

Safety & Health News

AIChE

AMERICAN INSTITUTE OF
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SAFETY AND HEALTH
DIVISION



A Supplement to *Process Safety Progress*

Spring 2003

SAFETY FORUM

WHAT HAS AIChE DONE FOR ME LATELY?

The role of engineering organizations in promoting safety is frequently understated. To begin with, their members are concerned on essentially a daily basis in making engineering judgments which involve safety and risk. While engineering is thought of as primarily a technical practice, there are many issues faced in development, design, and operations that encompass a major social component. It is through engineering that new technologies are used in products and processes in order to satisfy the needs and problems of society. Social and economic issues are faced at all levels of engineering practice in technical developments, thus making engineering a truly combined technical and social practice. Engineering work is heavily involved in responsibility for safety and the avoidance of public harm. Also, new technologies can indeed alter social relationships, working and living conditions, and cultural situations. Finally, engineering has a significant social component when involved in solving societal problems such as disease prevention and environmental controls. The engineering societies are fully cognizant of these combined technical and social obligations.

How do engineering societies contribute here? Foremost is the advancement of knowledge. For example, the Safety and Health Division organizes three symposiums, two on an annual basis and one biennially, to disseminate valuable information. The Center for Chemical Process Safety (CCPS) also schedules an annual conference and workshop that has international implications. Important safety considerations are included in other meetings and sessions sponsored by AIChE. And useful publications from AIChE abound.

The advocacy for safety in design is another contribution. Of particular importance is the effort to establish safety issues as critical components of engineering education. The Safety and Chemical Engineering Education (SACHE) program is a prime example. More emphasis on safety in chemistry education could be an additional factor in the future. Chemical engineering students are involved in chemistry courses early in their academic experiences, but generally little in the way of chemical safety is highlighted. The Chemical Health and Safety Division of the American Chemical Society is working diligently in this area, as well as in the introduction of chemical safety at the high school science class level.

Another important function of engineering societies is the development and promotion of industry standards. The establishment of the boiler codes in the 19th Century essentially initiated this activity. These various standards and practice guidelines are formulated by professional engineering organizations and become the *de facto* standards in industry and governmental regulatory agencies. The work products of the American National Standards Institute (ANSI) and the American Society for Testing and Materials (ASTM), both engineering driven, are examples, as are the Guidelines Books issued by CCPS. The fact that these engineering documents are produced voluntarily and are advanced by the engineering societies serves as an example of a self-regulated professional practice. The public accepts the technological advances with the tacit promise that the technology will be safe and reliable, even though the public generally does not understand that "safe" does not mean "absolutely safe" but rather that the risk is acceptable.

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SAFETY AND HEALTH DIVISION UPDATE**KRIS CHATRATHI, CHAIR**

Welcome to the year 2003 and to active participation in the AIChE Safety and Health Division. As the Chair for 2003, this is my first report to Division members.

At the core of the mission of the Safety and Health Division is the advancement of engineering practice associated with the safety of chemical process facilities - chemical manufacturing plants, petroleum refineries, petrochemical plants, pharmaceutical manufacturing units, plastics processing factories, and any other facilities that handle chemical products on an industrial scale. The Division does this through three program groups:

- ! Loss Prevention and Process Safety (Program Area 11a);
- ! Process Plant Safety Symposium (Program Area 11b); and
- ! Safety in Ammonia Plants and Related Facilities (Program Area 11c).

The Loss Prevention (11a) and Ammonia Safety (11c) groups hold annual symposiums and the Process Plant Safety group (11b) arranges biennial symposiums. The 37th Annual Loss Prevention Symposium and the 6th Process Plant Safety Symposium are scheduled during the AIChE Annual Spring Meeting in New Orleans, March 31-April 2, 2003. Each symposium has six sessions with five to six papers in each session. The Chairs and Vice-Chairs responsible for these two symposiums were listed and recognized in the Winter 2002/2003 issue of this Newsletter.

The 48th Annual Safety in Ammonia Plants and Related Facilities Symposium will be held on September 15-18, 2003, at the Caribe Royale Resort in Orlando, FL. The members of the Ammonia Safety Committee are:

Robert W. Clark	Theo Huurdeman	Jim Richardson
Jerry Davis	Richard L. Johnson	Werner Soyeyz
Gregory J. Deis	Reinhard Michel	Richard Strait
William Delboy	Svend Erik Nielsen	Kevin Vick
Louis Frey	Subir Rao	Ian E. Welch

Ashok Gupta

All of the individuals involved in these symposiums are providing a great service to the safety and health community and to the engineering profession as a whole.

