

# 2006 Environmental Controls Conference Sponsored by U.S. Department of Energy's National Energy Technology Laboratory

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Division, U.S. Department of Energy, National Energy Technology  
Laboratory, Conference Co-Chair**

**Ronald L. Cutright, Director, Environmental and Industrial Division, U.S.  
Department of Energy, National Energy Technology Laboratory,  
Conference Co-Chair**

## **Preliminary Agenda**

**Session 1:** Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR) for NO<sub>x</sub> Control  
May 16 and 17, 2006

**Session 2:** Techniques for Managing Sulfur Trioxide (SO<sub>3</sub>)  
May 18, 2006

## **TUESDAY, MAY 16, 2006**

- 7:00 a.m. Registration – Grand Ballroom
- 7:50 a.m. Welcoming Remarks and Introduction of Keynote Speaker  
*Thomas A. Sarkus*, Conference Co-Chair, U.S. Department of Energy, National Energy Technology Laboratory
- 8:00 a.m. Keynote Address: Taking a Pulse on SCR & SNCR Technologies  
*Carl O. Bauer*, Director, U.S. Department of Energy, National Energy Technology Laboratory

## **SESSION 1 (Day 1): Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR) for NO<sub>x</sub> Control Tuesday, May 16, 2006**

### **Regulatory Considerations**

**Moderator:** *Rui Afonso*, Energy and Environmental Strategies

- 8:30 a.m. Recent EPA Regulatory Actions and Effects on NO<sub>x</sub> Controls  
*Meg Victor*, U.S. Environmental Protection Agency

### **Overview of SCR/SNCR**

9:00 a.m. What's New in SCR  
Anthony Licata, Babcock Power Environmental  
Clayton Erickson and Robert Lisauskas, Riley Power, Inc.

9:30 a.m. Experiences from Three Years of SCR Operation  
Jack Robinson, SCANA

10:00 a.m. Break (Poster Session)

### **Managing SCR Catalysts**

10:30 a.m. STEAG's Long-Term Catalyst Operating Experience and Cost  
Horst Rhein, Hans Sobolewski and Hans Hartenstein, STEAG LLC

11:00 a.m. In-Situ SCR Catalyst Replacement  
Mark Schirmer, Cormetech  
Mark Hill, TVA

11:30 a.m. The Successes, Challenges and Future of Regenerating SCR Catalyst  
William J. McMahon, SCR-Tech, LLC

12:00 noon Lunch (on your own)

### **Managing SCR Catalysts (Continued)**

**Moderator:** Kevin Washington, Florida Power & Light Company

1:30 p.m. Acoustic Cleaners: The Catalyst Cleaning Standard in SCR Reactors – Seven Years of Success and Best Practices  
Jake Shelton, GE Energy  
Marty Adler, MarCom

2:00 p.m. Is Your SCR Ready for Year Round Operation?  
Greg Holscher and John Cochran, CERAM Environmental, Inc.

### **Gas Monitoring and Analysis**

2:30 p.m. Efficient Operation of SCR/SNCR  
Stephen B. Mandel, and Richard Zuendt, Spectra Gases, Inc.

3:00 p.m. Overview of NETL Supported Research and Development on Novel Sensors for Monitoring Gaseous Emissions  
Robert R. Romanosky and Susan Maley, National Energy Technology Laboratory

3:30 p.m. Break (Poster Session)

4:00 p.m. Real-time Monitoring of SO<sub>3</sub>/H<sub>2</sub>SO<sub>4</sub>/NH<sub>3</sub> in SCR Outputs  
Robert Spellicy, Industrial Monitor & Control Corporation

*Richard Himes*, Electrical Power Research Institute  
*John Pisano*, University of California, Riverside

### **Predictive Performance Tools**

- 4:30 p.m. In situ Determination of SCR Catalyst Activity  
*Randall A. Smith* and *L. Muzio*, Fossil Energy Research Corp.  
*D. Broske*, Electrical Power Research Institute  
*K. Harrison*, Southern Company Generation  
*C. Miller*, National Energy Technology Laboratory
- 5:00 p.m. SCR Catalyst Testing for Improved Plant Performance  
*Riker Blank*, *Robert Becker*, *Dan Ott*, and *Andy Toback*, Environex, Inc.

### **Non-Coal Applications**

- 5:30 p.m. Application of SNCR to Reduce CO Boiler NO<sub>x</sub> Emissions  
*David Moyeda*, *Wei Zhou*, and *Quang Nguyen*, GE Energy
- 6:00 p.m. Adjourn

**WEDNESDAY, MAY 17, 2006**

## **SESSION 1 (Day 2): Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR) for NO<sub>x</sub> Control Wednesday, May 17, 2006**

### **Layered SCR**

**Moderator:** *Keith Harrison*, Southern Company Generation

- 8:00 a.m. Cost Effective Layered Technology for Ultra Low NO<sub>x</sub> Control  
*Charles E. Trippel*, Advanced Combustion Technology, Inc.
- 8:30 a.m. Layered NO<sub>x</sub> Reduction Technologies on a 500 MW Cyclone-Fired Boiler  
*Bradley Adams*, *Marc Cremer*, and *Andrew Chiodo*, Reaction Engineering International  
*Craig Giesmann* and *Ken Stuckmeyer*, Ameren  
*John Boyle*, Fuel Tech, Inc.

