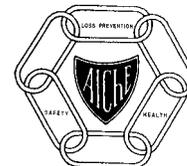


Safety & Health News

AIChE

AMERICAN INSTITUTE OF
CHEMICAL ENGINEERS

SAFETY AND HEALTH
DIVISION
www.shdiv.aiche.org



A Supplement to *Process Safety Progress*

Fall 2003

SAFETY FORUM DIVISIONS TO THE RESCUE

The current financial difficulties facing AIChE have led the Board of Directors to take some significant actions that will, in summary:

- stabilize the financial situation;
- continue the viability of AIChE as the professional home for chemical engineers;
- focus on essential core activities and services;
- provide new, broader volunteer leadership opportunities; and
- call to greater commitment from all of us.

The core activities identified through focus group meetings and through discussions at the Board of Directors meetings are: (1) conferences; (2) student services; (3) career support; (4) *Chemical Engineering Progress*; and (5) Technical Divisions.

AIChE, like other organizations, has faced a number of significant financial hurdles ranging from investment and income losses to high development costs for IT and similar programs. Financial stress has been particularly serious among discipline-oriented engineering societies, such as AIChE, where a primary objective is the broad advancement of the underlying science and technology of a specific branch of knowledge. Engineering organizations that focus on a job function or a specific industry have not had quite the financial anguish experienced by AIChE. Such organizations seem to maintain membership levels, advertising income, and meeting attendance, apparently because the focus is relatively specific.

Here is where Divisions within AIChE, or more specifically, certain Divisions, can start playing an expanded role. Divisions can be classified as highly technical (e.g., Catalysis and Reaction Engineering, Heat Transfer and Energy Conversion, and Separations) or as job functional (e.g., Safety and Health, Fuels and

Petrochemicals, and Environmental). All are heavily committed to technical programming as the primary objective. But those Divisions that can be classified as "job functional" have an opportunity for a substantially increased role. In short, such Divisions can serve as mini-societies within the broad AIChE umbrella.

The Safety and Health Division can be a good model. For one thing, it has a fine magazine in *Process Safety Progress*. But the overall objective of the Division can be summarized as putting on the Annual Loss Prevention Symposium almost to the exclusion of all other activities. The Annual Ammonia and Related Facilities Symposium, while considered a Division activity, has a life of its own and there seems to be little interaction between this valuable activity and the Division Executive Committee.

What can be done not only to improve membership numbers but also to improve the value of membership in the Division? These are obviously related issues. In fact, what can be done to make membership in the Division an essential element for lifetime career development for chemical engineers? What can be done to make the Division more valuable to the future of AIChE?

The attendance at the Annual Loss Prevention Symposium has been declining even though this is the primary, if not the sole, current function of the Division. What can be done to make this symposium an absolute "must attend" affair for a wide variety of practicing engineers? Is there a need for a dramatic change in session topic content? In broadening the topics to involve other industry interests such as pharmaceuticals, biochemicals, electronic chemicals? In meeting

(continued on page 12 - see DIVISION)

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SAFETY AND HEALTH DIVISION UPDATE

KRIS CHATRATHI, CHAIR

To start, here is a reminder that the 48th Annual Safety in Ammonia Plants and Related Facilities Symposium is scheduled for **September 15-18, 2003**, at the Caribe Royale Resort, Orlando, FL.

Each one of us, as members of the Safety and Health Division, receives the *Process Safety Progress* on a quarterly basis, which is, in fact, one of the major benefits of Division membership. *Process Safety Progress* (initiated as *Plant/Operations Progress*) is in its 22nd year of publication, and has been the premiere publication in the United States for process safety information in the chemical and allied industries. Many technical libraries subscribe to this publication as it continues to be an essential reference for process safety technical and engineering information. The founding editor of *Process Safety Progress* is Ted Ventrone. He has made plans to retire as editor at the end of this year.

At the AIChE Spring Meeting in New Orleans, the Division Executive Committee unanimously voted to recognize the outstanding job done by Ted Ventrone and to recognize his many years of service by establishing the Ted Ventrone Safety and Health Division Design Award. This annual award will be given to the student design that best incorporates inherent safety into the solution of the Annual AIChE Student Design Problem. Dennis Hendershot, Walt Frank, Dick Schwab, and Stan Gossel, all active in the work of the Division, met with Ted on July 26 to convey this information. As Chair of the Division, I add my thanks to Ted.

Ted's accomplishments and contributions to the Division will be described in the December 2003 issue of *Process Safety Progress*. The announcement of the new editor will also be made at that time.