Another set of individuals who are essential to the core mission of the Division are the authors of the 80 technical papers that will be presented in the three symposiums during 2003. Space does not permit listing them all here. However, I want to

recognize and appreciate the effort made by the authors. I believe they are the lifeblood of our organization. Their initiative and hard work over several months sustains us.

Typically, the first step in writing a paper is the conception and completion of a project within the author's own organization. After project completion, the author decides to take a risk and share this work with the engineering community at large. In a tactical sense, the effort at this point relative to the paper has been minimal. The author has to contact the Chair of the appropriate session - at this writing, for 2004. With the Chair's encouragement, an abstract is submitted with the hope of acceptance, but without a guarantee at this point. Assuming acceptance into the session, the reward for this initial risk is the additional work of writing a paper and putting together an oral presentation. These tasks must be completed by the scheduled date imposed by deadlines for the meeting and the publication of the Proceedings.

Once the cost of the trip to the symposium has been justified, the author will have the opportunity to make a presentation of 20-25 minutes in front of 100, 200, or 300 people, depending upon the session, in a large room. The acoustics and audiovisual equipment are usually very good. The only question, then, is "What are the questions from the audience?" Enduring the question and answer period is somewhat a rite of passage. Personally, as an author, I have always been ambivalent about either wanting or getting a lot of questions or not having any questions asked at all. Both situations present their own set of unique yin and yang implications. A lot of questions might imply either enthusiasm or incoherence. Lack of questions might imply boredom or a depth of presentation requiring thought before asking any questions.

After the symposium, the editor of *Process Safety Progress* may extend an invitation to have the paper published as an added benefit. The Symposium Proceedings, available at the meeting, represent a limited publication of all of the papers presented and are intended primarily for the attendees. These publications are available publicly at engineering and technical libraries. Thus, either through the quarterly *Process Safety Progress* or the Proceedings, the work of the author is available to persons not in attendance.

(continued on Page 4 - see UPDATE)

UPDATE (continued from page 3)

Thanks and congratulations to all of the authors who are presenting papers at the three Division symposiums this year. Your hard work is recognized. There are many of us who understand the effort you are expending and appreciate your contribution to the success of the Division programming.

Finally, in regards to programming, I invite any of the members of the Division to consider presenting a paper in a symposium during 2004. In particular, members who have not participated before are encouraged to make a presentation about their work. Now is the time to make your decision. The Call-for-Papers for the 38th Annual Loss Prevention Symposium scheduled during the 2004 Annual AIChE Spring Meeting in New Orleans on April 26-28 appears on page 9 of this Newsletter. The deadline for submitting an abstract is **July 1, 2003**.

In conclusion, please be assured that comments and suggestions about any Division programs or activities are always welcome. I can be reached at kris.chatrathi@crbusa.com.

Kris Chatrathi



FIVE AIChE FELLOWS

During 2002, five members of the Safety and Health Division were elected as Fellows of AIChE. Pictured at the 2002 AIChE Annual Meeting in Indianapolis are, from left to right, Art Dowell (Rohm and Haas Company), Dennis Hendershot (Rohm and Haas Company), Jack Weaver (AIChE/CCPS - retired), Ron Willey (Northeastern University), and Bob Rosen (BASF). Election to Fellow is in recognition of both technical and professional accomplishments which, for the five pictured here, had significant safety and health components. ○

(Note: The three photographs in this issue of the Newsletter are courtesy of Dennis Hendershot of Rohm and Haas Company.)

DIVISION ELECTION

In the recently completed Safety and Health Division election for Officers and Directors, **Walt Silowka** became 2nd Vice-Chair, starting the progression to Chair. **Bob Johnson** and **Erdem Ural** were elected as Directors for the 2003-2005 term. **Albert Ness** of Rohm and Haas was reelected as Secretary/Treasurer for a one-year term.

Kris Chatrathi of CRB Consulting Engineers moved to the Chair post, and **Scott Ostrowski**, ExxonMobil Chemical Company, advanced to 1st Vice-Chair.

Walt Silowka is not a new member of the Executive Committee having served as Director for the past three years, but he is now in a new post as 2nd Vice-Chair. He is Director of Process Safety and Reliability in the Corporate Engineering Department of Air Products & Chemicals, Inc. He holds a BS degree from the University of Delaware and an MS from Lehigh University, both in chemical engineering.

