Safety & Health News

AIChE

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS
www.shdiv.aiche.org

SAFETY AND HEALTH DIVISION

A Supplement to *Process Safety Progress* Summer 2003

SAFETY FORUM

TO ERR IS ....

Babe Ruth, a terrific hitter with 714 home runs, struck out 1,330 times. Cy Young had 511 victories to his credit, but also had 313 losses. Roberto Clemente struck out four times in an All-Star game.
Joe DiMaggio hit into seven double plays during a World Series - a record.

There are plenty of hits and wins above, but also some errors.

Safety professionals generally consider that human error is the principal cause of accidents. This concept was first addressed by H. W. Heinrich in his 1931 book *Industrial Accident Prevention*. He stated simply that the vast majority of accidents are caused by the unsafe acts of humans rather than by physical conditions. Prior to that date, safety work was primarily addressed towards physical preventive measures, such as mechanical guards, housekeeping, and inspections. While several of Heinrich's theories have subsequently been downgraded, two have remained paramount. People are the primary cause of accidents, thus safety is primarily a human problem, and the control of accidents is a management problem. It is interesting to note that the Occupational Safety and Health Act, the major federal law related to workplace safety, does not really address the human error issue.

Now there are certainly systems errors that result in accidents, but behind every systems error there is likely to be a human error.

Take a case of a heat exchanger bypass line handling a relatively new chemical product rupturing and causing significant damage. Where was the error? The research chemist failed to report that the new compound expanded on freezing. Or the design engineer failed to specify appropriate heat tracing on the bypass line. Or the contractor failed to install the heat tracing line. Or the operators were not trained where to turn on the heat tracing line. Or the operators failed to make the daily check of the heat tracing line. Or the maintenance workers failed to replace the heat tracing line that was pinched during a repair on the heat exchanger. Or the plant management delayed activating the heat tracing line to save energy, not recognizing that unusually cold weather was approaching.

The direct cause for the rupture is the failure of the heat tracing line. But take your pick as to where the human error was.

Now engineers are certainly not off the hook in accident prevention. The human error could indeed be in the design of the process and equipment. Engineering design can strongly influence the necessary human activities required to operate and maintain a process facility. Is the system designed so that the equipment, the human tasks required, and the environment are compatible with the limitations and capabilities of people?

An example of proper design approaches with human activity in mind can be seen in control systems that use primarily symbolic displays. Four design principles should apply here:

1. Simplicity - as a general principle, the simplest design is best;
2. Compatibility - the motion of the display should be compatible with (or in the same direction as) the motion of the operation and control mechanisms;
3. Arrangement - a poor arrangement of displays can be a source of error; when dials are grouped on a large panel and if they must be read at about the same time, they should be pointing in the same direction within the desired range; and
4. Coding - displays should be coded or labeled so the operator can recognize immediately what units are measured and what the critical range is.

(continued on Page 12 - see ERRORS)

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SAFETY AND HEALTH DIVISION UPDATE
KRIS CHATRATHI, CHAIR

The 2003 AIChE Spring Meeting in New Orleans on March 31-April 2 provided an excellent opportunity for members of the Safety and Health Division to broaden their knowledge through attendance at key technical sessions on process safety issues and through networking with colleagues. Sessions in both the 37th Annual Loss Prevention Symposium and the 6th Biennial Process Plant Safety Symposium were well attended and some of the discussions were quite spirited. The Division Executive Committee met to review past performance and to plan future activities.

Congratulations to Larry Britton who received the Division Miller/Walton Award for outstanding chemical engineering achievements in the areas of loss prevention, safety, and health.

The next meeting organized by the Safety and Health Division programming group, Area 11c in this case, is the 48th Annual Safety in Ammonia Plants and Related Facilities Symposium scheduled for September. There is more information on page 10 about this important symposium.

As an engineer making choices about process safety, I know that design alternatives can range from the lowest minimal cost to a "belt and suspenders" gold standard. However, the chosen design is required to be RAGAGEP, that is, "recognized and generally accepted good engineering practice." The activities, technical sessions, and publications sponsored by the Safety and Health Division help to establish RAGAGEP. As a service to the members of the Division and to the engineering community at large, the Division web site (**www.shdiv.aiche.org)** contains an extensive set of links to the web sites of other organizations and to other publicly available information sources that also help to establish RAGAGEP. As an encouragement to all members to visit the Division web site, a brief review of some of the helpful links is provided here.

The links are organized as follows:

- U.S. Organizations,
- International Organizations,
- OSHA,
- EPA,
- Risk Management Program,
- Other Government Sites, and
- Miscellaneous Sources.