Just as the purpose of the Ted Ventrone Safety and Health Division Design Award is to encourage implementation of safety concepts in the early stages of an engineer's career, a major effort is ongoing to encourage safety education at the undergraduate level. This effort is known as SACHE - Safety and Chemical Engineering Education. The SACHE program is under the auspices of the Center for Chemical Process Safety. Its charter is to enhance the presentation of process safety in undergraduate education by providing teaching materials and faculty training. Participation in SACHE has grown from an initial enrollment of 30 institutions to a current number of 125 universities. I strongly urge each Division

member to visit the SACHE website and determine if his/her alma mater is participating. If it is not a member of SACHE then please inform the head of the Chemical Engineering Department at your school that for a mere \$300 annually, a wide variety of teaching materials become available to the department. Examples of teaching materials sent in previous years include:

- Process Safety Problems in Chemical Engineering;
- Hazards of Hydroxylamine: A Case Study;
- Piper Alpha - A Spiral to Disaster;
- Flixborough Explosion;
- Fire Protection Concepts;
- Methacrylic Acid Tank Car Explosion;
- Vapor Cloud Dispersion Modeling;
- Batch Polystyrene Reactor Runaway; and
- Bhopal Slide Lecture.

In addition to providing teaching materials, annual workshops are also conducted for chemical engineering professors. The objective of the workshops is to provide undergraduate chemical engineering teachers with process safety technology, industrial experiences, and materials that can be used in the classroom. The workshop in 2002 was attended by 24 professors with 20 industrial professionals. The 2003 workshop will be held at the end of September at the ExxonMobil Baton Rouge site and will have a focus on designing for safe and reliable process operations. The workshop will include both presentations and tours of appropriate plant facilities.

The website is: www.aiche.org/sache.

The Division Executive Committee approved funding, together with CCPS, to prepare and have available for distribution the Second Edition of the CD to include all papers presented at the Loss Prevention Symposiums from 1967 through 2003 and the CCPS Conferences and Workshops from 1987 through 2002. This 2-disc product will contain over 1000 papers. Also included in this Second Edition are indexes of all papers published in *Process Safety Progress*, all papers presented at the annual Ammonia and Related Facilities Symposiums, and all papers presented at the biennial Process Plant Safety Symposiums. Randy Freeman and Scott Berger are working very hard to complete this project. Look for announcements regarding availability of this valuable compilation.

Kris Chatrathi

AMMONIA PLANT SAFETY

The 48th Annual Safety in Ammonia Plants and Related Facilities Symposium is scheduled for **September 15-18, 2003**, at the Caribe Royale Resort, Orlando, FL. These annual symposiums are dedicated to safety in the plants that manufacture ammonia and related chemicals such as urea, nitric acid, ammonium nitrate, and methanol. Over 30 papers are scheduled for presentation on subjects including hazardous incidents, safety developments, technological advancements, and maintenance improvements. These symposiums are organized by Program Area 11c.

The meeting will start with a special keynote address on Monday, September 15. Three round table workshops will be held on Thursday morning, September 18, addressing operating experiences and mechanical integrity programs, safety incidents, and field repair techniques.

Time is short, but you can still make arrangements to attend. For further information see:

www.aiche.org/conferences/ammonia.

CALL FOR PAPERS: It is not too early to consider presenting a paper at the 49th Annual Ammonia Plant Symposium, scheduled for September 20-23, 2004, at The Hyatt Regency Denver Hotel, Denver, CO. Proposed paper information should include:

- Author(s) name and full contact information including company name, address, telephone, fax, and e-mail;
- Speaker's name and full contact information as above;
- Title of paper; and
- Brief description of paper.

The proposal should be sent by **January 9, 2004**, to Reinhard Michel at:

michelr@tkk-uhde.thyssenkrupp.com. ■

DIVISION DUES FOR 2004

The good news is that the basic Safety and Health Division dues for 2004 will not change. The annual dues will remain at **\$39** which includes a subscription to *Process Safety Progress* and the Newsletter. Members can choose either a print version or an on-line version. For members electing BOTH print and on-line versions, the dues will increase from \$65 to \$69. Postage for the print version for members outside North America will increase from \$40 to \$50.

38TH ANNUAL LOSS PREVENTION SYMPOSIUM

Bob Johnson, Chair of the 38th Annual Loss Prevention Symposium, scheduled for **April 26-28, 2004**, in New Orleans, reports that plans for the technical content of the sessions are approaching completion. The deadline for submittal of paper proposals was July 31, 2003. This symposium is organized by Program Area 11a.

A particularly timely session is entitled "Engineering Solutions to Facility Security Challenges." This session will focus 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 under these circumstances.

The "Case Histories and Lessons Learned" session, a favorite each year, will have presentations covering recent chemical plant incidents and what can be done to prevent future accidents. Other sessions cover significant process safety issues such as "Advances in Consequence Modeling," "Safety Instrumented Systems/Layer of Protection Analysis," "Loss Prevention Aspects of Large Storage Tank Design," and "Fire, Explosion, and Reactive Hazards."