Bob Johnson holds BS and MS degrees in chemical engineering from Purdue University. He has been involved in both technical and management aspects of process safety for 25 years. Currently a Principal Consultant with Unwin Company, a risk management consultancy in Columbus, OH, he is Chair of the 2004 Loss Prevention Symposium.

Erdem Ural is now President of Loss Prevention Science and Technologies, Inc. He formerly was Manager of the Combustion Research Center for Fenwal Safety Systems. He received his BS degree from the Technical University of Istanbul and MS and PhD degrees from the University of Michigan.

All of the Officers and Directors have had significant leadership activities, both technical and managerial, in the Division.

PROGRAM COMMITTEE NOTE

The Area 11a Loss Prevention Program Committee has some openings for new committee members coming up this year. The committee is limited to 20 members. Members volunteer to serve as Chair or Vice-Chair of sessions in the Loss Prevention Symposiums. If you are interested and want to get additional information, contact the 2002-2003 Area 11a Committee Chair, **Dennis Hendershot**, at **215-785-7243** or DHendershot@rohmmaas.com.

Potential candidates with experience in the non-traditional areas and emerging fields of process safety are particularly welcome.

THE CCPS PAGE CENTER FOR CHEMICAL PROCESS SAFETY

MANAGEMENT OF REACTIVE CHEMISTRY HAZARDS AND HIGH ENERGY RELEASES

The CCPS 18th Annual International Conference and Workshop will convene on **September 23-25, 2003**, at the Marriott Camelback Resort in Scottsdale, AZ. The overall subject title is "Management of Reactive Chemistry Hazards and High Energy Release Events." Following previous formats, there will be both plenary sessions and workshops.

Carolyn Merritt, Chair of the U.S. Chemical Safety Board, and Deborah Dietrich, Director of EPA/CEPPO, will be featured speakers.

Emphasis will be on the use of state-of-the-art methodology in the areas of theory, testing methods, and applications to design and operation, including inherently safer processes, and the use of this information to design, operate, store, and transport potentially hazardous materials.

Planned session topics include: **P** Calorimetry and Data Generation; **P** Management System Structures and Practices; **P** Inherently Safer Approaches to Reduce Risk; **P** Use of Safety Instrumented Systems (SIS) Approaches; **P** Relief Systems Design and Evaluation; **P** Biological and Toxic Dose/Response Issues; **P** Reactive Chemicals Management in Transportation Systems; **P** Reactive Chemicals Storage in Warehouses; and **P** Forensics of Accident Reconstruction.

A highlight of the conference will be a panel of senior regulators discussing the impact of legislation/regulation of reactive chemicals.

For the conference program as well as for registration and hotel information see:

www.aiche.org/ccps/icw.

Note that there is an "advanced early bird" registration until **March 31, 2003**, which will save the attendee \$200. **O**

EHS MANAGEMENT

At the CCPS Technical Steering Committee Meeting in January 2003, a workshop was conducted on managing the environmental, health, and safety (EHS) issues on multi-owner sites. "Due diligence" questions were raised and discussed.

CCPS STAFF RETIREMENTS

F. Owen Kubias retired as a CCPS Staff Consultant at the end of 2002. He was actively involved with the Safety and Chemical Engineering Education (SACHE) program for 5 years, and was active on other CCPS projects during his 12 years on the staff.



Owen Kubias (center) receives a plaque from Joe Louvar (left) and Scott Berger of CCPS (right) at the 2002 AIChE Annual Meeting in Indianapolis for his significant achievements with SACHE.

Owen is a chemical engineering graduate from Iowa State University. He retired from the Glidden Company where he had for many years managed a loss prevention program.

Jack Weaver, who retired July 1, 2002, as Senior Director of the AIChE Industry Technology Alliances (which includes CCPS), Meetings, Programming, and Educational Services, continued as a CCPS Staff Consultant. He has now "retired" from that assignment to accept a full-time position as Staff Director and Vice President of Education with Nueva Esperanza, Inc., a non-profit community development organization dedicated to empowering the Latino community in Philadelphia. This group has been a very successful and effective Hispanic community support group and has received national recognition and support. **O**

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LOUVAR IS NEW CCPS STAFF CONSULTANT

Joe Louvar is now a CCPS Staff Consultant with the SACHE Program as his initial assignment. Joe is well known to members of the Safety and Health Division for his many activities in the work of the Division. He served as Division Chair in 1997 and received the Walton-Miller Award in 2001. He is a Fellow of AIChE.

