WPCA NEWS

www.wpca.info

A Bi-Annual Newsletter Sponsored by the WPCA — ISSUE 7 - 2005

WORLDWIDE POLLUTION CONTROL ASSOCIATION

Atomize your problems

Particulate Collection Options for Dry FGD Systems

By Richard Staehle, The Babcock & Wilcox Company

Dry flue gas desulfurization systems (DFGD) have, over the past several decades, become a viable solution for the reduction of SO_2 from the flue gas of electric utility boilers firing lower sulfur coals and/or when plant specific evaluations indicate DFGD as being favorable over wet FGD. In typical utility DFGD systems, a "semi-dry" approach is most often used where a reagent – typically lime/water slurry – is "atomized" into a finely divided cloud of droplets within a reaction chamber to absorb gaseous pollutants including SO_2. For new power plant DFGD installations, SO_2 removal efficiencies in excess of 90% are common today. Key decision factors regarding the choice of DFGD or wet limestone FGD include initial capital cost (generally favoring DFGD for lower sulfur cases) and operating costs (generally favoring wet FGD as % sulfur in the fuel increases). Specific site and situational factors, such as the disposition of FGD byproducts, can also come into play when choosing between wet and dry FGD.

> ***"The principal needs for particulate collectors associated with DFGD systems are:***
> - *For the control of stack emissions;*
> - *Secondary SO_2 absorption; collection of material for recycle back to the SDA;*
> - *The pre-collection of particulate before the SDA when and if necessary for flyash disposal/sale needs.*
>
> **Particulate collectors have become an integral part of the DFGD process and should be recognized as such by plant designers, as opposed to being thought of as a stand-alone commodity-type component."**

DFGD retrofits on certain existing plants may be accomplished using the original or upgraded particulate control equipment (fabric filter or electrostatic precipitator) while other existing plants and new plants will require new particulate collection approaches. In certain instances, where there are special flyash disposal/sale considerations, the need to segregate the majority of flyash prior to the DFGD may require additional particulate collection equipment. Such flyash pre-collection has been commonplace at installations in Europe for many years. *continued on page 4*

To push or pull, that is the question

Flyash Handling Systems for ESPs or Baghouses

By Joe Kaminski, EPSCO International Ltd.

In coal-fired power plants, there can be two types of flyash systems for ESPs or baghouses: pressurized or vacuum.

The two main suppliers of these systems are Allen Sherman Hoff and United Conveyor Company. Each flyash system is sized for the specific size of the precipitator or baghouse and for the number of hoppers involved. The flyash system is generally operated by a programmable logic controller with each system designed to run continuously under normal conditions. Unfortunately, this does not always occur in practice. Some companies run the flyash systems once a shift and sometimes once a day. This can and usually does cause hopper high levels, gas flow blockage and/or ash carryover for ESP, FF, multi-clone or cyclonic separators and field grounds for ESPs.

Flyash systems can also be operated using a single pass operation. This is generally done for testing purposes only. Each operating part is set up with a time that may be adjusted according to the type of fuel that is being burned. *continued on page 4*

Inside

Art? Science? Skill?

(This is the second part in a series of three articles)

Diagnosing Precipitator Problems Based on Electrical Meter Readings

By Peter Aa and Paul Ford, Redkoh Industries

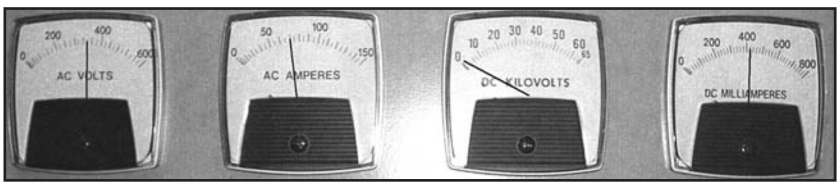
What Did We Learn in Part I?

❶ **Drawing conclusions from the meter needle positions is more to do with the operation of the precipitator than it does the understanding of electricity.**

❷ **We need to understand what the meters mean!**

- The Voltmeter reads the voltage being delivered to the primary of the transformer rectifier by the SCR controller.
- The Amp meter reads the current being drawn from the plant electricity supply.
- The Kilovolt meter reads the Voltage that has reached the precipitator high voltage grid.
- The Milliamp meter reads the current that is being drawn by the precipitator high voltage grid.

In issue 6 of the WPCA News we discussed three scenarios of meter readings and how to interpret their meaning. In this issue we offer three more possible electrostatic precipitator problems that can be detected based on meter readings.