### **Flow Distribution and Modeling**

- 9:00 a.m. Inter-Layer Mixing for Improved SCR Performance  
*D. Shore*, *J. Muncy*, *T. Martz*, and *L. Muzio*, Fossil Energy Research Corp.  
*D. Broske*, Electric Power Research Institute
- 9:30 a.m. Improving Design of SCR Systems with CFD Modeling  
*Bradley Adams* and *Connie Senior*, Reaction Engineering International

10:00 a.m. Break (Poster Session)

### **Flow Distribution and Modeling (Continued)**

10:30 a.m. Spray Nozzles Used for Chemical Injection in Environmental Applications  
*Mughis Naqvi* and *John Coulston*, Lechler Inc.

### **Hybrid Systems**

11:00 a.m. SCR/SNCR Optimization with In-situ Ammonium Bisulfate Fouling Measurement  
*Bernard Breen* and *Charles Lockert*, Breen Energy Solutions  
*Bryan P. Walsh*, Duke Power Co.  
*Jacob A. Peter*, AES/Cayuga

11:30 a.m. Hybrid SNCR/In-Duct SCR System  
*Dale Pfaff*, Fuel Tech, Inc. and *Richard Abrams*, Babcock Power Environmental, Inc.

12:00 noon Lunch (on your own)

### **Hybrid Systems (Continued)**

**Moderator:** *Lawrence Muzio*, Fossil Energy Research Corp.

1:30 p.m. A New Approach for Hybrid SNCR/SCR for NO<sub>x</sub> Reduction  
*Thomas L. Wright* and *James R. Cox*, WorleyParsons Group

### **Innovative Applications**

2:00 p.m. Large Particle Ash (LPA) Screen Retrofits at Coal-Fired Units in Indiana and Ohio  
*Michael Harrell* and *Joseph Jancauskas*, Dayton Power & Light  
*Hans Hartenstein*, *Hans Sobolewski*, and *Marilynn Martin*, STEAG LLC

2:30 p.m. Cracking Heater Convection Retrofit with Integral SCR  
*Mark Karrs*, ABB Lummus Heat Transfer  
*Phil Crepinsek*, Chevron Phillips Chemical Company, LP  
*Peter Lindenhoff*, Haldor Topsoe A/S

3:00 p.m. NO<sub>x</sub> Control with Ammonia-Free SCR  
*Zhen Fan* and *Andrew H. Seltzer*, Foster Wheeler North America Corp.  
*Richard G. Herman*, Energy Research Center, Lehigh University  
*Kamalendu Das*, National Energy Technology Laboratory

3:30 p.m. Break (Poster Session)

### **Innovative Applications (Continued)**

4:00 p.m. High-Dust SCR Design to Limit Impact of High Sulfur Operation on Air Preheater Operation  
*William Ellison*, Ellison Consultants  
*Volker Rummenhohl*, TackTicks, LLC  
*Helmut Weiler*, Weiler Consultants

### **SO<sub>2</sub> Conversion to SO<sub>3</sub>**

4:30 p.m. An Experimental Program to Optimize SCR Catalyst Regeneration for Lower Oxidation of SO<sub>2</sub> to SO<sub>3</sub>  
*Mike Cooper*, SCR-Tech  
*Keith Harrison*, Southern Company Generation  
*Chao Lin*, American Electric Power

5:00 p.m. Application and Operating Results of Low SO<sub>2</sub> to SO<sub>3</sub> Conversion Rate Catalyst for DeNO<sub>x</sub> Application at AEP Gavin Unit 1  
*Anthony Favale*, Hitachi Power Systems America Ltd.  
*Chao Lin*, American Electric Power  
*Isato Morita*, Babcock-Hitachi, K.K.

5:30 p.m. **Closing Remarks**  
*Thomas A. Sarkus*, Conference Co-Chair  
Director, Applied Science and Energy Technology Division, U.S. Department of Energy, National Energy Technology Laboratory

5:40 p.m. Adjourn

**THURSDAY, MAY 18, 2006**

## **SESSION 2 (Day 3): Techniques for Managing Sulfur Trioxide (SO<sub>3</sub>) May 18, 2006**

7:00 a.m. Registration – Grand Ballroom

7:20 a.m. Welcoming Remarks and Introduction of Keynote Speaker  
*Thomas A. Sarkus*, Conference Co-Chair, National Energy Technology Laboratory

7:30 a.m. Keynote Address: SO<sub>3</sub> Introduction/Overview  
*William Ellison*, Ellison Consultants

