

Safety & Health News

AIChE

AMERICAN INSTITUTE OF
CHEMICAL ENGINEERS

SAFETY AND HEALTH
DIVISION
www.shdiv.aiche.org

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CHEMICAL ENGINEERING STUDENTS AND PROCESS SAFETY

There were a number of awards presented to chemical engineering students at the AIChE Annual Meeting in San Francisco in November. Of specific interest, are the awards involving process safety issues.

The **Ted Ventrone and Ephraim Scheier Awards for the Application of the Principles of Inherent Safety** are sponsored by the Safety and Health Division. Winners are selected by a subcommittee of the Division. The awards are granted to the teams or individuals who apply one or more of the following concepts of inherent safety in the Annual AIChE National Student Design Competition: (1) design the plant for easier and effective maintainability; (2) design the plant with less waste; (3) design the plant with special features that demonstrate inherent safety; and (4) include design concepts regarding the entire life cycle. The design report must include a separate section titled "Inherent Safety" to describe the appropriate design features. Two winners were selected for 2006 - the **University of New Hampshire** team consisting of Ali M. Ali, Eric Beauregard, and John Kaye with P. T. Vasudevan as faculty advisor, and the **South Dakota School of Mines** team consisting of Brandon Coyle, Daniel Hammarsten, and Jeremiah Shumway with David Dixon as faculty advisor.

The **Walt Howard and Jack Wehman Design Awards for the Application of the Principles of Chemical Process Safety** are sponsored by Safety and Chemical Engineering Education (SACHE), an entity of the Center for Chemical Process Safety. The awards are presented to the individual and to the team for the best application of the principles of process safety in the Annual AIChE National Student Design Competition. For 2006, the Jack Wehman Team Award was won by the **Lamar University** team consisting of Thomas Cobb, Achala Naphad, and Brandi Ray with Carl Yaws as faculty advisor. The Walt Howard Individual Award was granted to **Adel Ghaden** of **Virginia Tech** with Y. A. Lui as faculty advisor.

The **Chem-E-Car Competition** was established to provide chemical engineering students with the opportunity to participate in a team-oriented hands-on design and construction of a small chemical powered model car; to design and construct a car that is powered with a chemical energy source that will carry a specified load over a given distance and stop; to encourage students to become active in their professional society; and to increase awareness of the chemical engineering discipline among the general public, industry leaders, educators, and other students. As part of this competition, SACHE sponsors an **Award for the Best Application of Chemical Process Principles in the Design and Operation of the Chem-E-Car**. The 2006 winner was the **Michigan Technological University** team of the Chemical Engineering Department. The members of the team were Terry Mazure (team leader), Warren Ball, Elizabeth Haibel, Jake Lundmark, Dave Marhevka, Phil Rausch, and Sten Schuler, with Jason Keith as the faculty advisor. ■

Safety & Health News is issued quarterly by the Safety and Health Division of the American Institute of Chemical Engineers (AIChE). It is available on the Division web site: www.shdiv.aiche.org. Since news items of interest to members of the Division of Chemical Health and Safety (CHAS) of the American Chemical Society (ACS) are included, this Newsletter is also available on the CHAS web site: <http://membership.acs.org/c/chas/>.

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AICHE SAFETY AND HEALTH DIVISION UPDATE

BOB BENEDETTI, CHAIR

Third Annual Global Congress on Process Safety. Plans for the Third Annual Global Congress on Process Safety, to be held as part of the 2007 AIChE Spring National Meeting in Houston on April 22-26, are coming together and are currently being implemented. The Safety and Health Division Program Area 11a recently held a telephone conference for final selection of the papers to be presented in the 41st Annual Loss Prevention Symposium. A fine collection of proposals had been received. Six sessions are scheduled. The program outline appears on page 9.

Meanwhile, the Safety and Health Division Program Area 11b has been putting together the 9th Process Plant Safety Symposium, also to be part of the Third Annual Global Congress on Process Safety. The program outline of the six scheduled sessions appears on page 10.

The third component of the Third Annual Global Congress on Process Safety is the 22nd Annual CCPS International Conference which is organized by Karen Person of the Center for Chemical Process Safety. Of course, there is close coordination of the development of this symposium with the organizers of the two symposiums which are the responsibility of the Safety and Health Division. The CCPS Symposium is outlined on page 11.

I hope you will plan to attend this Global Congress. The venue is the Houston Hilton Hotel and the George R. Brown Convention Center. At this writing, the process safety sessions are scheduled for the Houston Hilton.

Vacancies on Program Area 11a. I would like to point out that recent changes in the Organization and Operating Procedures for Program Area 11a have increased the number of members from 20 to 25. At this time, there are a few vacancies. Anyone interested in participating in this august group concerned with the development of the annual Loss Prevention Symposiums is encouraged to contact me for more information: Bob Benedetti, bbenedetti@nfpa.org or 617-984-7433.