Joe retired from BASF Wyandotte where he was Director of Chemical Engineering R&D that included small-scale production of specialty chemicals. He now teaches safety and risk analysis as a part-time visiting professor in the Chemical Engineering Department at Wayne State University.

He earned his BS degree in chemical engineering from the University of Missouri-Rolla, an MS degree from Carnegie Mellon, and a PhD degree from Wayne State University. ○

SACHE AWARD

The winner of the Annual SACHE Design Team Award was announced at the Students Award Luncheon during the 2002 Annual AIChE Meeting in Indianapolis. A team from Washington University in St. Louis took top honors.



Joe Louvar (left) and Ron Willey of Northeastern University (right) present the SACHE Design Team Award to Andrew Tillinghast, Katherine Rogers, and Corey S. Harris (center left to right), chemical engineering students at Washington University in St. Louis.

The award is for the best application of the principles of chemical process safety by a team in the AIChE Design Problem Program.

The Safety and Chemical Engineering Education program, sponsored by CCPS, now has about 125 university members. ○

CCPS PROJECT UPDATE

A new book entitled *Essential Practices for Managing Chemical Reactivity Hazards* is completed and may be released for sale at the 2003 AIChE Annual Spring Meeting. Pete Lodal of Eastman Chemical Company is Chair of the Technical Subcommittee that developed this book.

Understanding Explosions, a Concept Book, will be released shortly. This was developed by the Technical Subcommittee with Jan Windhorst of Nova Chemicals serving as Chair and Marty Gluckstein providing the CCPS liaison.

The project on the Business Case for Process Safety is nearing completion. The products will include a PowerPoint presentation, an executive summary, and a booklet targeted at senior executives. This booklet will serve as the replacement for the early CCPS booklet entitled *A Challenge to Commitment*. Jack Weaver, prior to his retirement, served as the CCPS representative on this project.

The draft of the 2nd Edition of *Guidelines for Investigating Chemical Process Incidents* is now circulating for peer review.

A new project to prepare a book on best practices for maintenance and mechanical integrity was initiated. Tom Folk (Rohm and Haas) and Brian Dunbobbin (Air Products) are serving as the Technical Subcommittee Co-chairs with Dan Silva as the CCPS Staff Consultant.

A project on Safe Design of Process Vent Headers was also initiated with John Davenport of CCPS serving as the Chair. ○

SAFETY MESSAGES

The CCPS *Process Safety Beacon* program, started late in 2001, is designed to provide safety messages for manufacturing personnel. Each month, a one-page document is issued electronically to deliver process safety messages to plant operators and other manufacturing personnel. Typical of the subjects covered are the three issued recently as noted below:

- Nov. 2002 Hot Liquid Handling - Steam
- Dec. 2002 Security
- Jan. 2003 Check Physical Clearances

Past issues can be found at:
www.aiche.org/ccps/safetybeacon.htm.

For further information about these useful data sheets and about sponsorship opportunities, contact Clare Bennett of CCPS at 212-591-7319 or at clarb@aiiche.org.

SAFETY NOTES

! Labor Secretary Elaine Chao announced that OSHA will look into the quality of Material Safety Data Sheets. There has been concern expressed over the difficulties in reading and understanding MSDSs, particularly in emergency situations. The adequacy of MSDSs has been a long-standing concern to OSHA. No schedule has been established for completing the investigation and making recommendations for changes.

! The following officers will serve on the Board of Directors of the Board of Certified Safety Professionals in 2003: **David A. Herbert, CSP**, as President; **Henry Smahlik, CSP, CIH**, as Vice-President; and **Curt Lewis, CSP, PE**, as Secretary-Treasurer. Herbert holds a Chemical Engineering degree from Drexel University. Two new Directors were also selected for three-year terms. They are **Paul Adams, PhD, CSP, PE, CPE**, and **Paul Specht, PhD, CSP**.

! OSHA recently revised its 30-year-old standard dealing with exit routes, emergency action, and fire prevention plans, writing it in a user-friendlier format with clear, consistent, and up-to-date information. Gone are inconsistent and duplicative requirements, replaced with simple and straightforward terms that aid workers and employers in understanding this key regulation.

! The U.S. Chemical Safety and Hazard Investigation Board (CSB) issued a Safety Bulletin to inform users of chlorine of the importance of using chlorine transfer hoses made of the proper material of construction and of the need for end user positive identification of hoses. Chlorine handlers using non-metallic-lined chlorine transfer hoses should ensure that these hoses are constructed with the appropriate structural braiding layer, either poly(vinylidene fluoride) or Hastelloy C-276.