The meeting is part of the AIChE Spring Meeting in New Orleans, a city noted for its hospitality. ■

PAPERS SOLICITED

Manuscripts are sought covering fundamental safety principles in scale-up of reactions to pilot plant level and safety issues involving pilot plants in general for *Chemical Health and Safety*. This is the peer-reviewed publication of the Division of Chemical Health and Safety of the American Chemical Society.

This publication, now in its tenth year, has featured chemical safety and health in general and laboratory safety issues in particular. Division members include laboratory managers and supervisors, science and engineering faculty members, industrial hygienists, consultants, and other individuals who have an interest in and responsibility for safety in the workplace.

The Division membership has recently indicated a strong interest in scale-up concerns and pilot plant operations. The editor, Harry Elston, has therefore issued this "Call for Publication." More information, including an Author's Guide, can be obtained from him at **217-971-6047** or at:

helston@midwestchemsafety.com. ■

THE CCPS PAGE CENTER FOR CHEMICAL PROCESS SAFETY

LOSS PREVENTION ON CD-ROM II

In progress for release in Fall 2003 is the development of the Second Edition of the popular CD-ROM to include all of the papers presented at the Loss Prevention Symposiums from 1967 through 2002 and the CCPS Conferences and Workshops from 1987 through 2002. This product of 2 discs contains well over 1,000 papers and 20,000 pages of process safety information, including papers that were presented but not published at the time.

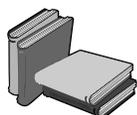
This Second Edition adds the papers presented at the Loss Prevention Symposiums from 1997 through 2002, and the proceedings of the CCPS Conferences from 1995 through 2002.

New for the Second Edition are an index of all papers published in *Process Safety Progress* to date, an index of the papers presented at the annual Ammonia and Related Facilities Symposiums, and an index of the papers presented at the biennial Process Plant Safety Symposiums. Also, an index of all CCPS books published through 2002 is included.

This is a joint project of CCPS and the Safety and Health Division so that sales benefit both organizations. The advance purchase price for Safety and Health Division members is \$139.30. Division members who own the first edition (Publication G-49) should clip the \$20 coupon from the inside of the CD case cover and mail it with their orders to get the best discounted price of \$119.30 for the second edition which is Publication G-77. These discounted prices will hold until the CD-ROM is released on October 1, 2003.

An order form with the correct mailing address, can be found at:

www.aiche.org/pdflibrary/pubs/book02.pdf. ■



THREE NEW CCPS GUIDELINES BOOKS

Guidelines for Investigating Chemical Process Incidents, 2nd Edition, ISBN 0-8169-0897-4, 600 pp, Publ. G-82, AIChE/CCPS, New York (2003), \$189.00 (20% discount for members).

This is a significantly enhanced and expanded version of the 1st Edition. The book provides a valuable reference tool for technical and management personnel who lead or are part

of incident investigation teams. This edition focuses on investigating process-related incidents with real or potential catastrophic consequences. It presents on-the-job information, techniques, and examples that support successful investigations. The methodologies, tools, and techniques described can also be applied when investigating other types of events such as reliability, quality, and occupational health incidents. The accompanying CD-ROM contains the text of the book as well as additional supporting tools for on-site reference and trouble shooting.

***Guidelines for Fire Protection in Chemical, Petrochemical, and Hydrocarbon Processing Facilities*, ISBN 0-8169-0898-2, 400 pp, Publ. G-83, AIChE/CCPS, New York (2003), \$169.00 (20% discount for members).**

While there are many resources available on fire protection and prevention in chemical, petrochemical, and petroleum plants, this is the first book that pulls the information all together in one comprehensive location. The book provides the tools to develop, implement, and integrate a fire protection program into the Risk Management System of a company or facility. This is a must read for loss prevention managers, site managers, project managers, engineers, and EHS professionals.

***Guidelines for Facility Siting and Layout*, ISBN 0-8169-0899-0, 400 pp, Publ. G-84, AIChE/CCPS, New York (2003), \$139.00 (20% discount for members).**

This is an excellent resource for individuals responsible for siting decisions. The book covers siting and layout of process plants, including both new and expanding facilities. Comprehensive guidelines in selecting a site, recognizing and assessing long-term risks, and the optimal layout of equipment facilities needed within the site are provided. The information is applicable to both U.S.A. and international locations. ■

For further information about CCPS, contact:

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WEB-BASED PUBLICATION ACCESS

CCPS is introducing a new Web service to make its publications more widely available and easier to access. The organization has joined with Knovel Corporation, a web-based technical information and analysis service, to provide immediate access to CCPS process safety information in the latest relevant books. By forming a partnership with Knovel, CCPS has made its resources more searchable, more portable, and more broadly available to engineers, safety professionals, and, in fact, to anyone involved in using, manufacturing, or processing chemicals.

