduce emissions and can replace traditional cleaning methods such as sootblowers.

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The Greenbank Group companies include Greenbank Energy Solutions a leading supplier of combustion optimization through coal and primary airflow balancing to the burners with high performance VARB® splitters, on-line & real-time coal mass flow, LOI measurement technologies, Loesche Dynamic Classifiers, and complimented by the abrasion resistant linings solution technologies offered by CBP Engineering Corp.

Haldor Topsoe, Inc.....32

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Haldor Topsoe is the market leader in the development and supply of heterogeneous catalyst and technology with over 1,000 stationary SCR references ranging from boilers firing Lignite, PRB and high arsenic coals to bio-mass fired sources operating at 340°F. Topsoe's diverse gas turbine experience covers IGCC and combined cycle sources to simple cycle gas turbine applications operating at 1,100°F. Topsoe's has proven, over our 70 plus years, to be a supplier of advanced products for industrial and environmental catalytic systems.

Hitachi Power Systems America, Ltd.....40

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Hitachi, original co-developer of DeNO_x catalyst, has supplied NO_x removal catalyst for over 30 years to over 800 plants including over 350 SCR systems worldwide and the only catalyst manufacturer who offers SCR Systems for coal-fired units in the U.S. Our experience and knowledge led to the development of arsenic and phosphorous resistant blends, low SO₂ conversion catalyst and now longer lasting catalyst (CM) which can exceed the longevity of present day catalyst capabilities. Hitachi's Mercury Oxidation Catalyst (TRAC® "Triple Action"), for bituminous and PRB fuels reduces NO_x, maximizes mercury oxidation, and minimizes the conversion of SO₂ to SO₃. Because of our experience and knowledge, we can test and inspect catalyst and optimize AIG.

Johnson Matthey Catalysts LLC.....37

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Johnson Matthey Catalysts manufactures both plate and honeycomb SCR catalyst and CO catalyst for numerous applications including coal fired power plants. We have extensive world-wide experience including over 50 coal-fired utility boiler installations in the U.S. alone. Johnson Matthey Catalysts has installed over 50,000 m³ of plate-type SCR catalyst in U.S. coal-fired applications. Plate catalyst is recognized for its resistance to fly ash plugging, low SO₂/SO₃ conversion, low pressure loss and mechanical robustness. Johnson Matthey is a 200-year old specialty chemicals company focused on its core skills in catalysts, precious metals, fine chemicals and process technologies. Our \$15 billion company has been providing catalytic solutions for air quality problems for more than 30 years.

Kiewit/TIC.....33

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Krishnan & Associates is a technical consulting firm providing marketing & communication, market research, executive & engineering recruitment, and M&A services focused on the global power and energy industry. Our clients include OEMs, Engineering firms, IPPs and Utilities. Our associates combine their management and engineering expertise to provide our clients with innovative actionable solutions. Headquartered in Stamford, Connecticut with a satellite office in India, K&A has also been initiating business development activities for suppliers, service providers, utilities and investors seeking market expansion in India. K&A also operates a web portal, www.enstreet.com, providing the latest in energy news and job opportunities.

M&C TechGroup13

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Mississippi Lime.....4

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Mississippi Lime hydrated lime is a proven high performing sorbent for acid gas mitigation in Dry Sorbent Injection Systems or Circulating Dry Scrubbers. Our quicklime

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Nalco Mobotec36

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Nalco Mobotec is your single solution provider for multi-pollutant emissions control and combustion optimization. Our technologies enable businesses to optimize combustion and reduce critical pollutants including NO_x, SO_x, mercury, CO, and acid gases, to meet global tightening air quality regulations. These technologies include Rotating Opposed Fire Air® (ROFA), Rotamix® Advanced SNCR, Duct Sorbent Injection (DSI), Furnace Sorbent Injection (FSI), Fireside Chemical Treatment, biomass conversions, and our suite of mercury control technologies. Our proprietary solutions have minimal impact on plant operation, are typically lower capital cost than competitive technology, and are backed by almost two decades of experience in emissions reduction.