The U.S. Organizations list includes some with which you may not be familiar. The familiar sites are, among others the American Society for Testing and Materials (ASTM), the National Fire Protection Association (NFPA), and the Mary Kay O'Connor Process Safety Center at Texas A&M University.

Some links to AIChE include CCPS and DIPPR. It should be recognized, though, that one source of revenue for these latter self-supporting organizations is the sale from their publications, standards, and guidelines. The links provide a convenient way to search, obtain, or purchase the latest guidelines that may be required for process safety considerations.

Some sites do provide a public document library, for example, the American National Standards Institute (ANSI) site. Searching the ANSI public document library for process safety resulted in 200+ matches, and the search for accidental releases resulted in 84 matches. Other notable sites with which you may not be familiar include the National Institute of Standards and Technology (NIST) and the Texas Chemical Council. The safety information on the Texas Chemical Council site provided data on occupational injury and illness rates from 1992 through 2000, and compared chemical manufacturing to all manufacturing and to all private industry.

The International Organizations list is not quite as extensive as the U.S. Organizations list, but includes links to the International Standards Organization (ISO) and the UK Institution of Chemical Engineers.

U.S. Government sources include links to the Chemical Occurrences page of the Department of Energy (DOE) and to the NOAA Chemical Reactivity Worksheet. The Chemical Occurrences page provides summaries and reviews of events reported at DOE facilities. The information can be accessed by date of occurrence. The chemical reactivity worksheet allows a review of the hazards of virtual mixing chemicals from a database of 6000 relatively common substances. An example problem included on the site involves a train colliding with a truck resulting in a derailed tank car labeled "hydrogen fluoride" and spilled containers from the truck labeled with a UN number of 1806. The hazards of mixing these chemicals can be evaluated using the worksheet. In addition to the example, a reactivity problem set is available.

The Miscellaneous Sources list includes links

(continued on page 4 - see DIVISION)

DIVISION (continued from page 3)

to the UK Health & Safety Executive, links to various engineering laboratories, libraries, and societies, and an "eclectic" list of links to engineering and technology sites.

The web site, thus, contains links to many informative sites that can be of significant assistance to members in the performance of their technical and engineering activities.

In summary, I strongly urge members to make use of the Division web site not only for information about Division activities but also to make use of the internet links to the wide variety of sites providing valuable information in the process safety field. In addition, your suggestions on additions and improvements to the site will be appreciated. I would like to thank all of the members who have previously suggested links for the site. Finally, I would like to thank Dan Crowl and his graduate students at Michigan Technological University for organizing and maintaining the web site on behalf of the Division. The current web master is Siddharth Choudhary.

As usual, your comments, suggestions, ideas, complaints, and whatever regarding Division activities are most welcome. Addresses and e-mails of all of the Division officers appear on page 2.

Kris Chatrathi

PAPER AWARD TO HENDERSHOT

The William H. Doyle Award is presented to the author of the best paper given, considering both technical content and presentation effectiveness, at each Loss Prevention Symposium. At the 2003 New Orleans Meeting, the Award for the best paper at the 2002 Symposium was announced.

Dennis Hendershot of Rohm and Haas Company was selected for the presentation entitled "How a Pipe Failure Resulted in Resizing Vessel Emergency Relief Systems." Subsequent to the presentation, this paper was published in *Process Safety Progress* **22**, No.1, 48-56 (March 2003).

Dennis was also the award recipient in 1999 and becomes only the second person to be presented with this award on two occasions. Larry Britton (see next column) received the award in 1987 and in 1990.

Dennis has long been active in affairs of the Safety and Health Division. He served as Chair in 1998. Currently he is in his third year as a Director of the Institute. **O**

BRITTON WINS AWARD

The Norton H. Walton/Russell L. Miller Award, sponsored by the Safety and Health Division, recognizes an individual's outstanding chemical engineering contributions and achievements in the lost prevention, safety, and health fields.

Dr. Laurence G. Britton of Dow Chemical Company is the 2003 recipient of this prestigious Award. For the past 25 years with Union Carbide (now Dow), his contributions have positively and significantly influenced the chemical engineering profession particularly in the areas of process safety and loss prevention. He is recognized as an outstanding engineer and scientist with exceptional skills and a special interest in sharing his knowledge with industry. His previous awards include two AIChE William H. Doyle Awards and the Union Carbide Special Recognition Award. He continues to be active in Division affairs.

Larry has been involved with more than 50 frequently cited publications including the well-known, scientifically relevant, and important reference book *Avoiding Static Ignition Hazards in Chemical Operations* (AIChE/CCPS 1999). His most recent publication was "Further Uses of the Heat of Oxidation in Chemical Hazard Assessment" (with D. J. Frurip), *Process Safety Progress* **22**, No. 1, 1-19 (March 2003).