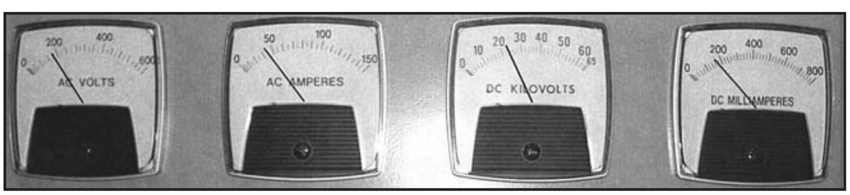
Indication

In this example, the kilovolt (secondary voltage) meter is reading zero (or a very non-characteristic reading) while the other meters are reading within normal ranges.

Probable Cause

This condition is indicative of a metering problem and could be caused by any of the following:

- A defective meter.
- A defective metering circuit (signal conditioning circuit).
- Shorted or open field wiring between the TR and the control cabinet.
- Defective voltage divider resistor, either in the TR tank or attached to the TR bus system.



Indication

Here the primary voltage and current, and secondary voltage and current, are all lower than normal at the same time. Spark rates are normal to high.

Probable Cause

This electrical condition is usually caused by sparking within the precipitator that starts at lower power levels than normal. Any of the following could be the reason for low level sparking:

- Heavy particulate buildup on either or both of the collecting and discharge electrodes resulting in close electrical clearances.
- Heavy particulate buildup between any grounded surface and the upper or lower high voltage frames resulting in close electrical clearances.
- Heavy particulate buildup on the surface of any electrical insulator causing electrical discharges across the surface.
- Build up in the hoppers, causing collected particulate to come close to the lower high-tension frame, resulting in spark over.
- Excessive moisture in the flue gas resulting in spark over.
- High gas velocity can cause re-entrainment of collected matter increasing spark occurrences.
- An increase in inlet particulate loading can overburden electrical fields reducing overall power.

As can be seen from the number of possible causes, reduced power operation is very difficult to diagnose. *continued on page 5*

"Sheer" madness? Not hardly!

Innovative Mixing Device Reduces Thermal Stratification in Ductwork

By Rob Mudry, Airflow Sciences Corporation

ATCO Power's Sheerness Station in Hanna, Alberta is a pulverized coal plant producing 750 MW of power. Sheerness was experiencing temperature stratification in its pulverizer inlet ductwork. Plant measurements indicated that temperature deviations of up to 58 ºF existed. In addition to reducing coal drying efficiency in the pulverizer, such imbalances can lead to safety issues.

The temperature stratification was a result of the merging two flow streams. Incoming flow from the air heater provides the thermal energy for drying of the coal as well as the required transport mechanism. The inlet air temperature is controlled using a tempering stream of ambient air, as seen in the schematic, Figure 8 on page 6. To resolve the stratification problem, ATCO installed an air mixer device designed and patented by Airflow Sciences Corporation (ASC) of Livonia, Michigan. A photo of the mixer installation is shown in Figure 1. A computational fluid dynamics (CFD) model was used to optimize the mixer design for ATCO's specific duct system geometry. A key consideration was to generate the mixing with minimal system pressure drop.

Figure 1:
Mixer Installation in Sheerness Pulverizer 1A

After installation of the ASC mixer, the temperature distribution was remeasured. The temperature deviation was reduced considerably with the mixer in place to 13 ºF. Test data from the before and after temperature measurements are shown in Figures 6 and 7 on page 6. The additional pressure loss caused by the mixer was barely measurable at 0.1 inches of water. *continued on page 6*

As_2O_3 and Old Lace

Arsenic Poisoning in High Dust SCR DeNOx Catalyst

By Nathan White, Haldor Topsoe

Recently imposed NOx emission limits in the United States have required a majority of coal fired power stations to install selective catalytic reduction (SCR) as their primary reduction method. Recently, proposed SOx emissions limits are increasing the likelihood these units will also have some type of flue gas scrubbing to meet the new stringent SOx requirements. The installation of flue gas scrubbers will allow coal fired power stations to switch from high priced low sulphur coal to a lower priced high sulphur coal. An undesirable problem with fuel switching is that most high sulphur coals found in the midwest and the east coast contain arsenic, a catalyst poison, which can lower catalyst service. Several prevention methods are currently used including; fuel switching, limestone addition to the boiler, and using a DeNOx catalyst with a diverse pore structure. Topsoe has developed a catalyst with a diverse pore structure that is more resistant to the arsenic poisoning.