Future Programming Plans. The 42nd Annual Loss Prevention Symposium is scheduled to be held at the 2008 AIChE Spring Meeting in New Orleans, April 6-10, 2008. Will there also be a Fourth Global Congress on Process Safety? Of particular interest is the fact that the ACS will be meeting in New Orleans at the same time, suggesting the possibility of some joint programming efforts with the ACS Division of Chemical Health and Safety (CHAS).

Looking further into the future, the World Congress of Chemical Engineering will be held in August 2009 in Montreal. Several representatives of the Canadian Society of Chemical Engineers (CSCHE) invited the Safety and Health Division to participate. Preliminary plans are now that the Global Congress on Process Safety will be held at the World Congress instead of at the 2009 AIChE Spring National Meeting.

Buncefield Tank Fire. In my last report, I mentioned the availability of the initial report of the Buncefield Major Incident Investigation Board. The report, along with prior progress reports, can be downloaded from: www.buncefieldinvestigation.gov.uk/reports/index.htm. The progress reports must be read to gain a full appreciation of the incident. Some of the pertinent issues are: (1) the cause of the spill and ensuing fire attributed to overfilling of a tank; (2) release of both fuel and water/foam mixture from fire fighting were the result of lack of proper spill containment; and (3) the force of the initial and subsequent explosions was unusually violent. With respect to the final point, one can only gain an appreciation of the magnitude of the explosion by seeing photos of the devastation - they are breathtaking. It is no wonder the damage is most often compared to damage sustained during warfare. And, it is ironic that the initial ignition source appears to have been start-up of a fire truck that was situated close to the tank from which the spill began.

It is surmised that gasoline spewing out of the overflow line cascaded down the tank shell, hitting a girder. This caused break-up of the flowing stream, resulting in a spray of fine droplets. This might have created a mist which, coupled with the delayed ignition, resulted in an incredible blast. This incident occurred on a Sunday morning. Judging by the damage sustained by nearby buildings adjacent to, but not part of the Buncefield complex, the number of deaths and injuries would have been substantial had the incident occurred during a workday.

As stated in my prior report, the petroleum and chemical industries are paying close attention to this incident. Codes and standards development groups are also reviewing the report to determine whether or not there are changes needed in certain consensus codes.

In Conclusion. If you are interested in participating more actively in the Division affairs or if you have some ideas or thoughts related to programming or other activities, please let me know at bbenedetti@nfpa.org or 617-984-7433.

Bob Benedetti

OBITUARIES

Walter B. Howard. Walt Howard died on October 30. Well known for his extensive activities in the process safety field, he worked for Monsanto for a number of years and then, upon retirement, established himself as a Process Safety Consultant. He earned BS, MS, and PhD degrees in chemical engineering from the University of Texas - Austin. He was a Fellow of AIChE and a member of the Safety and Health Division. Noteworthy in his lengthy and successful career were his efforts in establishing the Loss Prevention Symposium, first held in 1967 and then annually since. While serving as the Technical Program Chairman for the AIChE 1965 Spring National Meeting, he arranged a well attended session on process safety which germinated the need for more such sessions. His follow up work led to the first LPS. During the early symposiums, question and answer periods following a paper or a session were recorded and transcribed. Walt Howard, Trevor Kletz, and Bill Doyle could always be counted on to have cogent remarks. He later became the guardian of paper and slide quality. In 1987, he was honored by AIChE in presenting the 39th Annual Institute Lecture which he entitled "Chemical Process Safety, and Industry's Responsibility." That same year, he was the recipient of the first Walton-Miller Award given by the Safety and Health Division for outstanding contributions to the process safety field and to the work of the Division.

William J. Minges. Bill Minges died recently. A member of AIChE, he earned his BS degree in chemical engineering at Notre Dame University. He served Union Carbide Corporation for 36 years in a variety of senior management, financial control, and marketing posts in its chemicals, plastics, and agricultural businesses. After retirement, he joined the Center for Chemical Process Safety as a staff consultant in 1989. At CCPS, he was heavily involved with the Vapor Cloud Modeling Subcommittee, the Vapor Cloud Explosion Subcommittee, and the International Vapor Cloud Research Committee for which CCPS served as the Secretariat.

Harry H. West. Harry West died suddenly at his residence in Houston at age 63. He held a bachelor of science degree from Bucknell University and a doctorate degree from the University of Oklahoma, both in chemical engineering. He was a member of AIChE and the Safety and Health Division. He had more than 35 years of experience in the areas of chemical process/safety analysis, environmental assessment, and regulatory compliance for the natural gas, petroleum, and chemical industries. He was founder and president of Shawnee Engineers in Houston. He was a faculty member at Texas A&M University and was active there at the Mary Kay O'Connor Process Safety Center. Harry was an avid leader and supporter in process safety and was an energetic supporter of the Safety and Health Division Process Plant Safety Symposiums.