! EPA announced the availability of a final report entitled "Health Assessment of 1,3-Butadiene" (EPA/600/P-98/001F). This report is available

at www.epa.gov.ncea. The assessment concludes that 1,3-butadiene is carcinogenic to humans by inhalation based on the total weight of evidence. The substance also causes a variety of reproductive and developmental effects in mice.

! OSHA announced that it plans to go forward with the proposed rulemaking on occupational exposure to hexavalent chromium. Use of the metal, often as a structural and anti-corrosive substance in the production of stainless steel and iron and steel, and in electroplating, welding, and painting, has been associated with an increased risk of lung cancer and other respiratory problems.

! The health effects of a chemical mixture may differ significantly from that of the individual components. Most studies on the effects of chemicals on biological systems are conducted on one chemical at a time. In many cases, the effects of two substances may act at the same site in ways that can be additive or nonadditive. Many even more complex interactions may occur if two or more chemicals act at different but related targets. The principles and approaches to be used in the study of the toxicity of mixtures must be carefully considered, particularly at the molecular level.

! On January 13, 2003, Dow Chemical Company joined with OSHA to form an alliance to promote worker health and safety. OSHA and Dow will work together to provide technical knowledge and guidance on process safety management, reduce exposure to musculoskeletal hazards, and improve safety and health programs in the workplace.

! Developers of chemical products can now screen materials for environmental persistence, bioaccumulation, and toxicity (PBT) through a tool available at www.epa.gov/oppt/pbtp profiler. Input includes CAS Registry Numbers, molecular line notations, or chemical diagrams. There are limitations described at the web site. **O**



OSHA PROMOTES CERTIFICATION

OSHA management has made professional certification a priority for its employees and has initiated several initiatives to further this goal. OSHA has always had employees with PE licenses and with certifications as Safety Professionals and Industrial Hygienists, and continues to value all credentials. But the agency is now putting more emphasis on its professional image within the core occupational safety and health groups. This is particularly important where there is interaction on a grassroots level - in its field offices and certain headquarters offices.

Emphasis is being placed on the Certified Safety Professional (CSP) and Certified Industrial Hygienist (CIH) credentials. Engineering graduates would also be encouraged to consider PE licensing, which is state-specific.

A CSP is awarded by the Board of Certified Safety Professionals, a nationally accredited organization established in 1969. The sole business of this Board is to set standards for peer certification programs in professional safety issues. Individuals qualify by meeting education and experience requirements and by passing required examinations. There are approximately 10,000 professionals with CSP designations in good standing.

The internationally recognized CIH credential is granted by the American Board of Industrial Hygiene and, similar to the CSP, is granted to individuals who qualify by meeting education and experience requirements, and by passing the comprehensive industrial hygiene certification examination. There are about 6,300 professionals with active CIH designations.

Some 200 OSHA employees now hold certifications as a CSP or a CIH. About 26% of these employees with certifications are in the National Office and 76% are in field offices.

Many of the OSHA field office directors are encouraging the study and preparation needed for the employees to become certified. Recent changes in the law now permit federal agencies to reimburse their employees for expenses related to professional certification. OSHA is also exploring other approaches to encouraging certification, particularly at the field office level.

The OSHA management team knows that the agency will be a better organization by encouraging appropriate certifications and that it will be more professional, more influential, and better able to play a leadership role in improving workplace safety and health in the years to come. **O**

UPDATED RESPONSIBLE CARE

The Responsible Care program, implemented 15 years ago by the Chemical Manufacturers Association, now the American Chemistry Council (ACC), was designed to improve the environmental, health, and safety performance of the chemical industry and to build public trust. The next step has now been taken with a new Responsible Care program, partly as a revitalization action.

The new program is designed to embrace the public's growing interest in product safety and sustainable development and to raise the public perception of the environmental, health, and safety efforts and successes of the industry. A new code for security issues has now been added. The program now also requires ACC member companies to report a number of environmental and business metrics on an annual basis starting January 2004.

Some of the metrics include data on the Toxics Release Inventory as well as greenhouse gas emissions and energy efficiency. Additional data will include health effects test results from the industry High Production Volume Chemical Test Program. Reporting data and being open about the results will help motivate the industry toward better performance that, with a communication and outreach campaign, will emphasize that better performance to the public.