Background

In a coal fired boiler, Arsenic in the coal is vaporized to Arsenic Trioxide (As_2O_3). If the vapor pressure of the Arsenic Trioxide in the gas phase is higher than the equilibrium, the arsenic will precipitate in the catalyst pores due to capillary forces. As_2O_3 (g) + catalyst $\longleftrightarrow$ As_2O_3-catalyst.

If the vapor pressure of As_2O_3 in the gas phase is higher than the equilibrium, then As_2O_3 will be deposited in the micro pores of the catalyst. In a catalyst with a diverse pore structure, if the vapor pressure of As_2O_3 is reduced, i.e. by switch of coal type, a reduction of the arsenic content in the catalyst has been observed. *continued on page 6*

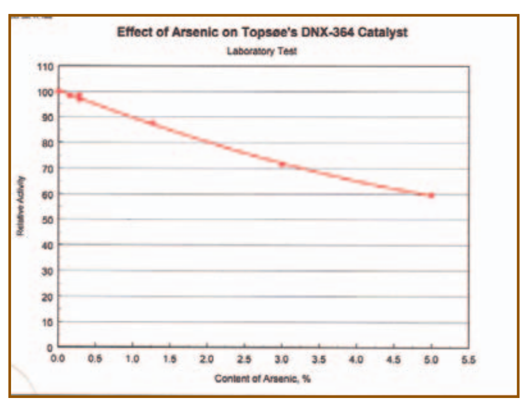


Figure 2: **Laboratory Test-Effect of Arsenic on Topsoe's DNX-364 Catalyst**

Atomize your problems *continued from front page*

Figure 3: **Niro Rotary Atomizer for Power Plant DFGD**

Although there are a number of types of "semi-dry FGD" technologies available, rotary atomizer spray dryer systems are widely used by electric utilities. In rotary atomizers, slurry flows into a cavity inside a wheel which rotates at high speed. The slurry is then expelled through nozzles in the wheel circumference under extremely high hydraulic pressure to create the atomization. Other systems make use of compressed air nozzles ("dual-fluid") to atomize the reagent slurry.

Conventional dry ESPs, or fabric filters, are used to collect particulates downstream of the spray dryer absorbers (SDA). Fabric filters have demonstrated a better ability to provide additional system SO_2 capture relative to ESPs due to the characteristics of the bag's filter cake that the flue gas passes through on its way to the stack. It is now common to see pulse-jet type fabric filters following SDAs on modern, high efficiency DFGD systems.

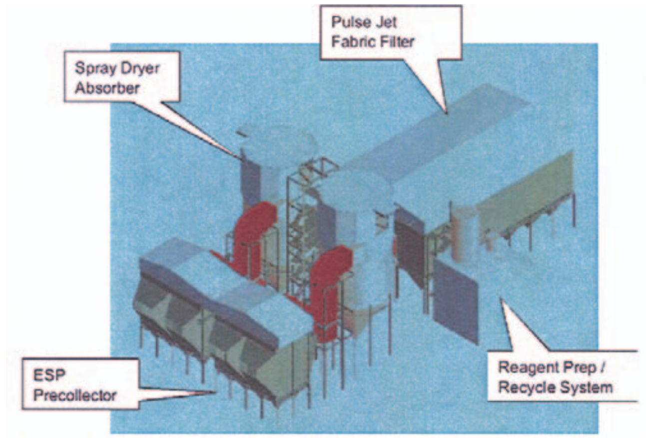


Figure 4: **Modern B&W DFGD System with Flyash Pre-Collection and Recycle**

A more in-depth perspective of particulate collectors associated with DFGD systems is available in technical paper BR-1743 which can be found on The Babcock & Wilcox Company's website, www.babcock.com. This paper also provides a life-of-plant economic model study comparing differing types of particulate collection scenarios (with and without ash recycle systems, ESP/pulse jet/reverse air evaluations, etc.) at two actual power plants which have existing DFGD systems in place.

To push or pull, that is the question *continued from front page*

The transport line pressure is monitored continuously and will close the gate valve of the hopper that is being fed if the pressure gets too high or too low.

Pressurized Systems

Pressurized systems consist of a blower, pressure relief valve, transport lines, equalizing valves, top gate valves, feeders, bottom gate valves, bottom feeders, hopper vibrators and level detectors. They operate on the following sequence.