CALL FOR PAPERS 52ND ANNUAL SAFETY IN AMMONIA PLANTS AND RELATED FACILITIES SYMPOSIUM



The 52nd Annual Safety in Ammonia Plants and Related Facilities Symposium, organized by the Safety and Health Division Area 11c, is scheduled to be held on September 16-20, 2007, at the Hyatt Regency Lake Las Vegas in Henderson, NV. This symposium attracts experts of safety interest in plants that manufacture ammonia, urea, nitric acid, ammonium nitrate, and methanol. International speakers are included in this popular symposium. Papers are solicited that include plant incidents or learning events, incident responses, mechanical reliability issues, operation issues, and projects that improve reliability and economics for facilities. Papers on process or product innovations are welcomed, particularly in conjunction with a plant application. Timely topics for 2007 could include: (1) alternate hydrogen sources (coal or petcoke gasification), (2) natural disaster or incident disaster response, (3) applications of ISA 84 in existing facilities, (4) plant incidents and learning experiences, and (5) successful implementation of innovative repairs.

The Program Chair is Harrie Duisters, Ammonia Technology Manager, DSM Agro, P. O. Box 291, 6160 MG Geleen, The Netherlands.

To submit a Proposal-to-Present, please prepare an abstract that should not exceed 1500 words including title of the presentation, and be sure to include author(s), identifying the speaker, and full contact information. This should be sent via e-mail to harrie.duisters@dsm.com no later than **December 31, 2006**. ■

GLOBAL HARMONIZATION SYSTEM AND CHEMICAL HAZARD COMMUNICATION

Significant Changes are on the Horizon for all MSDS Users and Preparers

JIM KAPIN, CHAIR, ACS CHEMICAL HEALTH AND SAFETY DIVISION

In the September 7, 2006, *Federal Register*, OSHA published an Advance Notice of Proposed Rulemaking (ANPR) seeking public comment on the implementation of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The GHS includes criteria for classifying substances and mixtures according to their health, environmental, and physical hazards, standardized label elements (pictograms, signal words, hazard and precautionary statements for each hazard class and category), and standardized format and contents for Material Safety Data Sheets (MSDS). Adoption of the GHS by OSHA will require OSHA to propose changes to the current Hazard Communication Standard (29CFR1910.1200). In addition, adoption of GHS could lead to changes in a number of other OSHA standards. Personally, as a safety professional, and also in my capacity as 2006 Chair of the ACS Chemical Health and Safety Division (CHAS), I strongly support the adoption of the GHS for hazard communication in general and specifically as outlined in the ANPR.

OSHA implementation of GHS in the United States will enhance protection of human health and the environment through warnings and precautionary language that are consistent across different products and materials as well as across all workplaces. Currently, depending on where the materials are used, manufactured, or transported, each may need to be classified by over 15 different agencies and systems to comply with applicable regulations. The GHS documentation has an example showing over 12 different classification systems for toxic materials. Personally, in our office, we have compiled a table showing over 15 different classifications for flammable substances. This variety of classification schemes frequently requires manufacturers and distributors to provide redundant or duplicative labeling, and requires workers to interpret and evaluate confusing terms such as "Toxic," "Highly Toxic," "Very Toxic," and "Extremely Toxic," as well as terms such as "D2A" or "Packing Group 2." Clearly replacing these classification systems with a single, globally harmonized system would reduce the burden on manufacturers and distributors. Also, providing consistent terminology will greatly aid the worker in understanding the real significance of the hazard associated with a particular chemical substance. I think the regulations proposed by OSHA are a significant step in that direction.

In addition, the current OSHA requirement for hazard communication in the workplace, the Hazard Communication Standard (HCS), is a "performance standard." This allows the preparers of warnings, labels, MSDSs, and other hazard communication documents a great deal of flexibility. Compared to conditions that prevailed prior to the adoption of the HCS, this approach has proven effective, and the situation was greatly improved. Label language is better and more descriptive, warnings are more consistent, and nearly all workers can access an MSDS to learn more about the hazards of the materials with which they work. However, anyone who has reviewed MSDSs critically can also see the shortcomings of the current system. MSDSs for similar substances can vary greatly in content, warnings, and even hazard classifications. MSDSs can vary significantly in length; even those that are relatively short can be difficult to interpret for many workers. In addition, concerns about liability drive many MSDSs to be extremely conservative in their warnings, protective equipment recommendations, and other guidance areas. These problems, such as the soap MSDS that warned users to wash with soap and water if they got any on their skin, can rob MSDSs of much of their utility.

Replacing the current system with one that provides specific guidance for the classification of substances and mixtures, and then provides specific guidance for appropriate warnings and appropriate MSDS content will remove much of the variability. The promise of the GHS is that a given material, whoever the manufacturer or distributor, will have a similar classification, similar label language, similar precautions, and similar work procedures outlined in the MSDS. These documents will then be easier to prepare and easier to understand, with a resultant improvement in the safety of workers.