He has contributed actively to 17 national technical committees in ASTM, NFPA, CMA (now ACC), and AIChE. He is currently on the Editorial Review Board of *Process Safety Progress*.

The Safety and Health Division and the entire chemical engineering community recognizes and appreciates Dr. Larry Britton's energy, enthusiasm, and many technical contributions. He continues to dedicate time and energy to the advancement of the profession in Division activities and in publications.

Dr. Britton joins a list of distinguished Walton/Miller award winners:

1987	Walter B. Howard
1988	Eugene S. DeHaven
1990	Stanley S. Grossel
1991	William J. Bradford
1993	Ted A. Ventrone
1994	Gui LeGendre
1998	Robert W. Ormsby
1999	Richard F. Schwab
2000	John A. Davenport
2001	Joseph F. Louvar
2002	Daniel A. Crowl
2003	Laurence G. Britton

O

THE CCPS PAGE
CENTER FOR CHEMICAL PROCESS SAFETY

MANAGING CHEMICAL REACTIVITY HAZARDS AND HIGH ENERGY RELEASE EVENTS

The CCPS 18th Annual 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 "Management of Reactive Chemical Hazards and High Energy Release Events." The overall format is primarily in plenary sessions but with ample opportunity for networking and discussions.

Emphasis will be on the use of state-of-the-art methodology in the areas of theory, testing, and applications to design and operations, including inherently safer processes. The use of this information to design, operate, store, and transport potentially hazardous materials will be highlighted in the discussions. Appropriate regulatory issues will be reviewed.

The Conference Chair is Pete Lodal of Eastman Chemical Company. Bob Perry is the CCPS staff representative.

The conference will start on Tuesday morning, September 23, with a keynote address by **John Henshaw**, Assistant Secretary of Labor and Director of the Occupational Safety and Health Administration. This will be followed by a regulatory issues panel consisting of **Deborah Dietrich**, Director of the EPA Office of Chemical Emergency Preparedness and Prevention (CEPPO), **Ron De Cort** of the UK Health and Safety Executive Office, **Carolyn Merritt**, Chair and Chief Executive of the U. S. Chemical Safety and Hazard Investigation Board, and **John Henshaw**. Ample time is provided for discussions about the materials presented by these key speakers.

The luncheon speaker on Tuesday will be **Deborah Dietrich.** The speaker at the Wednesday luncheon will be **Carolyn Merritt**. **Ing. Guillermo Camacho Uriate** of Pemex Mexico and **Scott Berger**, Director of CCPS, will be the featured speakers at the luncheon on Thursday.

Ten plenary sessions are planned with a total of 32 paper presentations scheduled for these sessions. About 40% of the papers will be presented by international experts from countries such as Canada, United Kingdom, Switzerland, The Netherlands, Japan, and Malaysia, which is typical of the CCPS Annual Conferences.

Two plenary sessions are scheduled for Tuesday afternoon, September 23. The first, chaired by Don Connolley of AKZO Nobel, is entitled **"Management Systems"** which will then be followed by a **"Calorimetry Tools"** session chaired by David Moore of AcuTech Consulting Group. An opening night welcoming reception is then scheduled.

The plenary sessions on Wednesday morning, September 24, are **"Inherent Safety"** chaired by Eugene Lee of EPA/CEPPO, and **"High Energy Release Events"** chaired by Walt Frank of ABS Consulting.

On Wednesday afternoon, September 24, the two scheduled plenary sessions are **"Relief System Issues"** (David Jones, ChevronTexaco, Chair) and **"Transportation and Storage"** (Shakeel Kadri, Air Products and Chemicals, Chair).

At the networking reception late Wednesday afternoon, there will be six pertinent poster presentations.

Michael Broadribb of BP America will chair the second **"Management Systems"** plenary scheduled for Thursday morning, September 25, which will be followed by a plenary session on **"Calorimetry Data Generation"** chaired by Gary Pilkington of Abbott Laboratories.

The two final plenary sessions on Thursday afternoon, September 25, chaired by Lisa Morrison of NOVA Chemicals will cover "**Case Histories."** Such sessions are not only informative particularly as related to the prevention of serious incidents, but are also very popular.

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

www.aiche.org/ccps/icw.

Note that there is an "early bird" registration until July 18, 2003, which provides for a reduced registration fee. **O**

For further information about CCPS, contact:

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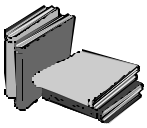


NEW CCPS BOOKS

***Understanding Explosions*, ISBN 0-8169-0779-X, 208 pp, Publ. G-61, AIChE/CCPS, New York (2003), $89.00 (20% discount for members).**

Detailed technical definitions of explosions are complex, and there are many of them. This reference provides valuable information on explosions for everyone involved in the operation, design, maintenance, and management of chemical processes, and in the handling of flammable substances. The book helps to enhance the understanding of the nature of explosions and the practical methods required to prevent them from occurring. Minimizing the probability of an explosion during routine operations with flammable and reactive materials is key.