1. The equalizing gate opens to equalize the pressure between the hopper and the feeder.
2. A few seconds later, the top gate is opened to allow the ash to drop from the hopper into the feeder.
3. The top gate closes and the equalizing gate closes to equalize the pressure between the feeder and the transport line.
4. The bottom gate opens and the ash in the feeder feeds down through the transport line to the flyash silo.
5. If the pressure in the transport line is too high, the bottom gate will close until the pressure is back to normal and will then reopen and allow the ash to feed out.
6. This sequence continues to allow the ash in the hopper to be removed before continuing to the next hopper.

Sometimes these systems have a maximum number of times a hopper can be fed and will then go to the next hopper. In this case, an alarm will sound to alert the operations personnel that the sequence has changed.

Vacuum Systems

Vacuum systems consist of a blower, transport line, pressure monitoring switch, and a gate valve. The vacuum system operates in the following way:

1. The gate opens and the ash is transported out to the flyash silo.
2. This is done in one continuous run per hopper unless the pressure in the transport line is too high. In that case, the gate closes until the pressure becomes normal.
3. Then the gate reopens and the ash feeds out, allowing the system to go to the next hopper.

continued on next page

Insulation and lagging is just as important as the flyash systems themselves. This is because flyash will not flow unless it is kept hot. Maintenance of the insulation and lagging is extremely important. This includes the insulation that runs parallel to the hopper walls and, in addition, the insulation that runs perpendicular to the hopper walls called chimney blocking. This insulation stops the possibility of cool air coming between the insulation and the hopper walls.

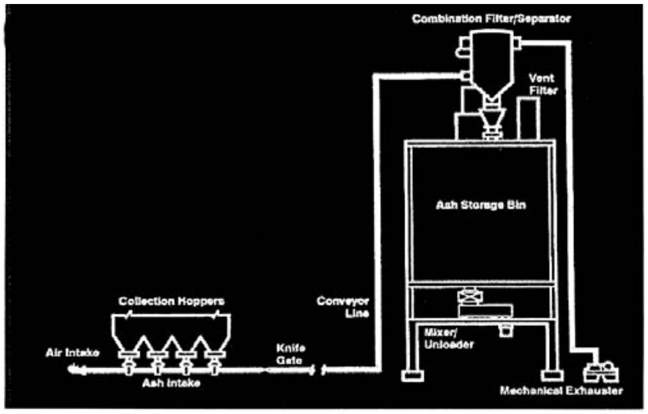
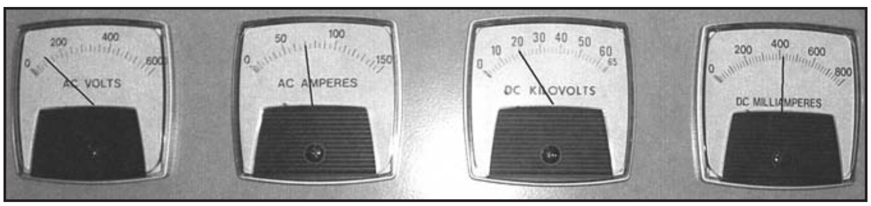


Figure 5: **Typical Vacuum System**

A good preventative maintenance program is necessary. Both operations and maintenance personnel need to walk down the equipment. Operations should check the system once per shift, checking the blowers and control logic. Maintenance should, once per week, visually check top and bottom gates, equalizing valve, blowers and motors. Semi-annual and annual checks should include opening up the equipment and inspecting for wear.

It is very important that the systems be maintained. Faulty operation can and will cause ESP grounds or baglife problems in fabric filters. These systems do not make electricity, but due to the new environmental regulation, they can reduce the amount of electricity that you can produce or even shut a unit down completely.

Art? Science? Skill? *continued from page 2*



Indication

Primary current and secondary current are normal or slightly higher than normal while the primary voltage and secondary voltage are much lower than normal. Spark levels are low to normal.

Probable Cause

This electrical condition is usually caused by heavy particulate buildup on the collecting electrodes causing a voltage drop across the collected particulate layer. This condition can be caused by the following:

- Heavy particulate buildup on the collecting electrode due to insufficient cleaning.
- Heavy particulate buildup on the collecting electrode due to an exceptionally sticky nature of the particulate.

May also be due to:

- Back Corona (back ionization) manifesting itself due to increased ripple on the KV signal as the precipitator tends towards being more resistive than capacitive.