That is not to say that there will not be significant hurdles to overcome in order to implement this new system. If adopted, there will be a significant work load for chemical producers and distributors to produce compliant warnings, and significant training will be required for all chemical handlers to familiarize them with the new system with the associated warnings, pictograms, etc. Also, it is important to note that the OSHA proposed regulations can be applied only to workplaces in the USA. Classification and labeling of materials for transport in the USA are already largely harmonized with international regulations. Other areas, most significantly the harmonization of consumer product classifications in the United States, are not nearly as advanced. Therefore, adoption by OSHA of the GHS may be only one step in a long process towards global

(CONTINUED ON PAGE 5 - SEE GHS/HAZARD COMMUNICATION)

GHS/HAZARD COMMUNICATION (continued from page 4)

harmonization of chemical hazard communication regulations, but it is a very important step.

Conclusion: Adoption of the GHS, as proposed by OSHA, promises improved protection of human health and the environment through warnings and precautionary language that are consistent across different products and materials as well as across all workplaces. The proposed approach will address weaknesses and limitations in the current system, and will, result in more effective warnings. Although implementation will require significant effort on the part of OSHA, manufacturers, distributors, and employers, CHAS strongly supports the adoption of the GHS for hazard communication in general, and specifically as outlined in the ANPR.

OSHA has committed to propose regulations on the subject during the first part of 2007. Once the proposed regulations are published, I hope that CHAS and the AIChE Safety and Health Division can work together to provide constructive comments to OSHA. By building a strong consensus within and between our two organizations, we can help shape regulations that will impact us all and that represent a significant step forward from the current system.

Please contact me at jim@chemical-safety.com to discuss this issue or to discuss any issues or ideas relative to the activities of the ACS Chemical and Health Division.

Jim Kapin MPH, CIH, REA

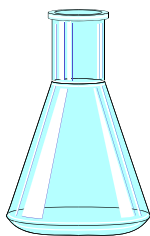
[Jim Kapin, 2006 CHAS Chair, is a Chemical Safety Consultant with Advanced Chemical Safety. He can be reached at jim@chemical-safety.com or 619-990-5955.]

CHAS AWARD WINNERS

CHAS recently announced the 2006 winners of two major awards. The **Howard Fawcett Chemical and Safety Award** was presented to **Dr. Jeff Burton**. This award recognizes and encourages outstanding contributions to the field of chemical health and safety. Dr. Burton is a strong advocate of safety and health practices in the laboratory and in safe laboratory design. He has been particularly active in the field of industrial ventilation from the safety standpoint.

Barbara Foster of West Virginia University was the recipient of the **Tillmanns-Skolnick Award** which recognizes outstanding service to the Division. Barbara has been very active in CHAS affairs for a number of years. She is currently Chair-Elect of CHAS and is Secretary of the ACS Joint Board-Council Committee on Chemical Health and Safety.

There was no College and University Award presented this year due to lack of nominations. The Award is established to recognize the most comprehensive safety program in higher education at the undergraduate level. ■

CHAS SESSIONS IN CHICAGO

The following CHAS sessions are planned for the 233rd ACS National Meeting in Chicago, March 25-29, 2007. Debbie Decker, University of California - Davis, is the Spring Meeting Program Chair.

- "Chemical Health and Safety," Organizers: Russ Phifer (WC Environmental) and Frankie K. Wood-Black (ConocoPhillips)
- "Chemical Safety in a Clinical Setting," Organizer: Kathryn G. Benedict (Pfizer Global Research and Development)
- "New Perspectives in Managing Laboratory Wastes," Organizers: Russ Phifer (WC Environmental) and E.A. Talley (Cornell University)
- "Special Regulatory Requirements for Chemical Security," Organizers: Neal Langerman (Advanced Chemical Safety) and Kim Jeskie (Oak Ridge National Laboratory)
- "Teaching Safety: Learning By Accident," Organizers: George Wahl (North Carolina State University) and Tom Murdock (Medtronic)
- "Safety and Health Issues for Small Chemical Businesses," joint with the Division of Small Chemical Businesses.

For registration and further information, see <http://chemistry.org/meetings>.

THE CCPS PAGE CENTER FOR CHEMICAL PROCESS SAFETY

MAJOR RELEASE OF BOOKS

CCPS is expected to release five new books just about the time of the Third Global Congress on Process Safety scheduled for April 22-26, 2007, in Houston. A special event is planned to celebrate this bounty of new and important material. The five books are:

- **Guidelines for Risk-Based Process Safety.** This new book will establish a paradigm shift for industries that manufacture, consume, or handle chemicals with a focus on new ways to design, correct, and improve process safety management practices. The book has been developed as Project #179.
- **Guidelines for Management of Change for Process Safety.** This book will provide an up-date guide that describes the best current thinking about Management of Change (MOC) from the process safety perspective. The book was developed under Project #180.
- **Guidelines for Pre-Startup Safety Review.** Guidance to those having responsibility for scheduling and executing a pre-startup safety review is outlined in this book. A protocol and a tool for use by project and turn-around teams are provided (Project #184).
- **Guidelines for Safe and Reliable Instrumented Protective Systems.** This guidelines book will help engineers design instrumented protective systems (Project #159).
- **Inherently Safer Processes (2nd Edition),** This is an update of the 1995 "Gold Book" to address experience gained in the last ten years in the consideration of inherently safer processes, including practical guidance and useful tools. This book was developed under Project #183.