An annual subscription for the service is required, either by organizations or by individuals. Subscriptions can be to individual books, to collections of books (e.g., the entire CCPS collection), or to collections of topics (e.g., the Safety collection or the Chemical Engineering collection, both of which contain the CCPS books).

The Knovel format enhances CCPS titles with interactive productivity tools, such as graphing and calculation packages, that make the information search process more efficient.

The CCPS books reside within the chemical engineering book collection at Knovel. The books can be accessed at www.knovel.com, then scroll down to CCPS. About 2-3 books are digitized and added to the collection each month. At this writing the following 12 books are available:

- *Avoiding Static Ignition Hazards in Chemical Operations*
- *Deflagration and Detonation Arresters*
- *Estimating the Flammable Mass of a Vapor Cloud*
- *Evaluating Process Safety in the Chemical Industry - A User's Guide to Quantitative Risk Analysis*
- *Guidelines for Chemical Process Quantitative Risk Analysis (2nd Edition)*
- *Guidelines for Process Equipment Reliability Data (with Data Tables)*
- *Guidelines for Process Safety in Batch Reaction Systems*
- *Guidelines for Process Safety in Outsourced Manufacturing Operations*
- *Layer of Protection Analysis - Simplified Process Risk Assessment*
- *Making Environment, Health, and Safety (EHS) an Integral Part of Process Design*
- *Revalidating Process Hazard Analyses, and*
- *Wind Flow and Vapor Cloud Dispersion in Industrial and Urban Sites.* ■

MANAGING CHEMICAL REACTIVITY HAZARDS

The 18th Annual CCPS International Conference and Workshop will convene on **September 23-25, 2003**, at the Marriott Camelback Resort Inn in Scottsdale, AZ. The overall subject title is "Managing Chemical Reactivity Hazards and High Energy Release Events." The keynote address will be presented by John Henshaw, Assistant Secretary of Labor and Director of OSHA.

Ten plenary sessions are planned with a total of 32 paper presentations. For the complete conference program, as well as registration and hotel information, see:

www.aiche.org/ccps/icw.

SAFETY MESSAGES

The CCPS *Process Safety Beacon* program, started in late 2001, is designed to provide safety messages for manufacturing personnel. Each month, a one-page color document is issued electronically to deliver process safety messages to manufacturing personnel, for example:

May 2003 Management of Change
 June 2003 Safety Interlocks
 July 2003 Dust Explosions

See: www.aiche.org/ccps/safetybeacon.htm. ■

CCPS NEWS ITEMS

- At the Chemical Safety and Hazard Investigation Board roundtable meeting on June 10, 2003, EPA and OSHA announced that they were working towards making funds available to enable CCPS to provide the electronic version of *Essential Practices for Managing Chemical Reactivity Hazards* on the Internet free of charge. When the details are worked out, it will be possible to access the book through links from the OSHA, EPA, SOCMA, ACC, and CCPS web sites. This is intended to help small and medium-sized companies address chemical reactivity issues.
- The CCPS Technical Steering Committee Meeting on May 20-21, 2003, featured a workshop on "Getting Better Process Safety Results with Fewer Resources."
- The CCPS Managing Board voted to decrease the minimum dues for small manufacturers. ■

OSHA STATES THAT SAFETY AND HEALTH ADD VALUE

According to John Henshaw, OSHA Administrator, the proper approaches to safety and health add value to businesses, to workplaces, and to individual lives. This is the foundation on which OSHA functions to help employers and employees save lives, prevent injuries, and protect the health of the workforce in the United States.

It is estimated that businesses spend \$170 billion annually on costs associated with occupational injuries and illnesses. Injuries and illnesses increase workers' compensation and retraining costs, absenteeism, and production faults. Productivity, morale, and ultimately profits are decreased. But workplaces that have active safety leadership have fewer injuries, are often rated as better places to work, and have more satisfied and more productive employees.

Attention to safety, and the increased attention to production detail that results, can lead to improved product design, innovation, and morale. This can result in faster identification of faulty processes or products, decreasing production costs, increasing productivity, and, thus, higher corporate profits.

Well organized safety and health programs add value to the business.

The workplace, that is, the physical location where work is performed, the environment in which it is carried out, and the dynamic between employees and employers, is an important factor in the assessment of value as it relates to safety and health. Workplaces with active safety and health leadership have fewer injuries and more efficient operations. Safe environments improve employee morale which often leads to higher productivity. Employees will feel more appreciated for the work that they do.