In the next issue we will look at even more precipitator problems that can be diagnosed by properly interpreting electrical meter readings. Further information can obtained from Peter Aa at peteraa@redkoh.com

"Sheer" madness? Not hardly! *continued from page 3*

Kevin Burgemeister, Plant Engineer at Sheerness, has this to say regarding the installation and operation of the device:

"We were looking for a device that would provide an even temperature distribution to a temperature compensated airfoil in order to provide more reliable airflow control to our Pulverizers. The air mixing device from ASC provided the temperature profile we were seeking while the simple construction and ease of installation made this a cost effective solution."

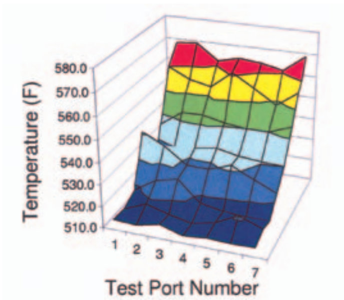


Figure 6: **Temperature Distribution Before Mixer Installation**

The techniques described here may be applied to any situation where flow streams of differing temperature and/or chemical content need to be combined and mixed in an efficient manner. The design parameters of the mixing device may be optimized using CFD (as in the ATCO case) or may be estimated using engineering experience (to reduce costs). The resultant improvement in mixing can be used to improve efficiency, increase throughput and reduce safety concerns.

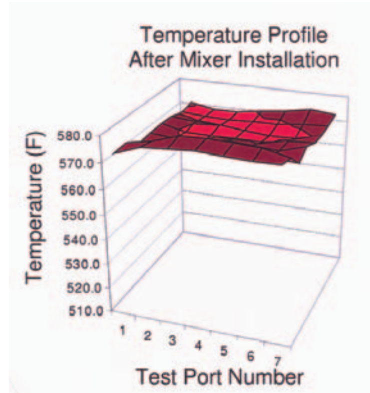


Figure 7: **Temperature Distribution After Mixer Installation**

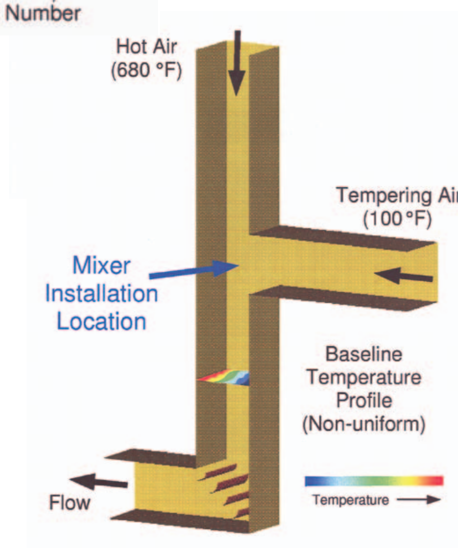


Figure 8: **Schematic of Pulverizer Inlet Ductwork**

As_2O_3 and Old Lace *continued from page 3*

The mechanism of arsenic poisoning is not fully understood but a high resistance towards poisoning by arsenic is clearly associated with the pore size distribution of the catalyst. The presence of a large amount of macro pores in combination with both medium and micro pores show increased resistance to arsenic poisoning due mainly to the capillary forces. The As_2O_3 is predominantly condensed in only small pores still allowing reaction with the active catalyst ingredients in the other pores.

Experimental laboratory data on Topsoe's highly porous DeNOx catalyst has demonstrated that deposition of approximately 1% Arsenic will have only a minor effect on the catalyst. This number is higher than we have observed presently in coal fired power plants both in the United States and Europe (see Figure 2 on page 3). Even with 5% arsenic accumulated in the catalyst pores, a significant activity is still observed.

Topsoe's DNX catalyst has operated on coal types from all over the world: Australia, Canada, Columbia, Poland, Russia and USA containing up to 50 ppm of arsenic. In all cases, the contribution to the deactivation caused by arsenic deposition has been found to be a minor contributor to catalyst deactivation. These units deactivation rates have been observed to be far less than 15% per 10,000 hours of operation, which is normal for coal-fired units.

Laboratory Experience

Through a vaporization process, As_2O_3 was deposited on Topsoe's DeNOx catalyst and the activity was measured. Afterwards the catalyst was analyzed for arsenic (see Figure 2.) A deactivation of only 10% is observed for an accumulation of 1% arsenic. Even with an arsenic deposition of 5%, a deactivation of only 40% is observed demonstrating the high tolerance of a multi-porous catalyst towards arsenic poisoning.

continued on next page

European Industrial Experience

The results from a 250 MWe power station in Denmark that has operated over 90,000 hours while burning over 60 different coals are shown below:

The graph shows the content of arsenic in the two catalyst beds. During the period from 0 to 10,000 hours, the boiler was burning coal from Russia with an arsenic content of approximately 50 ppm. A significant accumulation of arsenic was observed.