### **SO<sub>3</sub> Overview**

**Moderator:** *Edward Levy*, Lehigh University

- 8:00 a.m. Projection of U.S. Coal-Fired Power Plants Potentially Impacted by Excess SO<sub>3</sub> Emissions  
*James T. Murphy*, Science Applications International Corporation
- 8:25 a.m. Analyses of Rate of Formation of SO<sub>3</sub> in Coal-Fired Boilers  
*Harvey Stenger, Carlos Romero, Hugo Caram, Harun Bilirgen, and Edward Levy*, Lehigh University
- 8:50 a.m. Break (Poster Session)

### **Acid Gas Control Issues**

- 9:15 a.m. Benefits of Effective SO<sub>3</sub> Removal in Coal-Fired Power Plants: Beyond Opacity Control  
*Robert Moser*, Codan Development, LLC
- 9:40 a.m. SO<sub>3</sub> Mitigation Strategy Process  
*Jeffrey P. White*, American Electric Power
- 10:05 a.m. MEMBRANE WESP – A Lower Cost Technology to Reduce PM<sub>2.5</sub>, SO<sub>3</sub>, and Hg<sup>+2</sup> Emissions  
*John Caine* and *Hardik Shah*, Southern Environmental Inc.
- 10:30 a.m. Improving Effectiveness of SO<sub>3</sub> Mitigation Systems with CFD Modeling  
*Bradley Adams, Connie Senior, Jim Valentine, and Jinliang Ma*, Reaction Engineering International
- 10:55 a.m. SO<sub>3</sub> Control and Wet ESP Technology  
*James “Buzz” Reynolds*, Wheelabrator Air Pollution Control, Inc., A Siemens Company

### **Sorbent Injection for Acid Gas Mitigation**

- 11:20 a.m. Avoiding Problems With Trona for SO<sub>3</sub> Mitigation  
*Douglas P. Ritzenthaler and John D. Hume*, American Electric Power
- 11:45 a.m. Lunch (on your own)

### **Sorbent Injection for Acid Gas Mitigation (Continued)**

**Moderator:** *Joe Diggins*, Hitachi

- 1:15 p.m. Developments in Sorbent Injection Technology for Sulfuric Acid Mist Emissions Control  
*Paul Nolan*, Chemical Lime Co.
- 1:40 p.m. SBS Injection™ Technology for SO<sub>3</sub> Control: Summary of Operating Performance and Economics  
*Sterling M. Gray*, URS Corp.

*Mick Harpenau, Duke Energy*

- 2:05 p.m. Duct Injection for SO<sub>3</sub> Control  
*Keith C. Day* and *Jonathan E. Norman*, O'Brien & Gere
- 2:30 p.m. Use of Magnesium Hydroxide for Reduction of SO<sub>3</sub> Emissions from Coal-Fired Power Plants  
*Lewis Benson*, Carmeuse Technology Center
- 2:55 p.m. Uses of Lime at Low Cost in Controlling SO<sub>3</sub>/H<sub>2</sub>SO<sub>4</sub>(v)/H<sub>2</sub>SO<sub>4</sub>(l) Emission  
*William Ellison*, Ellison Consultants  
*Lewis Benson*, Carmeuse Technology Center
- 3:20 p.m. Break (Poster Session)

**Effects of SO<sub>3</sub> on Mercury Control**

- 3:30 p.m. Implications of SO<sub>3</sub> Removal on Mercury Capture  
*Frank Meserole*, Codan Development LLC  
*Scott Miller* and *Carl Richardson*, URS Corporation
- 3:55 p.m. Mercury Oxidation Catalyst for PRB-Fired Boilers  
*William Gretta* and *Sung Wu*, Hitachi Power Systems America, Ltd.  
*Yoshinori Nagai*, Babcock Hitachi, K.K.  
*Edwin L. Morris*, We Energies
- 4:20 p.m. **Closing Remarks**  
*Thomas A. Sarkus*, Conference Co-Chair  
Director, Applied Science and Energy Technology Division, U.S. Department of Energy, National Energy Technology Laboratory
- 4:30 p.m. Adjourn

# POSTERS

**Commercial Experience of DeNO<sub>x</sub> SCR Catalyst at 500 MW Poryong  
Coal Thermal Power Plant Unit 6 in Korea**

*Sangho Lee, Okyoun Kim, Yongil Lee, Junghyug Hyun, Junseong Ahn, Jonghyun Kim*  
Daedok Institute of Technology

**A SO<sub>x</sub> Formation Model for Industrial CFD Applications**

*Jens I. Madsen, David G. Schowalter, S. A. L. Perera*  
Fluent, Inc.

**A Software Tool for SCR Catalyst Management Decision Making**

*Lawrence Muzio, FERCo*  
*Ed Cichanowicz, J.E. Cichanowicz, Inc.*  
*D. Broske, EPRI*

**Release of Ammonia in Metals from SCR/SNCR Fly Ashes**

*Carol Cardone, Ann Kim, and Karl Schroeder, National Energy Technology Laboratory*