The special event recognizing the issuance of these books is another excellent reason to attend the Third Global Congress on Process Safety. ■

CCPS POTPOURRI

NEW BOOK. *Human Factors Principles for Improving Performance in the Process Industries* was released on December 1, 2006. This new book is written in user-friendly style. It features an accompanying CD of the book in full color.

NEW STAFF MEMBER. Robert Coulter joined the CCPS staff as the staff consultant in charge of the web community. He is overseeing the new CCPS discussion board and blog, and will be coordinating the CCPS web content project.

INTERNATIONAL DEVELOPMENTS. CCPS will hold a joint workshop with the Indian Chemical Council in Mumbai on December 13-14, 2006. In addition, CCPS is working toward establishing operating chapters in China and India. Please encourage your colleagues in these regions to participate. If you have any questions, please contact Karen Person at: karep@aiiche.org.

CCPS MEMBERSHIP. CCPS continues to grow, reaching a record high recently of 86 member companies and organizations. The number of member companies headquartered outside the USA also continues to grow. The emeritus member program also continues to expand. Emeritus membership allows retirees who participated in CCPS during their careers to continue participation. For further details, contact Karen Person at karep@aiiche.org.

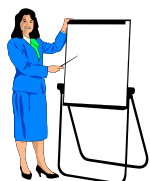
CCPS INTERNATIONAL CONFERENCE. The 22nd Annual CCPS International Conference is scheduled as part of the Third Global Congress on Process Safety to be held during the AIChE Spring National Meeting in Houston on April 22-26, 2007. The CCPS program is on page 11. ■

WEB KNOWLEDGE AND CCPS COMMUNITY

The scope here, as Project #181, is two-fold, involving a "static" portion and a "live" chat portion. The static portion is aimed at developing CCPS resources and guidelines into an on-line, topic-driven format to build process safety knowledge and disseminate globally. The second portion involves a live CCPS blog. Initially this blog will be open only to CCPS members and will be an environment for discussion, surveys, feedback, and similar on all things about process safety. The blog portion is now live and can be accessed by CCPS members. There will be continued structure of the live portion to develop the web community/chat room feature. The static content is currently being developed.

SAFETY NOTES

- The Dow Chemical Company was recently recognized by OSHA as a Voluntary Protection Program (VPP) "Corporate Pilot." The VPP Corporate Pilot Program streamlines the application and onsite evaluation processes for corporations that have made a commitment to VPP. The Dow process safety management program, and internal and external awareness of safety and health goals and results, are particular areas of excellence.
- Two Northwestern University graduate students were injured in early October in a chemical explosion at a campus laboratory. A reaction between two chemicals sparked the explosion and a small fire inside the school's Technological Institute. The identities of the two chemicals were not disclosed. The two students were treated for burns at a local hospital. The fire was contained to the laboratory, and was quickly extinguished.
- The National Toxicology Program (NTP) of NIEHS recently announced its proposed review process for nominations for the Twelfth Edition of the Report on Carcinogens (RoC). The RoC is a congressionally mandated document published by the Secretary of Health and Human Services that identifies agents, substances, mixtures, or exposure circumstances that may pose a carcinogenic hazard to human health. The two new important elements in the proposed RoC review process are: (1) the public peer review of draft background documents by *ad hoc* scientific expert panels, and (2) the peer review of draft substance profiles by the NTP Board of Scientific Counselors.
- OSHA recently posted on its web site a new fact sheet focusing on the *Health Effects of Hexavalent Chromium*. The document, one example of compliance assistance that will complement an OSHA final standard on the compound, offers preventative measures to reduce the harmful physical effects of the substance, explains how employees can be exposed to it, and highlights some of the requirements of the final standard.
- In November, a fire that began in a chemistry laboratory destroyed a high school in Gibsonville, North Carolina, leaving more than 1000 students without a school building for the rest of the year. A teacher spotted the fire and tried to put it out with an extinguisher, but then pulled the fire alarm. The building was evacuated. An emergency official indicated that if the buildings had a sprinkler system, the students probably could have returned to school the next day. The school was not required to have such a system when it was built in 1974. The cause of the fire is under investigation.
- The EPA Green Chemistry Program is seeking nominations for the 2007 Presidential Green Chemistry Challenge. This program is in partnership with the American Chemical Society, the chemical industry, and the broader scientific community. Typical achievements for recognition include: (1) development of a chemical synthesis that does not use or generate hazardous chemicals; (2) design of a safer chemical; (3) elimination of a hazardous solvent from a chemical process; and (4) creating a new green chemistry technology. For further information and nomination forms, see www.epa.gov/greenchemistry. The 11th Annual Green Chemistry and Engineering Conference will be held in Washington in June 2007.
- An explosion at a University of Kentucky engineering laboratory in November sent one student to a hospital for treatment of injuries. Six other people were examined in the emergency room. The student was pouring nitric acid into a waste container and an explosion occurred when the acid came into contact with other substances. A hazardous materials crew cleared the building of fumes.
- The rate of workplace injuries and illnesses in private industry declined in 2005 for the third consecutive year according to the Bureau of Statistics of the Labor Department. Approximately 4.2 million injuries and illnesses occurred in 2005. This number translates to a rate of 4.6 cases per 100 full-time employees, slightly less than the 4.8 number reported in 2004, and is an all-time low. ■