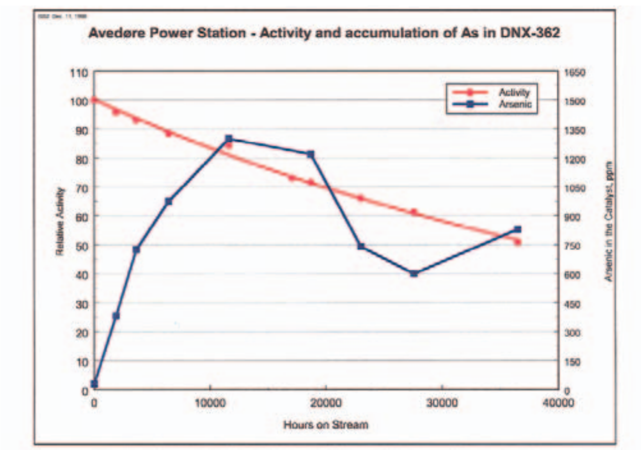


Figure 9: **Results from Avedore Power Station (A 250 MWe Power Station in Denmark) Activity and Accumulation of As in DNX-362**

In the period between 10,000 and 27,000 hours, the boiler was burning coal from Poland with an arsenic content of 15 ppm. This resulted in a lower vapor pressure of As_2O_3 in the flue gas and consequently, a decrease of the amount of As_2O_3 in the catalyst was observed.

After 27,000 hours the boiler switched to U.S. high sulphur coal and the arsenic content in the catalyst began to increase again. As expected, no unusual deactivation was observed.

United States Industrial Experience

The performance of Topsoe's DNX on U.S. high sulphur coal with up to 12 ppm arsenic and less than 1% calcium oxide was demonstrated at a Pennsylvania power station. Extruded, wash coated and standard plate catalyst had experienced a service life of less than 2,500 hours. Topsoe's DNX-564 catalyst operated for 3,100 hours, accumulating 2,070 ppm of arsenic and still retained an average 97% of its activity. The accumulation of arsenic had only a minor effect on Topsoe's catalyst deactivation.

The results from a 675 MWe and 160 MWe power stations are shown in Figure 10.

A very rapid accumulation of arsenic was observed in both stations over the first 8,000 hours of operation, see graph below. The accumulation of 8,500 mg/kg of arsenic on the DNX-758 catalyst and the accumulation of 7,500 mg/kg of arsenic on the DNX-664 catalyst had only a minor effect on Topsoe's catalyst deactivation. In fact, both plants are operating with less catalyst deactivation than normally observed in a high dust coal fired catalyst.

What can be clearly seen in the graph below is the effect of arsenic accumulation on standard DeNOx catalyst. The same arsenic accumulation would have resulted in a significant loss (> 50%) in catalyst activity if a standard DeNOx catalyst had been in service at either plant.

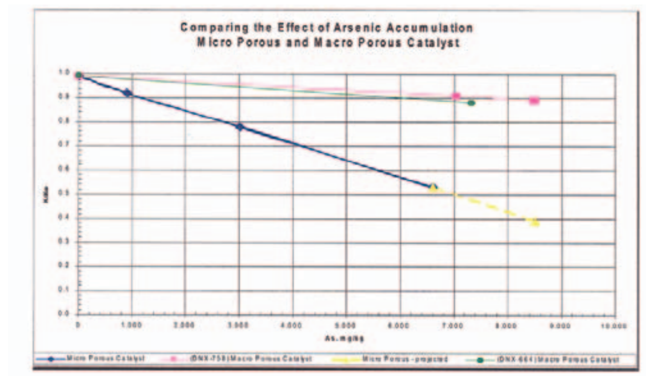


Figure 10: **Results from a 675 MWe and 160 MWe Power Stations Comparing the Effect of Arsenic Accumulation- Micro Porous and Macro Porous Catalyst**

Conclusion

Both industrial experience and laboratory tests show a very high capacity for arsenic in Topsoe's DNX catalyst. It appears that Topsoe's DNX catalyst is over two times more active at the same arsenic loading as standard DeNOx catalyst. Topsoe has also found that in normal operation with an arsenic content in the coal of up to 50 ppm, only a minor influence on catalyst performance and lifetime is expected.

