

### AIChE DVS Meeting and Tour October 19th, 2004

#### Waste-To-Energy Plant Operation

**M**ontenay Energy Resources' mission starts from development to design and construction to operations, closely working with local communities to implement integrated waste management strategies in an environmentally sound manner. This is briefly described below.

**Waste Delivery:** Trucks deliver solid waste to the scale house of a facility, where the truck is weighed and identified.

**Waste Unloading:** The trucks unload waste into a storage pit in an enclosed tipping hall. The truck fumes and waste odors are drawn into the furnace by large fans to provide combustion air and to prevent any odors from escaping.

**Waste Feeding:** The Waste is inspected on the tipping floor or in the storage pit, prior to feeding the waste into the furnace by large overhead cranes.

**Waste Combustion:** The waste is burned at high temperatures (over 2000 deg F) in the furnaces. The waste moves through the furnaces through drying, combustions and final burnout stages over a 60 minute period.

**Energy Recovery:** The heat of waste combustion generates steam for use

*(Continued on page 2)*



*The Montgeny County Plant produces 36 megawatts/hour from 1200 tons/day of waste.*

**Meeting Date:**  
October 19<sup>th</sup>, 2004

**Location:**  
Tour - Montenay Energy Resources  
1155 Conshohocken Road,  
Conshohocken, PA 19428  
Appropriate dress is no shorts  
or open shoes.

Meeting - Champs Restaurant & Bar

**Tour Time:** 4:00 to 5:30 pm  
**Networking:** 6:00-6:30 pm  
**Dinner:** 6:30-8:30 pm

**Price:** Dinner \$25.

**RSVP:** Ajit Ghorpade,  
By October 12<sup>th</sup>, 2004;  
Email (preferred):  
ajitghorpade@verizon.net;  
Phone: 610 337-8525

### 20 years After Bhopal Chemical Process Safety

By Richard Kral

I t's a symbolic moment, the eve of the 20 year anniversary of the Bhopal Tragedy. Our Philadelphia Chemical Engineering Community wanted to do something about it. The result is an educational conference aimed at students and professionals for Chemical Process Safety set for Thursday Dec 2<sup>nd</sup> from 11:30 am to 8:45 pm at Widener University.



**Sharmila Rao**

Our speakers provide a 360 degree perspective on Chemical Process Safety. We feature Widener Provost and Sr, Vice President Dr. Jo Allen and Pennsylvania State Representative Thaddeus Kirkland for the educational and community perspectives. Dupont Vice President Eng & EHS James Porter will be the dinner speaker and will provide a view from the corporate management.

Other conference "perspectives" include Bhopal Historical, Ethical,

*(Continued on page 4)*

## Tech Tips - Reduce Emissions

by Lisa Walton, PE

**A** variety of technologies are used to reduce emissions from chemical facilities. Three basic ways to remove entrained chemicals from gas streams are:

- Scrub—using a packed tower or wet scrubber
- Burn—using a thermal oxidizer
- Filter—using a charcoal filter or dry scrubber.

Scrubbers are useful when the pollutant is soluble in water. Efficiency removals to five nines (99.999%) are easily obtained, making scrubbers the primary selection for toxic chemicals that can be neutralized. A packed tower scrubber is a column, filled with a depth of packing, a sump at the bottom, a spray header at the top and a pump for the recirculating scrubbing liquid. If the process supplies sufficient gas pressure to force the gas through the column and out the stack, a fan is not required. Otherwise, an exhaust fan provides the required pressure.

A venturi scrubber is similar to a packed tower, except that the pumped liquid provides the motive force for the gas. Additionally, part of the neutralizing reaction takes place in the venturi nozzle, reducing the packing depth.

If neutralizing won't work, the chemical is most likely a volatile organic compounds or VOC. They are destroyed through burning, typically in a thermal oxidizer.

The basic type of thermal oxidizer (TO) is a direct flame TO where the burner fires into the gas stream, and all heat is lost to atmosphere. A direct flame oxidizer can provide organic destruction efficiencies in excess of 99.99 %

Regenerative and recuperative types are designed to recover the heat generated by combustion. A regenerative TO uses multiple beds of ceramic media, while a recuperative uses air-to-air heat exchangers to heat the incoming air. Typically, a regenerative TO offers better heat recovery (approximately 95%), with lower destruction efficiency (99%) than a recuperative TO (75% and 99.9% respectively).

Another option, the flameless TO, heats ceramic media to high temperature using electrical resistance or gaseous fuels, resulting in very low levels of NOx formation. A flameless TO can also include heat recovery of approximately 80%, and achieves organic destruction efficiencies in excess of 99.99%

Filters are very practical for small, at-source applications, but can also be used in larger plant-wide systems. Particulate is easily filtered using paper mesh filters, and VOCs can be filtered through charcoal filters. For other aggressive chemicals, a dry scrubber can be utilized.