PAPERS PAPERS PAPERS

"Detection of Autocatalytic Decomposition Behavior of Energetic Materials Using APTAC," C.Weij, W.J.Rogers, and S.M.Mannan, *J.Thermal Analysis and Calorimetry* **83**, No.1, 125-130 (2006).

Characterization of autocatalytic decomposition reactions is important for the safe handling and storage of energetic materials. Isothermal differential DSC tests are time consuming, and the choice of experimental temperature is crucial. This paper shows that an automatic pressure tracking calorimeter (APTAC) can be a reliable and efficient screening tool for the identification of autocatalytic decomposition behavior of energetic materials. Calorimetric measurements for the thermal decomposition of 24% hydroxylamine nitrate (HAN) in water are presented. APTAC heat-wait-search and heat-soak-search modes were used to characterize the thermal decomposition. The most likely decomposition pathway of HAN is proposed to explain the observed autocatalytic behavior.

"Safety Valve Sizing to EN ISO 4126-4 and Industrial Practice in the Case of Highly Viscous Liquid Duty," D.Moncalvo and L.Friedel, *J.Loss Prev.Process Ind.* **19**, No.4, 312-315 (July 2006).

The calculations of the minimum relief area on the basis of the iterative procedure, as reported in EN ISO 4126-4, and by adopting an explicit method as carried out in industrial practice, leads to the same valve size. This applies to valves with a high and low value of the related lift respectively, with a valve nozzle orifice according to API RP 526.

"Use and Misuse of Chemical Reactivity Spreadsheets," D.Quigley, F.Simmons, H.Whyte, L.Boada-Clista, and J.C.Laul, *J.Chem.Health & Safety* **13**, No.5, 29-34 (Sept./Oct. 2006).

Accurate hazard identification is critical to any safety program. Chemical reactivity worksheets have been developed to simplify chemical reactivity hazard identification. Limitations of the worksheets, spreadsheets, and matrices available through the Internet are discussed. Special care must be taken when determining hazards for three or more component interactions. Examples are given when hazards that do not exist are identified in these tools, and examples when significant hazards are not identified are also presented.

"Kinetic and Safety Assessment for Salicylic Acid Nitration by Nitric Acid/Acetic Acid," R.Andreozzi et al, *J.Hazardous Materials* **134**, Issues 1-3, 1-7 (June 30, 2006).

The nitration process of salicylic acid for the production of the important intermediate 5-nitrosalicylic acid is studied from the thermokinetic and safety points of view. Investigations were carried out by considering, as process deviations, the loss of the thermal control point and the possibility of runaway phenomena due to the occurrence of polynitration reactions. Isothermal experiments were carried out at various conditions to assess the involved reaction network and the reaction kinetics.

"The Criteria of Critical Runaway and Stable Temperatures of Catalytic Decomposition of Hydrogen Peroxide in the Presence of Hydrochloric Acid," K-T Lu, C-C Yang, and P-C Lin, *J.Hazardous Materials* **135**, Issues 1-3, 319-327 (July 31, 2006).

Hydrogen peroxide and hydrochloric acid are used together in computer chip manufacture. The hydrochloric acid catalyzes an exothermic decomposition of hydrogen peroxide into oxygen and water. The accumulation of heat and non-condensable gas increases the temperature and pressure in this reaction process which leads to a runaway reaction and accident owing to inadvertent mixing. Thus, the chemical reaction hazard must be clearly identified. In this investigation, the critical parameters of various volumetric ratios of hydrogen peroxide to hydrochloric acid were estimated. Then, these kinetic parameters were used to evaluate the critical temperature and stable criteria in each reaction process.

Measurement Best Practices for Safety Instrumented Systems," S.R.Brown and M.Menezes, *Chem.Eng.* **113**, No.9, 66-72 (September 2006).