Don't miss out....

The WPCA/Duke NOx Seminar

is coming to Duke Headquarters in Charlotte, NC, on June 7, 2005.

This is a free NOx O&M Seminar for all members of the WPCA.* If you are not a member and would like to join, go to www.reinholdenvironmental.com and click on the blue WPCA button on the left hand side of the home page, or call Reinhold Environmental at 847-291-7396.

***NOTE:** WPCA Members must be actual users of APC equipment.

*The WPCA is a not-for-profit organization

WPCA*/Duke NOx Seminar

June 7, 2005 • Duke Energy Corp. Headquarters • Charlotte, NC

Registration/Membership Form

Complete this form and mail to Reinhold Environmental, 420 Academy Drive, Northbrook, IL 60062 USA, or fax to 847-498-1512. You may also register for this event, and/or become a WPCA member, on-line at www.reinholdenvironmental.com On the home page, click the blue WPCA button on the left side of the screen.

Part I – Choose a Membership

(Note: WPCA members must be actual users of APC equipment. For further information, visit www.wpca.info)

- ❑ **$300 Lifetime Membership** includes free registration to all seminars and, upon request, a copy of each and every seminar proceeding
- ❑ **$90 3-year Membership** includes free registration to all seminars during membership period and, upon request, 1 copy of any 3 different seminar proceedings
- ❑ **$45 1-year Membership** includes free registration to all seminars during membership period and, upon request, 1 copy of any single seminar proceeding
- ❑ **I am currently a Member.** My membership is valid through June 7, 2005

Part II – Membership/Registration Information

Name Last (family name)________________ MI______ First (given)________________

Company/Utility________________ **Title/Position**________________

Address (street)________________ (city)________________

(state/province)________________ (country/postal code)________________

Phone(s)________________ **Fax**________________

Email________________

Part III – Payment Information

(please ignore this portion if your membership is current through June 7, 2005)

- ❑ ***Check enclosed.*** Check must be in U.S. currency drawn on U.S. bank. **Make check payable to WPCA.**
- ❑ ***Traveler Checks.*** All travelers checks accepted in all currencies.
- ❑ ***Money Orders.*** Money orders must be in U.S. currency.
- ❑ ***Credit card.*** Circle one: VISA Mastercard American Express

Card no.________________ Expiration Date________________

Address on card (if dfferent from above)________________

Cardholder's name (please print)________________

Cardholder's signature________________

Italicized code (on the back of VISA and Mastercard and the front of Am Ex)________________

WPCA/Duke NOx Seminar

June 7, 2005
Duke Energy Corporate Headquarters
Charlotte, NC

The WPCA and Duke Energy are hosting a free NOx O&M Seminar for all WPCA members. WPCA members must be actual users of APC equipment. If you are not a member, you must apply for membership when you register.

WPCA/Duke NOx Seminar
AGENDA
Tuesday, June 7, 2005

7-8 am	**Continental Breakfast/Registration at Duke Corporate Headquarters**
8-8:30 am	**Welcome and Introduction** *by Carol Goolsby, Duke, and William Armiger, WPCA*
8:30-9:30 am	**Overview of SCRs** *by Clay Erickson, Babcock Power*
9:30-9:45am	**Fifteen Minute Break**
9:45-10:15 am	**Overview of SCRs (continued)** *by Clay Erickson, Babcock Power*
10:15-11:45 am	**Lessons Learned: Discussion Panel** *Moderated by Scott Hinton, WS Hinton & Assoc. Panelists-Larry Hicks, AEP; Linton Hutchinson, Duke; Mike O'Connor, Cinergy; Rob Mudry, Airflow Sciences; Alan Paschadag, Advanced Burner Tech.*
11:45 am-12:45 pm	**Lunch**
12:45-1:30 pm	**Sonic Horns** *by Terry Farmer, GE Energy*
1:30-2:30 pm	**NH_3 Injection/Gas Mixing and the Effect on Reactor Performance** *by Kevin Rogers, B&W*
2:30-2:45 pm	**Fifteen Minute Break**
2:45-3:15 pm	**Ammonia Supply Systems** *by Chemithon*
3:15-4:15 pm	**Catalyst Management** *by Nate White, Haldor Topsoe*
4:15-5 pm	**SNCR – What is the Right Application?** *by William Sun, Fuel Tech*
5-6 pm	**WPCA Reception** *PCUG, Duke, and WPCA Attendees*