Dry scrubbers are relatively new to the

*(Continued on page 5)*

## October Tour

*(Continued from page 1)*

in making electricity. After providing for in-plant electrical needs, excess energy is then sold to the local electric utility.

**Residue:** After the combustion of the waste, ferrous metals are removed from the remaining residue by magnetic separation. These ferrous metals are then recycled. The remaining residue can be beneficially reused or recycled, further reducing reliance on land filling.

**Pollution Control:** State-of-the-art pollution control equipment removes acid gases and other air emissions following the waste combustion process. Clean Air Act and other environmental standards are achieved through a combination of equipment such as baghouses, and scrubbers. In March 1999, the facility began operation of a Sorbalime Injection System for mercury emissions reduction in accordance with MACT (Maximum Achievable Control Technology, and in September 1999 the facility commissioned a NoxOut Injection system for Nox emissions reduction in accordance with RACT (Reasonable Achievable Control Technology).

*(Continued on page 5)*

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## Chemical Engineers Invited to Bhopal

By David Salas

**T**wo Chemical Engineers with Philadelphia connections will visit the site of the Bhopal tragedy on its 20th anniversary this coming December. Dennis C. Hendershot and Scott A. Berger were invited by the Indian Institute of Technology in Kanpur, India to be Presenters for a three-day conference to commemorate the 20<sup>th</sup> anniversary of the Bhopal tragedy. The three-day conference includes a visit to Bhopal site, paper presentations, technical sessions and exhibitions. Dennis and Scott both have spent many years at Rohm and Haas and they currently reside in the Broader Philadelphia area. Dennis will participate as a member of the Conference Advisory Committee, and will present a paper (title: "Some Reactive Chemistry Incidents and How They Could Have Been Prevented"), and conduct a course on inherent safer design. Scott will represent the Center for Chemical Process Safety.

The Center for Chemical Process Safety (CCPS) was founded in 1985 shortly after the 1984 Bhopal incident to develop technology and management practices that mitigate or eliminate chemical process accidents. CCPS will celebrate its 20<sup>th</sup> anniversary at its 20<sup>th</sup> International Conference, April 11 – 13, 2005, in Atlanta, GA. Please see [www.aiche.org/ccps/icw](http://www.aiche.org/ccps/icw) for details.

To learn or register to the Conference to commemorate the 20<sup>th</sup> anniversary of the Bhopal tragedy in Kanpur, India, visit <http://www.iitk.ac.in/infocell/announce/bhopal/>



**Dennis C. Hendershot** received his B.S. in chemical engineering from Lehigh University. Prior to graduate school,

Dennis worked for Rohm and Haas as a research process engineer where he performed different assignments such as process development, scale ups, and economic analyses. While working in Rohm and Haas, Dennis returned to school to earn his M.S. in chemical engineering from the University of Pennsylvania. With over 25 years working in Process Hazard Analysis, Dennis is currently a senior technical fellow in the Process Hazard Assessment Department at the Rohm and Haas Engineering Division in Croydon, Pennsylvania. He has been involved with the development and application of hazard analysis, risk management, and safety engineering tools, with particular emphasis on inherently safer design, process hazard analysis, and quantitative risk analysis. Dennis is a fellow of the American Institute of Chemical Engineers (AIChE) and he has been active in the Center for Chemical Process Safety (CCPS). Dennis is dedicated to teach future students and professionals about the dangers of failing to manage the hazards of chemical plants.



**Scott A. Berger** received his B.S. and M.S. in chemical engineering from the Massa-

chusetts Institute of Technology. He began his career at Rohm and Haas where he held positions in the departments of research and development, engineering, production, and environment, health and safety. Scott also worked with Owen Corning as the Director of Strategic EHS Management before coming to the Center for Chemical Process Safety. After a 25-year career working in and with industry to foster and develop "greener" and "inherently safer" technologies, Scott is now the Director of the Center for Chemical Process Safety, an Industrial Technology Alliance of the American Institute of Chemical Engineers. Scott devotes his career to bring together engineers, expert consultants and government representatives to improve chemical process safety for the prevention, mitigation and resource recovery of chemical process accidents.

Earlier this year, the History Channel interviewed Scott about Chemical Process Safety for their Modern Marvels Show. The show featuring Scott's interview will be transmitted on October 19, 2004.