Safety and health programs, when properly implemented, add value to the workplace.

Workplace injuries and illnesses can have a critical impact on an employee's quality of life, affecting personal income, mental health, and family well-being. Safe workplaces promote successful, vibrant lives and better living. Stress from working in an unsafe environment can cause additional injuries, compounding the problem. Occupational stress from such conditions can cause emotional, physiological, and behavioral problems, such as mood and sleep disturbances, as well as strained relationships with family members.

Adding value to life is the third benefit of an active safety and health program. ■

OBITUARY

Leslie Bretherick, initiator and author of the classic *Handbook of Reactive Chemical Hazards*, died in April 2003. He was an organic chemist and safety enthusiast in various chemical industries in the United Kingdom before he retired in 1982. He then reworked his classic text, putting it into machine-readable form from which computer-generated lists, indexes, and typesetting are possible. The book is widely accepted as the reference work on reactive chemical hazards. It includes essentially every chemical for which documented information on a reactive hazard has been found. P. G. Urban replaced Bretherick as editor for the more recent versions. The Sixth Edition, published in 1999, contains over 2,500 pages in two volumes, and is available from AIChE.

ACCIDENT PRECURSORS

The National Academy of Engineering is undertaking a project that will document and promote industrial and scientific approaches for detecting, analyzing, and benefitting from knowledge of accident precursors. The project was motivated by findings from an NAE planning meeting with the conclusion that, although industry sectors have benefitted significantly from precursor analysis, the sharing and cross-pollination of methods has been limited. An opportunity now exists for presenting and promoting current approaches and research challenges in precursor detection and analysis such that multiple industries may benefit and safety science may be advanced.

Many incidents result from a series of events, "an accident chain," that occur in just the wrong way. Precursor events do not, in and of themselves, result in loss. Yet the eventual accident is contingent upon the precursors having occurred.

The initial workshop was held in Washington on July 17-18, 2003, with papers presented by a variety of industrial and academic representatives. The papers can be located by following the project workshop link at: www.nae.edu/NAE/naehome.nsf/weblinks/JPHR-5L5RDK?OpenDocument.

Among other objectives, the project is expected to provide a framework for understanding precursors to accidents, and to facilitate cross-industry collaboration in precursor-based risk-mitigation approaches against future catastrophes.

The overall project will be conducted in two stages over a period of seven months. ■

SAFETY NOTES

- The U.S. Chemical Safety and Hazard Investigation Board issued a new safety bulletin that presents a series of good practices to prevent nitrogen-related incidents. Asphyxiation by nitrogen caused about 80 fatalities in the U.S. in the past decade. Causes of the incidents included personnel not knowing they were entering an oxygen-depleted atmosphere or not realizing that the environment had changed. Incidents occurred in a variety of settings including chemical plants. The safety bulletin is available at: www.csb.gov.
- The cost of disabling workplace injuries and illnesses outpaced inflation between 1998-2000 according to the annual index compiled by Liberty Mutual. The top three injury causes were overexertion (e.g., excessive lifting, pushing, pulling, or carrying), falls on the same level, and bodily reaction (e.g., bending, climbing, slipping, or tripping without falling). These three accounted for 51% of workers compensation direct costs in 2000, a 5% increase from 1998.
- OSHA recently developed new tools to help employers plan for emergency response. The Evacuation Planning Matrix provides assistance to employers in reducing vulnerability to workplace emergencies. The matrix helps employers evaluate their existing plans or helps them construct new ones, and provides on-line resources to help develop emergency evacuation plans. OSHA also developed the Emergency Exit Routes fact sheet, a tool to aid employers and workers in safely evacuating workplaces during emergencies. Further information can be obtained at: www.osha.gov.
- The Research and Special Programs Administration (RSPA) of the U.S. Department of Transportation announced grants for three research and development projects to improve the safety and reliability of pipelines. The awards totaled \$540,000. The grants will assist RSPA in determining the value of various pipeline construction practices, will develop guidelines for pipeline operators to mitigate possible hydrogen-induced damage, and will enhance current inspection procedures for small diameter pipelines.
- Four sites were selected by the Texas Chemical Council (TCC) as "Best in Texas" for safety in 2002 from 220 TCC member company facilities statewide. The Solvay Solexis Inc. site was selected for Class I (60 or less employees), BP Chemicals Green Lake site was picked for Class II (61-201 employees), BP Solvay Polyethylene North America Deer Park site was selected for Class III (201-500 employees), and the Solutia Inc. Chocolate Bayou site won for Class IV (over 500 employees). The objective of this Awards Program is to promote the continual improvement of safety performance by TCC member companies.
- OSHA and the American Biological Safety Association (ABSA) are working together to protect health and prevent illnesses and injuries in the workplace from biological hazards. ABSA will share technical information and best practices regarding biological safety with OSHA, and will provide OSHA with technical advice, information, and recommendations on biological safety issues.
- Following a lengthy development and regulatory process, Kelso Technologies (Vancouver, B.C.) began production of a safety pressure-relief valve for use on tankcars transporting non-hazardous substances. The goal is to obtain approval for use with hazardous materials. The valve, said to be the first innovation in pressure relief for tankcars in years, is designed to relieve pressure in a controlled fashion following upsets such as derailments.
- OSHA and EPA have developed a template for safety and health professionals to use to create a site-specific health and safety plan for cleaning up facilities contaminated with anthrax from bioterrorism actions. The template meets the HAZWOPER Standard. ■