Nol-Tec Systems, Inc.....14

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Nol-Tec Systems offers Sorb-N-Ject® Technology, a dry bulk sorbent injection systems to mitigate SO₂, SO₃, Hg, and HCl emissions effectively and efficiently. We are a global single-source supplier of custom-engineered bulk material handling, pneumatic conveying, and integrated control systems – including limestone and fly ash handling systems. Nol-Tec is dedicated to providing the best value in high-quality custom solutions and unparalleled customer service.

NoNOx Components (Integrated Global Services, Inc.).....24&25

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NoNOx Components offers the leading high temperature erosion resistant LPA/Popcorn Ash filtration system for protection against catalyst plugging. NoNOx supports utilities and OEM's in the design and manufacture of components for effective filtration over long service intervals, while minimizing system pressure drop. The NoNOx patent-pending screens have been successfully installed in over 50 SCR's across the US.

RE Consulting.....12

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RE Consulting is a division of Reinhold Environmental Ltd., a corporation which continues to provide numerous O&M services to the coal-burning utility industry since 1993. Using its team of industry experts, RE Consulting's current focus is to provide engineering studies, on-site training, and O&M based troubleshooting and consulting. In addition, RE Consulting provides training via its state-of-the-art, on-line training manuals as well as customization support for specific plant configurations.

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Sealeze, a unit of Jason Inc.....20

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XtraSeal HT™ is a patent-pending, adaptive brush sealing system specifically engineered for Rotary Air Preheaters and the constant variations in gap sizes inherent in their operation that strip seals can't accommodate. Air Preheaters, properly sealed with XtraSeal HT, provide measurable reductions in fuel consumption, fan power usage and CO₂ emissions, ensuring consistent conditions for optimal air pollution control equipment function.

Southern Research Institute.....6

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Southern Research provides Standard Testing of SCR Catalysts in both bench-scale and micro-reactor test facilities, air-pollution-control technology evaluation, and testing and laboratory services for utility, industry, and government clients. Our areas of expertise include: vapor-phase mercury monitoring; carbon-trap mercury measurements; SCR catalyst activity and reactivity testing; XRF, XRD, ICP-MS, and morphological analyses; coal combustion research; and, flue-gas analysis for SO₃, Hg, halides, HCl, HF, and other gas species. We also provide analysis of FGD scrubber liquids and slurries, and water treatment technologies.

STEAG Energy Services41&42

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STEAG Energy Services provides a full scope of environmental engineering and consulting service to the North American energy industry including SCR and SNCR system design and review, SCR catalyst management services including catalyst data interpretation, catalyst exchange strategies, catalyst cleaning, rejuvenation and regeneration, STEAG's patented/pleated large particle ash screens, AIG tuning, combustion optimization services, complete in-house SCR catalyst bench scale testing and XRF testing services, complete SCR on-site installation / removal services, STEAG's patented mercury capture / sequester system and SCR and FGD Training / O&M services.

URS Corporation.....28

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A global leader in engineering, design, construction, and program management, URS Corp. provides the complete life cycle of services to clients in the power industry - fossil fuels, coal combustion residual, cogeneration, emissions control (NO_x, SO₂, SO₃, CO₂, toxics), renewable energy, hydroelectric, nuclear, transmission and distribution.

Wahlco, Inc.....34

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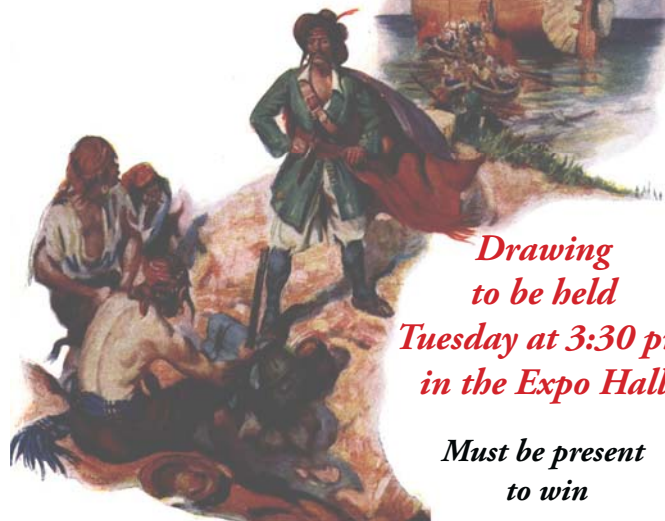