The new framework should encourage companies to consider initiatives such as "green" chemistry in R&D on new products and processes and in reevaluation of existing products and processes for possible improvement. **O**

ENGINEERING UNITS

2000 pounds of Chinese soup = 1 Won ton
 1000 aches = 1 megahertz
 1 million bicycles = 2 megacycles
 10 cards = 1 decacards
 453.6 graham crackers = 1 pound cake
 2 monograms = 1 diagram
 8 nickels = 2 paradigms
 1 kilogram of falling figs = 1 Fig Newton
 basic unit of laryngitis = 1 hoarsepower
 10 rations = 1 decoration
 100 rations = 1 C-ration
 1 millionth of a mouthwash = 1 microscope
 2000 mocking birds = two kilomockingbirds
 1 millionth of a fish = 1 microfiche
 half of a large intestine = 1 semicolon



CALL FOR PAPERS

38th Annual Loss Prevention Symposium

New Orleans, Louisiana

April 26-28, 2004.

The Loss Prevention Symposium, organized by the Safety and Health Division Area 11a, has been held annually since 1967. The objective of the symposium is to promote safety in the chemical process and allied industries by providing a forum for practitioners from industry, academia, and government to share experiences, technological advances, and new ideas. Accepted papers will be published in the Symposium Proceedings and may be chosen for publication in the Division journal, *Process Safety Progress*. The Symposium, consisting of six sessions of five or six papers each, is part of the Annual Spring AIChE Meeting to be held in New Orleans on April 25-29, 2004.

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1. FIRE, EXPLOSION, AND REACTIVE HAZARDS. The analysis, prevention, and mitigation of fire, explosion, and reactive hazards continue to be important issues. The reactivity issue is very timely due to the recent recommendations of the U.S. Chemical Safety Board. Papers are invited that identify, characterize, or offer design guidance.

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2. LOSS PREVENTION ASPECTS OF LARGE STORAGE TANK DESIGN. This session invites papers addressing design issues related to large storage tanks. Siting and spacing, seismic design, mechanical integrity, fire protection, overflow prevention and protection, secondary containment, and floating roofs are a few of the design issues that are the subjects of current work.

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3. SAFETY INSTRUMENTED SYSTEMS/LAYER OF PROTECTION ANALYSIS. Protection safeguards must reliably and effectively detect, diagnose, and control process derivations before they can result in loss events such as fires and explosions. Topics related to analyzing, designing, and implementing these safeguards include abnormal situation management, layer of protection analysis, and safety instrumented systems.

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4. ADVANCES IN CONSEQUENCE MODELING. Engineers often use consequence analysis tools to assess the risk of accidental or deliberate incidents. Such tools are invaluable in establishing priorities for the cost-effective allocation of resources for mitigation. Papers are invited that describe the latest advances in this area.

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5. ENGINEERING SOLUTIONS TO FACILITY SECURITY CHALLENGES. Session focus is on developing engineering solutions to reducing facility vulnerability to sabotage and terrorist attack through enhancing security or reducing the consequences of a hazardous chemical release. Inherently safer alternatives will be discussed. (Co-sponsored by Process Development Division.)

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6. CASE HISTORIES AND LESSONS LEARNED. Reviews of process safety incidents and near misses provide valuable learning opportunities. Papers dealing with incidents, near misses, and lessons learned are solicited. (Co-sponsored by Process Development Division.)

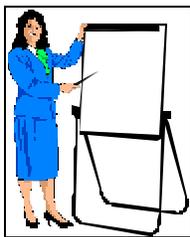
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TO PRESENT A PAPER - contact the appropriate Session Chair and submit a typed abstract of 150-200 words by **July 1, 2003**. Include the names, addresses, telephone numbers, and affiliations of the authors. Electronic submissions by e-mail or computer disk are encouraged. Session Chairs will select papers to be presented and contact the authors by **August 1, 2003**. Authors of selected papers will need to complete a Proposal-to-Present (PTP) form on the AIChE web site by **September 30, 2003**. Final manuscripts for publication in the Symposium Proceedings are due to Session Chairs **December 10, 2003**. O



PAPERS PAPERS PAPERS

"Vulnerability Assessment Methodology for Chemical Facilities (VAM-CF)", C.D.Jaeger, *Chem. Health &*

Safety **9**, No.6, 15-19 (Nov./Dec. 2002).

A Vulnerability Assessment Methodology (VAM) has been developed for chemical facilities by Sandia National Laboratories using a systematic risk-based approach. A set of worksheets is provided indicating the activities necessary both to assess the risk of a chemical facility against malevolent threats and to identify and evaluate possible countermeasures to reduce unacceptable risks in appropriate areas. The VAM leverages many different approaches including hazard analysis, process safety, emergency response, and physical security.