ENGINEERING PROFESSION CHANGES AFOOT

Three issues are evolving that can have significant impact on engineers, including, of course, chemical engineers involved with process safety matters. As Division members have been informed, AIChE is undergoing a belt tightening process and will concentrate on five core functions: conferences, student services, career support, *Chemical Engineering Progress*, and Technical Divisions. These primary activities make the most impact on the benefits of membership, so, except for greater opportunities for volunteer services and some increase in Institute dues, most members will probably not see a great deal of change.

A second issue is the action of the American Society of Civil Engineers in issuing Policy 465 on "Academic Prerequisites for Licensure and Professional Practice." The policy states that ASCE supports the concept of a master's degree or its equivalent as a requirement for licensure and for the practice of civil engineering at a professional level. The equivalence of a master's degree is generally defined as 30 credits that fit a "body of knowledge" that can include formal graduate and advanced undergraduate courses, distant learning techniques, and other mechanisms. A policy statement approved by the Board of Directors of the National Society of Professional Engineers in 2002 supports the basic concepts outlined in the ASCE proposal. The rationale for this proposal relates to the increasing technical complexity of engineering work, the newer multiple major environmental and safety regulations, and the extensive community needs in industrial and infrastructure activities. At the same time, there has been a decrease in the required credit hours for an undergraduate degree over the past couple of decades, typically dropping from about 140 to 128. Also, there has been a further decrease in technical subjects with increased focus on such courses as business, management, and ethics.

To raise support for this proposal, ASCE has been making presentations to organizations representing other engineering disciplines. Further, to enable the creation of criteria for meeting the education requirements, ASCE is working with the Accreditation Board for Engineering and Technology on an initiative to allow dual accreditation of both bachelor's and master's degree programs. As of now, engineering programs can be accredited only in one program.

Significant opposition to this proposal has been forthcoming. For example, engineers of today have unprecedented access to information

and knowledge throughout their careers so that the need for further formal schooling can be challenged. Also, the additional proposed requirements could lower the overall availability of engineers at a professional level. In any event, such a change is not likely to occur rapidly. For further information, see:

www.asce.org/raisethebar.

(Editorial note - identifying the master's degree as the minimum educational level for professional engineering work is hardly new. Your editor recalls similar discussions of perhaps 40-50 years ago, with subsequent arguments over the years. This is perhaps the first time, however, that a major engineering organization has taken the significant step of endorsing an educational requirement beyond the bachelor's degree for entry to professional work.)

Now the third issue involves the entry into an engineering education. A new study by the American College Testing (ACT) organization claims that the position of the United States as a world engineering leader is threatened by a dwindling number of qualified engineering students. According to the report, there has been a 12-year drop in the number of high school graduates who say they would like to become engineers, as well as a drop in their levels of preparation.

The solution suggested to ensure the future of engineering in the United States is to work diligently to prepare high school students better and to tap females and minorities into the field. According to ACT, the number of females considering engineering is at a 12-year low.

The racial and ethnic minority high school students interested in pursuing a college engineering program are not adequately prepared from an academic standpoint.

School districts can help remedy this situation by offering challenging science and math courses that are aligned with engineering college requirements, and starting these courses no later than middle school.

Colleges can work with school districts to strengthen middle school and high school math and science courses, while engineering organizations can use the media to disseminate information about the desirability of engineering careers.

For further information, see:

www.act.org/research/policy/pdf/engineer.pdf.

(Another editorial note - there does seem to be some disconnect here in that only about 50% of the engineering class of 2003 had confirmed jobs at graduation.) ■



PAPERS PAPERS PAPERS

"Thermal Hazard in a Batch Process Involving Hydrogen Peroxide," P.DeFillipas, C.Giavarini, and R.Silla, *J.Loss Prev.Process Ind.* **15**, No.6, 449-453 (November 2002).