This paper defines how to comply with new standards for safety instrumented systems to maximize plant safety and availability while minimizing life cycle costs. In order to accomplish this, eight suggested steps are presented for users. ■

Third Global Congress on Process Safety
41ST ANNUAL LOSS PREVENTION SYMPOSIUM
APRIL 22-26, 2007, HOUSTON, TX

at the Houston Hilton adjacent to the George R. Brown Convention Center



The Loss Prevention Symposium, organized by the AIChE Safety and Health Division Area 11a, has been held annually since 1967. The objective of the symposium is to promote safety in the process and allied industries by providing a forum for practitioners from industry, academia, and government to share experiences, technological advances, and new ideas in the loss prevention and process safety fields.

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1. MODELING IN FIRE AND EXPLOSION PROTECTION.

CFD and similar modeling techniques have been used for characterizing fires and explosions and are being used more frequently for predicting the performance of protection systems. The newest models are able to address more complex geometrics and have diverse uses such as optimizing testing projects, post-explosion forensic analysis, process design, and protection design. Modeling papers on the following topics are included: gas explosions, venting, suppression, or isolation protection, model development, model validation, and successful model application.

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2. FIRE, EXPLOSION, AND REACTIVE HAZARDS.

The analysis, prevention, and mitigation of fire, explosion, and reactive hazards continue to be extremely important to the Loss Prevention community. This session covers papers on new research, tools, and methods that identify, characterize, and offer design and operational guidance on fire, explosion, and reactivity hazards.

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3. FACILITY SITING AND BUILDING DESIGN FOR EXPLOSION PROTECTION.

The siting and design of buildings continue to be critical aspects in providing a safe workplace. A decade ago, the focus was on explosion risks to central control buildings. Incidents in the last few years both in the process industries and on the security front have highlighted the importance of applying these concepts to all occupied structures. New design tools provide greater analysis options and allow for more cost-effective blast resistant designs. Papers addressing the relevant and effective solutions to the problems are included.

Chair

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4. COMMUNICATING EXPERT KNOWLEDGE TO TECHNICAL COMMUNITIES.

This session is primarily intended to help engineers effectively communicate important safety technology within and between companies (hazard communication, product labeling, product stewardship, etc.), but also to improve communications from the technical community to non-technical executives. Papers include the following topics: (a) sources of technical information for plant safety; (b) highlights of recent technology that need better dissemination; (c) highlights of older technology that are neglected; and (d) tools and methods for improving communications in the safety arena.

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5. PREPARING FOR NATURAL DISASTERS AND LESSONS LEARNED.

Process facilities face many and varied natural threats that can impose forces and consequences far greater than the design limits of equipment and controls. Papers address many of the issues related to natural disasters, including plant siting, design basis selection, rare natural event likelihood and consequence assessments, supply and product chain management, and lessons learned from the 2005 hurricanes and other natural disasters. Natural disaster emergency preparation, response, and recovery are also covered.

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6. CASE HISTORIES AND LESSONS LEARNED.

This popular session topic includes papers dealing with incidents, near misses, and the lessons learned to provide valuable learning experiences.

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**Third Global Congress on Process Safety
9TH PROCESS PLANT SAFETY SYMPOSIUM**

APRIL 22-26, 2007, HOUSTON, TX

at the Houston Hilton adjacent to the George R. Brown Convention Center



The 9th Process Plant Safety Symposium (PPSS), organized by the AIChE Safety and Health Division Area 11b, is scheduled to be held as part of the Third Global Congress on Process Safety during the 2007 AIChE Spring Meeting in Houston, TX. The PPSS was originally organized by the South Texas Section of AIChE as a stand-alone meeting on a biennial basis, but it was incorporated into the Safety and Health Division programming efforts as part of the First Global Congress on Process Safety, and has been held annually since. This symposium continues to focus on process safety and risk issues and solutions for immediate application in process plants and throughout industry.

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1. RISK ASSESSMENT AND RISK MANAGEMENT - NEW

DIRECTIONS. Innovation continues in the assessment of plant and corporate risks in business terms. Papers highlighting the assessment and risk management of process safety related business risks and successful integration of risk decision making into main stream business processes are scheduled. Also, success stories in influencing plant management, business leaders, executives, and the public, and in creatively eliminating or minimizing risks will be included.

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2. SAFETY INSTRUMENTED SYSTEMS - IDENTIFICATION, DESIGN, AND APPLICATION.

The identification of Safety Instrumented Functions (SIFs) and the design and proper application of Safety Instrumented Systems (SIS) are ongoing challenges in the process industries. This session includes papers in the areas of Independent Protection Layer (IPL) identification, Safety Instrumented Function (SIF), Safety Integrity Level (SIL) assignment, and SIS management systems. This session is co-sponsored by CCPS.

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3. PSM AND RISK TRAINING IN THE 21ST CENTURY - METHODS, TOOLS, AND INNOVATIONS.

Formal structured methods of training material development are an important aid in setting specific objectives and creating materials that achieve them uniformly in delivery. Advances in technology provide many new avenues for development and implementation of training programs in risk, process safety, and security. Papers are included that highlight formal methods of training material development and utilization of current technology and media (e.g., CD, internet, intranet, web casting, pod casting) to enhance delivery of training programs through traditional and innovative approaches.