"Manual for Identifying and Evaluating Thermal Runaway Reaction Hazards," Chemical Risk Directorate, Federal Ministry of Employment and Labour, rue Belliard 51, B-1040, Brussels, Belgium.

This Manual provides an outline of the phenomenon and a code of good practice for systematic evaluation and prevention of runaway reaction risks based on simple and practical criteria. Topics include the evaluation of risks associated with the handling and storage of reactive substances, and the evaluation of runaway reaction phenomenon. Rules of good manufacturing practice for controlling runaway problems are provided.

"Towards Improved Reaction Runaway Studies: Kinetics of the N-Oxidation of 2-Methylpyridine Using Heat-Flow Calorimetry," M.Papadaki et al, *Trans.IChemE, Part B*, **80**, No.B4, 186-196 (July 2002).

Isothermal reaction calorimetry can be used for the development of theoretically sound kinetic models, even for complex reactions. In this paper, the reliability of a previously developed model for the N-oxidation of 2-methylpyridine is tested in a heat-flow calorimeter. The experimental results are compared with the model. In principle, they corroborated the previous findings. However, the kinetic model cannot represent the behavior of the reacting system at low catalyst concentrations. The reason is believed to be the inadequate formula for the evaluation of the active versus apparent catalyst concentrations.

"Methyl Soyate: A New Green Alternative Solvent," S.Wildes, *Chem. Health & Safety* **9**, No.3, 24-26 (May/June 2002).

A primary example of the new focus on bioproducts is the growing use of soybean-based solvents to replace petroleum and chlorinated solvents. Soy methyl esters offer numerous environmental and safety advantages over traditional solvents in terms of VOC levels, flammability, toxicity, biodegradability, and waste disposal. Despite its strong solvent properties, methyl soyate is not typically used neat because it evaporates slowly and may leave a residual film on cleaned surfaces. For most applications, it is formulated with cosolvents or surfactants to improve these properties and to meet specific performance requirements.

"Security - Another Hat for the Safety Professional," N.Langerman, *Chem. Health & Safety* **9**, No.6, 20-25 (November/December 2002).

As with any new professional assignment, knowledge must be obtained and assimilated. This knowledge must then be used to develop and implement a response. Security has always been a concern in the chemical process industries. The traditional responsibilities of perimeter patrols, access control, and emergency assistance have become more critical and imperative. The assessment of the risk at large facilities is in a way conceptually easier and various guides have been developed and published. Smaller facilities have a somewhat more difficult task. In smaller plants, security has now been frequently assigned to the safety, health, and environmental professionals. This paper describes an appropriate risk assessment tool.

"How Green is a Chemical Reaction? Application of LCA to Green Chemistry," X.Domènich, J.A.Ayllón, J.Peral, and J.Rieradevall, *Env.Sci.& Technol.* **36**, No.24, 5517-5520 (December 15, 2002).

In this work, Life Cycle Assessment (LCA) is used to evaluate a chemical reaction to assess the usefulness of this methodology as an environmental and safety tool. Routes to maleic anhydride are used as the examples.

AND MORE PAPERS

"Safety Instrumentation Systems: How Much is Enough?" B.Lytollis, *Chem.Eng.* **109**, No.12, 50-56 (November 2002).

Independent of normal process control, instrumented safety systems are designed to take some action to render the process plant safe in the event of a malfunction. The broad acceptance of the IEC 61508 Standard is of significance in determining how much instrumentation is needed to develop confidence and reliability in the safety instrumentation system. From a user's perspective, the Standard provides a more quantifiable reference of risk, and a more scientific, quantitative approach to specifying and designing safety systems.

"Modelling Top Venting Vessels Undergoing Level Swell," P.Cumber, *J.Hazardous Materials* **89**, No.2-3, 109-125 (January 28, 2002).

The storage and processing of fluids in a two-phase state at pressure requires the consequences of a failure of the vessel wall or a pipe break due to corrosion or third-party interference to be considered as part of a safety analysis. This paper describes a mathematical model for predicting outflow rates from top venting high-pressure vessels undergoing liquid swell. The model is validated by comparing predicted flow parameters such as vessel pressure and mass flow rate with measurements and existing mathematical models. This new model agrees more closely with the experimental measurements than previous approaches over the range of experimental conditions considered.