Hydrogen peroxide is a versatile reagent for many industrial processes. However, it is very sensitive to impurities that can catalyze its decomposition so that the desired reaction can be accompanied by undesired parallel and consecutive reactions. As an example, free-radical polymerization of butadiene with hydrogen peroxide in an organic solvent was studied. Batch polymerization occurs in the liquid phase at about 120°C. Because of the reactive chemicals and the relatively high temperature involved, this is an intrinsically dangerous reaction. The aim of this project was to study the influence of impurities on the overall heat of reaction. Experiments were carried out in a high-pressure reaction calorimeter. Impurities do indeed alter the reaction course. Carboxylic acids and/or ionic iron must be avoided.

"Hydroxyurea Explosion: A Thermoanalytical and Calorimetric Study," A.Lunghi et al, *J.Loss Prev. Process Ind.* **15**, No.6, 489-495 (November 2002).

In a fine chemicals plant, a vessel exploded during the concentration step of a water solution of hydroxyurea. The process is normally run at 50°C under vacuum in a stirred tank. A stirrer failure occurred and it was not possible to empty the vessel because solids blocked the bottom outlet. The vessel was then filled with water for the weekend. On Monday morning, an explosion occurred with serious damage to structures, but with no injury to personnel. Based on thermogravimetric analysis and Fourier transform infrared spectroscopy, it was postulated that the probable autocatalytic mechanism of decomposition, together with the long holding period, caused a temperature rise to the boiling point which, in addition to decomposition gases, led to the pressure increase resulting in rupture.

"The Road to Zero Accidents," S.Kemp and J.Sieving, *Chem.Eng.* **110**, No.6, 44-49 (June 2003).

Improving the effectiveness of an EHS program by reducing the number and severity of incidents is a three-stage process. Stage 1 is the

implementation of safety programs and processes, as well as the leadership directive. Stage 2 is making the process a collaborative effort with the line organization. Stage 3 requires that employees take individual responsibility for the EHS program.

"Effect of Air in the Thermal Decomposition of 50% Hydroxylamine/Water," L.O.Cisneros, W.J.Rogers, and M.S.Mannan, *J.Hazardous Materials* **95**, Issues 1-2, 13-25 (November 2002).

Experimental measurements of 50% hydroxylamine/water thermal decomposition in air and vacuum environments using an automatic pressure tracking calorimeter (APTAC) are presented. Overall kinetics, onset temperatures, non-condensable pressure, times to maximum rate, heat and pressure rates versus temperature, and mixture vapor pressures for the experiments in vacuum were similar to the corresponding data for hydroxylamine decomposition in air.

"Influence of Heat Transport Mechanisms on Transport Classification of SADT-Measurement as Measured by the Dewar Method," H Fierz, *J.Hazardous Materials* **96**, Issues 2-3, 121-126 (January 2003).

The self-accelerating decomposition temperature (SADT) needs to be measured for self-reactive chemicals. One of the techniques is the use of the Dewar method. This method is well suited to assess the transport stability of liquids, whereas for solids, the assessment errs on the unsafe side. The differences in heat transfer between solids and liquids are explained using cooling curves and by applying the theories of Semenov and Frank-Kamenetskii for critical heat release rates.

"Intervention Effectiveness Research: A Review of the Literature on Leading Indicators," J.M.Haight and R.E.Thomas, *Chemical Health & Safety* **10**, No.2, 21-25 (March/April 2003).

The objective of this research review was to determine if there is a scientifically supported method or tool available to help ensure that safety and health programs are effectively designed and optimally implemented. Measurement of safety related intervention activities is difficult at best since there is usually interaction between interventions.

AND MORE PAPERS

"A General Criterion to Define Runaway Limits in Chemical Reactors," J.M.Zaldivar et al, *J.Loss Prev.Process Ind.* **16**, No.3, 187-200 (May 2003).

A general runaway criterion valid for single as well as for multiple reaction types (consecutive, parallel, equilibrium, and mixed kinetics reactions) and for several types of reactors (batch reactor, semi-batch reactor, and continuous stirred tank reactor) has been developed. Furthermore, different types of operating conditions (isoperibolic and isothermal) have been analyzed. The criterion states that a runaway situation has developed when the divergence of the system becomes positive on a segment of the reaction path. The results show that this is a general runaway criterion that can be used to calculate the runaway limits for chemical reactors. The runaway limits have been compared with previous criteria. A considerable advantage over existing criteria is that it can be calculated on-line using only temperature measurements; hence, it constitutes the core of an early warning runaway detection system.

"Using Mathematical Models to Estimate Exposure to Workplace Air Contaminants," M.Nicas, *Chemical Health & Safety* **10**, No.1, 14-21 (January/February 2003).