## Professional Development By Mark DeLuca

Over the summer the list of job seekers grew to 27 engineers. This month, two people found jobs, one as a chemistry teacher in Philadelphia, and the other as a Federal employee in Denver Colorado. Neither of them got a job in local manufacturing, the mainstay of employment for the majority of our members. Looking at the huge investments being made in China, it is easy to understand why so many bulk chemicals are now made there. The technical jobs will soon to follow, because the Chinese workforce will be right there where the process is and we will be half a world away.

We have to stay ahead of the curve and that means investing in our careers. Staying current with regulatory affairs and increasing the level of your credentials can help.

For those planning to take the P. E. exam in April, 2005, Ross Topliff [rosst@medasorb.com](mailto:rosst@medasorb.com) is looking to form a study group.

As for the jobs that are still here in the local area, I am always amazed when someone in HR pays an agency \$30K for a same resumes they can get from me for free. Fortunately employers are beginning to contact me directly

Below is an example:

I work for a small consulting company that is headquartered in San Francisco, but I manage our office in Lawrence-

ville, NJ. We specialize in process safety, risk management, and process security for the chemical/process industry. We define that term broadly to include petroleum, petrochemical, chemical, as well as pharmaceutical, food processing (if they use ammonia as a refrigerant), and other similar facilities. Although most of our clients are subject to the PSM or RMP regulations, some are not and hire us for other reasons. The security of these facilities has been a strong component of our business over the past few years.

We are looking for additional staff, however, the candidates should have some experience as consultants, or at a minimum, experience in process safety or security at a chemical/processing facility. We do not perform design or construction management services. If you know of someone with our desired skill set who is looking for work please forward their resume or contact information to me. My contact information is

Michael J. Hazzan, P.E.  
Manager, Eastern Business Unit  
Chemetica Inc./Acutech Consulting Group  
1911 Princeton Ave.  
Lawrenceville, NJ 08648  
Tel: 609-695-1670  
E-fax: 425-940-8491  
[mhazzan@acutech-consulting.com](mailto:mhazzan@acutech-consulting.com)

Mr. Hazzan would like to hire someone from our membership. AIChE is the best source of chemical engineers. Is your company looking to hire? While I can't post every job in the newsletter, I will forward all job information to the job seekers.

Until next month . . .

## 20 years After Bhopal

*(Continued from page 1)*

Process Safety Management (PSM), HAZOP, Inherently Safer Design (CCPS), Process Simulation for Safer Design, Chemical Accident Prevention Plan (EPA), Responsible Care (American Chemical Council, ACC), a student poster contest and an original musical composition. A very unique perspective, from a young person growing up in India and becoming a Chemical Engineer, which will be delivered by Ms. Sharmila Rao. Sharmila is a second year Chemical Engineering Graduate student at Widener University. She is a member of the Collagen Research Group under the direction of Professor Jerry Maffia. Sharmila received her undergraduate degree from The University of Karnataka in India. She is presently doing extensive research and presenting papers. (Editors note: also in this issue is a story about two area chemical engineers who are invited to visit the Bhopal site to mark the anniversary).

Our conference schedule is accommodating. Get in a morning's work and get over to Provost Jo Allen's welcoming remarks at 1 pm or "flex-out" to catch Representative Kirkland in late afternoon. If you just cannot get out of the office, come for social hour and dinner to hear keynote speaker James Porter.

The conference price is attractive: \$25 (\$15 students), which includes a complimentary lunch, afternoon coffee, cash bar social hour, and dinner. Dinner has an interesting twist because it will be prepared and served by Widener's hospitality school. For more information and for booking reservations check-out our conference website <http://quantum.soe.widener.edu:281/ps1.htm>

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**Tech Tips - Reduce Emissions**

*(Continued from page 2)*

market. A typical dry media filter is composed of alumina sulfate.

Paper filters are utilized to remove smoke and particulate fumes down to HEPA standards. Filters can be either cleanable or disposable. Charcoal filters can be emptied and refilled for several cycles, providing an economical choice for solvents.

As with all engineering applications, knowledge of available technologies is the engineer's first defense.

**October Tour**

*(Continued from page 2)*

**In Communities that source reduce recyclable materials**, an intermediate processing or material recovery facility can be coordinated with a waste-to-energy facility in an integrated solid waste management system. For those communities that do not source separate recyclable, a waste-to-energy facility can easily be designed to incorporate a front end separation system to separate unprocessed waste into recyclable materials and fuel.

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## inside...

**Oct. Meeting Info**  
**20 Years After Bhopal**  
**Tech Tip**

page 1  
page 1  
page 2

**Philadelphia ChEs to Bhopal**  
**Professional Development**  
**DVS AIChE Officers**

page 3  
page 4  
page 5