"Surface Tension Prediction for Hydrocarbons and Its Application to Level Swell Modelling," P.Cumber, *J.Hazardous Materials* **89**, No.2-3, 127-139 (January 28, 2002).

In this paper, methods for estimating surface tension are considered where the specific gravity and normal boiling point are known, for example, when the composition is expressed as petroleum fractions. Surface tension is an important parameter in the calculation of out-flow conditions from a two-phase system undergoing level swell. The sensitivity of outflow predictions to changes in the surface tension is presented for a depressurizing vessel containing pentane.

"Asbestos: Minerals and Fibers," S.K.Thompson and E.Mason, *Chem.Health & Safety* **9**, No.4, 21-23 (July/August 2002).

Asbestos is not a single substance but a general commercial term for a group of nonmetallic, fibrous minerals formed, for the most part, by regional metamorphism, a process where the source materials are rock constituents that have undergone recrystallization or recombination or both. The chemical compositions of various asbestos minerals are described. The health hazards of the different types of asbestos are indicated. Amphibole fibers tend to be straight and are a greater health threat than serpentine fibers which tend to be curved.

"Don't Get Burned - Know the Limits of Flammability and Combustible Fluids," M.Schmidt, *Chem.Eng.* **109**, No.12, 58-63 (November 2002).

The words "flammable" and "combustible" have very specific meanings within the context of fire prevention and suppression. It is important to know what mixtures are ignitable and when they have been diluted enough to be considered safe from ignition. Standard measurements are critical. In fact, fire codes do not recognize any alternatives. However, it is sometimes of value in preliminary engineering activities to have some general idea of the flammability characteristics of the substances under consideration. Methods for estimating flammability and combustibility of mixtures, including lower and upper explosive limits, are presented.

"Developing a Laser Safety Program," G.Sackett, *Chem.Health & Safety* **9**, No.4, 24-27 (July/August 2002).

As the use of lasers becomes more prevalent in the workplace, the importance of a comprehensive laser safety program is evident. Laser safety is primarily concerned with the hazards associated with human exposure to the laser beam. The most sensitive organs are the eyes, although at high power levels, laser radiation can also burn the skin. Laser applications include laboratory research, cutting, welding, and measurements. A various classes of lasers and potential health hazards are described.

SOCIETIES (continued from page 1)

A very important function of engineering societies relative to safety is the promulgation and enforcement of Codes of Ethics. The first Canon of the AIChE Code of Ethics reads: "Members shall hold paramount the safety, health, and welfare of the public in performance of their professional duties." The second canon reads: "Members shall formally advise their employers or clients (and consider further disclosure if warranted) if they perceive that a consequence of their duties will adversely affect the present or future health or safety of colleagues or the public."

How should engineers interpret the Code of Ethics? Certainly, products and processes should be designed to be safe. But that is primarily a value judgment. No engineering project is likely to be without risk. Thus, safety and risk are crucial parameters to be considered in design and operations, seeing the project in terms of trade-offs between costs and benefits and not strictly from a purely scientific and technical basis. Here, the recognition of acceptable risk is paramount.

How does an engineering society enforce its Code of Ethics? The only real power is to expel an engineer from membership in case of a proved ethics violation (a Professional Engineer could lose the license to practice). But education, persuasion, and examples serve as valuable tools for the engineering societies in ethics matters.

AIChE is indeed heavily involved in safety issues.

Sam West

... CHEMISTRY SAFETY IN HIGH SCHOOLS AND UNIVERSITIES

The Chemical Health and Safety Division of ACS held an on-line conference about teaching safety in high schools and universities in October/November 2002.

Stephen Stepenuck, Jr., who teaches a formal course in chemical safety and health at Keene State College, NH, provided guidance for laboratory work with the following three ideas for undergraduate students:

1. Have a zero tolerance for unsafe attitudes or practices; if you are serious about safety, you must show it!
2. Require that the safety and health hazards of each chemical be determined and written down before any bottle is opened.
3. Require that a safety and health analysis and hazard summary for the entire experiment be part of the laboratory report.

Warren Kingsley of Norfolk, VA, discussed the need for students to become familiar with labels and Material Safety Data Sheets, and with references such as the NIOSH *Pocket Guide to Chemical Hazards*.

Stefan Wawzyniecki, University of Connecticut, pointed out that when teachers of high school science programs hear about management of waste chemicals, they sometimes confuse the "environmental" rules and the "health and safety" requirements, or they consider them interchangeable. Requirements under the OSHA Laboratory Standard need to be clarified. **O**



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(Spring 2003)

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