Air sampling is traditionally used to assess exposure to airborne contaminants. However, failing to account for exposure variability by taking only a few measurements, and failing to record information on exposure determinants for the time periods monitored, substantially limit the conclusions that can be drawn from the data. Mathematical modeling offers a partial solution to this problem, and is a useful adjunct to exposure monitoring. Two examples of this approach are described in detail.

"Emergency Planning: Expect the Unexpected," R.Jasnieski, *Chem.Eng.* **110**, No.5, 63-67 (May 2003).

A nine-point plan is described to prepare employees, emergency responders, and the surrounding community for dealing with accidents and emergencies. An Emergency Action Plan (EAP) represents an essential line of defense for chemical process plants to protect the health and safety of onsite workers and for safeguarding the public from the potential catastrophic consequences of unplanned incidents.

"Upgrading an Alkoxylation Facility: The Value of Calorimetric Studies," R.L.Rogers and K.Hermann, *ICHE Symposium Series*, No.149, 549-558 (2003).

The approach used during the upgrade of an alkoxylation facility which resulted in the removal of the reactor rupture discs, thus avoiding the need to install dump tanks, is described. Inherently safe operating conditions, now ensured by a high integrity process control system, were determined by extensive calorimetric studies. The experimental methods used to characterize the highly exothermic desired and runaway reactions, which show non-ideal temperature-pressure behavior, are described. The justification for the decisions reached are discussed.

"Pressure Relief of Liquids Containing Suspended Solids," D.McIntosh, S.Waldram, and J.Etchells, *ICHE Symposium Series*, No.149, 559-575 (2003).

The multiphase venting of vapors, liquids, and solids has been studied experimentally on the 1- and 10-liter scales. In non-reacting systems, the depressurization profiles of superheated water and water-glycerol mixtures were studied on their own and with added glass particles. The particles were both solid and hollow with specific gravities greater than 1. Similar depressurization experiments were made during the runaway reaction of acetic anhydride and water, with and without solids. Experimental design techniques were used to study the effects of many factors efficiently. Depressurization profiles with and without solids present were compared. In general, the solids had little statistically significant effect. Tests with runaway reactions highlighted some difficulties in comparing systems with and without solids present.

"The Quest for Sustainability: Challenges for Process System Engineering," B.R.Bakshi and J.Fiksel, *AIChEJ* **49**, No.6, 1350-1358 (June 2003).

Sustainable process system engineering needs to evolve by developing the relevant experience, heuristics, and models for incorporating sustainability in all process engineering tasks. Thus, specific challenges are created in developing a systematic framework. ■

DIVISION (continued from page 1)

location? Should the Symposium become a stand-alone meeting and not be associated with the AIChE Spring Meeting?

An organized membership campaign for Division members should be planned and developed. For example, the preparation of a simple promotional brochure can have real value and be of low cost. This could be a single three-fold page that could be printed on any PC. It would be useful to have available at all AIChE meetings.

A review of the Division membership status of the attendees at the Loss Prevention Symposiums, the Ammonia and Related Facilities Symposiums, and the CCPS International Conferences could lead to a potential Division member list for further action.

A Division Government Relations Committee could be established to provide input and position papers to government agencies, such as EPA and OSHA, regarding safety issues. A recent possible example would be a description of the problems involved in setting a regulatory standard for "reactive" chemicals under the EPA Process Safety Management rules.

A number of useful liaison arrangements could be made with other "job function" Divisions, such as the Environmental Division and the Process Development Division. Liaison arrangements with specific groups within other societies having a strong safety interest could be of value. Organizations include the American Society of

Mechanical Engineers, the American Chemical Society, and the American Society of Safety Engineers. The purpose here would be perhaps joint programming, the preparation of position papers, and the establishment of safety standards.

Future continuing education programs may of necessity be organized outside the AIChE in order to save money. Here, a group within the Division could be active in preparing and keeping up to date a list of continuing education courses of interest to process engineers involved in safety work. The group could also act as liaison to any outside agency arranging continuing education courses for the Institute.

Now all of this will mean more volunteer work, but that is one of the actions necessary to continue the viability of AIChE as the professional home for chemical engineers. More self-starting of the current volunteer cadre into new areas is necessary. The elected Division Directors usually have no specific responsibilities other than attendance at one or two executive committee meetings during the year. Here is an active elected group. Directors could select assignments for Divisional activities along some of the lines mentioned. Obviously, there are other activities not described here that would be of value.

In short, let's move towards enhancing the membership of the Division, enlarging the role of the Division to include more functions than programming, and make it a "mini-society."

Sam West



CLIP THIS COUPON AND GIVE IT TO A NON-MEMBER COLLEAGUE. URGE YOUR ASSOCIATES TO JOIN THE SAFETY AND HEALTH DIVISION!

(Fall 2003)

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