4. ASSURING SAFETY IN DESIGN AND CONSTRUCTION OF PROCESS SYSTEMS.

Engineering design and projection execution methods are important components in the development and construction of safer process plants. Case histories are presented that illustrate successful application of best practices.

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5. SECURITY, VULNERABILITY ASSESSMENTS, AND MITIGATION.

This session contains papers regarding security, vulnerability assessments, and innovative and cost-effective mitigation solutions for plant sites, in transportation and distribution operations. Included are new techniques and methods, advances in application of existing approaches, and use of innovative new technologies.

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6. SAFETY CULTURE - KEY TO PROCESS SAFETY PERFORMANCE.

Building, maintaining, and nurturing a strong safety culture is critical to long-term process safety performance. There are many challenges to ensuring a positive safety culture in business operations at all locations, with additional challenges posed by acquisitions, mergers, and divestitures. Papers here demonstrate proactive approaches to assess, build, maintain, and nurture a strong safety culture to achieve process safety excellence.

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7. CASE HISTORIES AND LESSONS LEARNED. Joint with the Loss Prevention Symposium - see page 9. ■

Third Global Congress on Process Safety
22ND ANNUAL CCPS INTERNATIONAL CONFERENCE
ADVANCING PROCESS SAFETY THROUGH
DESIGN AND OPERATIONS
APRIL 22-26, 2007, HOUSTON, TX

at the Houston Hilton adjacent to the George R. Brown Convention Center



The 2007 Annual CCPS Conference is again running as part of the Global Congress on Process Safety. The theme is "Advancing Process Safety Through Design and Operations." There are many factors that can affect achieving process safety excellence. Some of these include sound process design adhering to current engineering standards, codes, and practices; employing inherent safety approaches for new designs; ensuring ongoing mechanical integrity with effective preventive maintenance, inspections, and turnaround programs; identifying hazards and managing their risk using passive, active, and administrative safeguards; and implementing management systems to drive operations, stability, and health, safety, and environmental performance.

At the CCPS 2007 Annual Conference, papers will discuss and explore the most current thinking and approaches as demonstrated through case histories and lessons learned. The conference will include the following topical areas:

- **Risk-Based Process Safety and Risk Tolerance Criteria.** Session Chair: Lisa Morrison, PPG Industries, lmorrison@ppg.com
 "Improve the Risk Ranking Process by Categorizing and Detailing Consequence and Probability Categories"; "Implementing a Risk-Based Process Safety Management System because it Makes Dollars and Sense"; "How to Incorporate the Health, Safety, and Environmental Management System in Quantitative Risk Assessments."
- **Process Safety Management Systems.** Session Chair: Steve Meszaros, Wyeth Pharmaceutical, MESZARS@wyeth.com
 "Safety Culture: 'Black Art' or 'Paradigm Shift?'; "Finding Potential Failures Deliberately"; "Six Sigma Analysis Applied to Process Safety Systems"; "Labor Accidents and the Relation with Human Factors"; "Evaluating and Improving Operational Discipline"; "Management Review - Be Sure Your Process Safety Systems are Working"; "OECD Guidance on Safety Performance Indicators."
- **Inherent Safety.** Session Chair: Dan Wiff, Nova Chemical, wiffd@novachem.com
 "Reactivity Hazards in Storage: A Simplified Approach"; "How to Stimulate Examples of Successful Inherent Safer Solutions in Other Companies"; "Regulating Inherent Safety."
- **Standards, Codes, and Regulations, and Criteria for Retroactive Implementation.** Session Chair: Shakeel Kadri, Air Products, kadrish@apci.com
 "Legal Considerations for Complying with Changing Regulations or Consensus Standards"; "The AMEX Directives - Explosion Safety and Regulation: The European Approach"; "Retrofitting New Standards into Existing Facilities is Not as Easy as it Seems."
- **Reliability and Process Safety including Mechanical Integrity, Risk-Based Process Safety, and Turnaround Considerations.** Session Chair: John Herber, 3M, jwherber@mmm.com
 "Passive Device Technology: The Trend Away from Reliance upon Venting Systems to Address Transfer Line Failure"; "From PSM to Operational Excellence: Safety Critical Variables and Equipment"; "Field-based Evaluation of PFD Valves to Safety-related Loop Typical."
- **Safety Instrumented Systems.** Joint with PPSS - see page 10.

The Center for Chemical Process Safety was formally chartered by AIChE on March 25, 1985, following a preliminary discussion with 17 senior executives from 13 major chemical and petroleum companies. While the immediate driving force was the Bhopal incident of December 1984, CCPS in concert with industry envisioned a broad and far reaching mission to advance the state-of-the-art process safety technology and management practices. Annual international conferences represent one of the many programs established by CCPS to accomplish the continuing mission. ■

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