Hotel Information

Residence Inn • 404 S. Mint Street • Charlotte, NC

Phone: 1-704-340-4000 • Fax: 1-704-358-1211 • http://mariott.com

Group Name: Duke Energy/WPCA • Group Rate: $90.00

WPCA Directors

Airflow Sciences Corp.
Robert G. Mudry, P.E.
37501 Schoolcraft Road
Livonia, MI 48150 USA
Phone: +1.734.464.8900
Fax: +1.734.464.5879
Email: rmudry@airflowsciences.com
Website: www.airflowsciences.com

BHA Group/GE Energy
Mike Sedler
8800 East 63rd. Street
Kansas City, MO 64133 USA
Phone: +1.800.821.2222
Fax: +1.816.353.1873
Email: michael.sedler@ge.com
Website: www.gepower.com

F and M Resources
William Armiger
113 Edward Wyatt Drive
Williamsburg, VA 23188 USA
Phone: +1.757.258.3453
Fax: +1.757.258.4535
Email: wjarmiger@fandmresources.com
Website: www.fandmresources.com

REDKOH Industries
Paul Ford
125 Stryker Lane, Units 1-4, Building 29
Hillsborough, NJ 08844 USA
Phone: +1.908.874.5588
Fax: +1.908.874.7994
Email: paulford@redkoh.com
Website: www.redkoh.com

Advanced Burner Technologies
Alan E. Paschedag
271 Rt. 202/206
Pluckemin, NJ 07978 USA
Phone: +1.908.212.0106
Fax: +1.908.470.0479
Email: alan@advancedburner.com
Website: www.advancedburner.com

Chemithon
Norm Foster
5430 West Marginal Way S.W.
Seattle, WA 98106 USA
Phone: +1.206.937.9954
Fax: +1.206.932.3786
Email: nfoster@chemithon.com
Website: www.chemithon.com

Reinhold Environmental Ltd.
Susan Reinhold
420 Academy Dr.
Northbrook, IL 60062 USA
Phone: +1.847.291.7396
Fax: +1.847.498.1512
Email: sreinhold@reinholdenvironmental.com
Website: www.reinholdenvironmental.com

Wheelabrator Air Pollution Control
Buzz Reynolds
441 Smithfield Street, 5th floor
Pittsburgh, PA 15222-2292
Phone: +1.412.562.7102
Fax: +1.973.215-2.57
Email: jreynolds@wapc.aquilex.com
Website: www.wapc.com

Haldor Topsoe
Nathan White
17629 El Camino Real Suite 300
Houston, TX 77058-3051 USA
Phone: +1.281.228.5127
Fax: +1.281.228.5129
Email: tnw@topsoe.com
Website: www.haldortopsoe.com

Babcock Power Environmental
Tom Robinson
5 Neponset Street
Worcester, MA 01606 USA
Phone: +1.508.854.3762
Fax: +1.508.854.3800
Email: trobinson@babcockpower.com
Website: www.babcockpower.com

The Babcock & Wilcox Company
Greg Bielawski
20 S. Van Buren Ave.
Barberton, OH 44203 USA
Phone: +1.330.860.1591
Fax: +1.330.860.9222
Email: gtbielawski@babcock.com
Website: www.babcock.com

WPCA News

is a bi-annual newsletter sponsored
by and for the
Worldwide Pollution Control Association
www.wpca.info

Purpose:
To foster new ideas and greater awareness concerning pollution control in the energy industry

Publisher:
Reinhold Environmental Ltd.

Editor:
Susan D. Reinhold

Design Editor:
Nadine D. Burge

***Comments & Other Inquiries to*:**
Reinhold Environmental Ltd.
420 Academy Drive
Northbrook, IL 60062 USA
1.847.291.7396
sreinhold@reinholdenvironmental.com
www.reinholdenvironmental.com

The WPCA Welcomes its newest corporate sponsor: Advanced Burner Technologies

WPCA News Information Request: Return this form for additional material

Mail to Reinhold Environmental Ltd., 420 Academy Dr., Northbrook, IL 60062 USA, or fax to 1.847.498.1512, or email sreinhold@reinholdenvironmental.com

Your name______________________________

Company Name______________________________

Address______________________________

____

____

Phone/Fax______________________________

Email______________________________

I would like information regarding the following:

WPCA Director(s):____________________

____

☐ **WPCA Newsletter Subscription**

☐ **Future WPCA Conferences**

☐ **Membership in the WPCA**