Wahlco serves the power industry through the manufacture and supply of SO₃ and NH₃ flue gas conditioning (FGC) systems, small NO_x reduction (SCR and SNCR) systems, ammonia systems for SCR plus urea-to-ammonia "U2A®" (patented process) systems for DeNox and industrial applications.

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- Airtek.....Booth 31*
- CoaLogix.....Booth 1&2*
- FMC Corp.....Booth 29*
- Fox Equipment.....Booth 10*
- Fuel Tech.....Booth 17*
- Haldor Topsoe.....Booth 32*
- Hitachi Power Systems.....Booth 40*
- Johnson Matthey Catalysts.....Booth 37*
- Nalco Mobotec.....Booth 36*
- STEAG Energy Services.....Booth 41&42*

10 VISA Gift Cards will be awarded
 1@ \$500
 2@ \$300
 3@ \$200
 4@ \$100



Drawing to be held Tuesday at 3:30 pm in the Expo Hall

Must be present to win



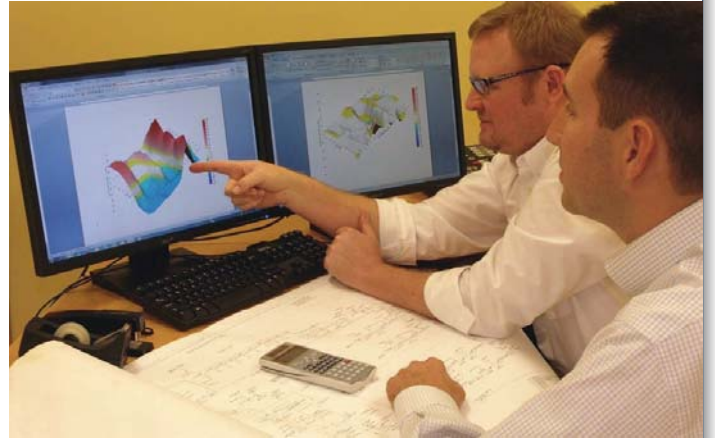
SCR Catalyst Regeneration with *Selective Impregnation®*



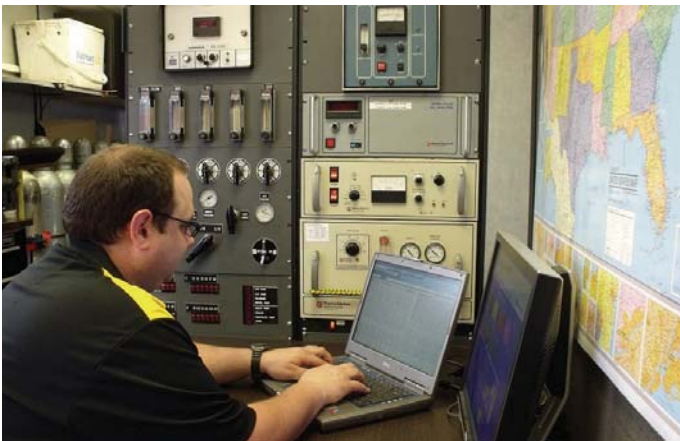
Bench Scale and XRF Testing Services



FGD Design/Re-design and Review Services, and Mercury/Selenium Removal Technology



SCR/SNCR and Ammonia System Design/Re-design, Management and Review Services



Full scope SCR & AIG Tuning and Combustion Services



STEAG's pleated/hinged LPA Screen

STEAG Energy Services

See us at booth # 41 + 42