The text includes: (1) the fundamental basis for explosions; (2) characterizing the explosive and flammable behavior of materials; (3) different types of explosions; (4) fire and explosive hazard recognition; (5) practical methods for preventing explosions and minimizing the potential consequences of explosions; and (6) references for further study.

Understanding Explosions was written for use by the broad spectrum of people in, and associated with, the process industries.

***Essential Practices for Managing Chemical Reactivity Hazards*, ISBN 0-8169-0896-6, 194 pp, Publ. G-81, AIChE/CCPS, New York (2003), $129.00 (20% discount for members).**

In its recent investigation of chemical reactivity accidents, the U.S. Chemical Safety Board noted a discontinuity in technical guidance and regulatory coverage. This volume closes the gap in technical guidance, helping small and large companies alike to identify, address, and manage chemical reactivity hazards. It guides the reader through an analysis of the potential for chemical reactivity accidents to help prevent reaction runaways, fires, explosions, toxic chemical releases, and chemical spills. The material presented is applicable to processes of any scale. The book is particularly valuable for engineers, chemists, and safety managers involved in process scale-up. An enclosed CD-ROM provides checklists and analysis tools. A list of references is included.

An extremely useful complementary book is ***Guidelines for Chemical Reactivity Evaluation and Application to Process Design,*** Publ. G-13, ISBN 0-8169-0479-0, 213 pp, AIChE/CCPS, New York (1995), $109 (20% discount for members). **O**

[To order AIChE/CCPS books, see: **www.aiche.org/pubcat**.]

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 plant operators and other manufacturing personnel. It is estimated that the messages reach over 250,000 manufacturing personnel. The free program is still in effect. Financial sponsorship opportunities are available. Any company, or other organization, that wishes to sponsor the program for one month gets its logo on the upper right corner of the *Beacon* and an electronic hyperlink to its web page.

Typical of the subjects covered are the three issued recently as noted below:

Feb. 2003 Fire Response Training
Mar. 2003 Reactive Chemistry
Apr. 2003 Sparks and Heat

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 CCPS at **212-591-7319** or at **ccps@aiche.org**.

SAFETY BUSINESS CASE

The **"Business Case for Process Safety"** is a CCPS package that summarizes a recent industry-wide study identifying four ways businesses benefit from implementing a robust process safety program. The package consists of an executive summary, ten copies of a booklet targeted at senior executives, and a PowerPoint presentation on a CD-ROM. The 16-page booklet serves as a replacement for the early CCPS publication entitled "A Challenge to Commitment."

The report is especially valuable for senior executives, business leaders, and process safety professionals who want to communicate how a rigorous process safety program is essential to the success of companies that process hazardous substances. A connection between process safety and profitability is recognized. Top-tier companies realize that process safety is an essential part of achieving manufacturing excellence and increasing shareholder value.

This package is available from AIChE/CCPS as Publication G-86 (2003), ISBN 0-8169-0914-8, for $99.00. **O**

SAFETY NOTES

! The National Center for Environmental Assessment (NCEA) of EPA announced the availability of the final document on "Toxicological Review of Benzene - Non-cancer Effects" (EPA/635/R-02/001F). Chronic exposure to benzene may pose several types of non-cancer human health effects. Hematotoxicity, for example, the progressive deterioration of the ability of the body to form blood, is consistently reported to be the most sensitive indicator of non-cancer toxicity in both experimental animal tests and in humans exposed to benzene occupationally. The hazards can result from inhalation, oral, or dermal exposure. The document is available at **www.epa.gov/ncea** under the "What's New" and "Publications" menus.

! OSHA issued a fact sheet on "Emergency Exit Routes" designed to ensure that employers and workers have the proper information about the issue. Valid and reliable information is critical during an emergency situation and can indeed result in saving lives. Emergency action plans are required for facilities covered by the Process Safety Management regulations and are highly desirable for any other work sites. The plan must be written, kept in the workplace, and be available for employee review. The fact sheet is available through **www.osha.gov**.

! As part of the Electric and Magnetic Fields (EMF) Research and Public Dissemination Program of the Department of Energy and the National Institute of Environmental Health Sciences, and updated booklet entitled "Questions and Answers about EMF" is now available at **www.niehs.nih.gov/emfrapid**. The booklet identifies some sources of EMF exposure, some potential hazards involved, and some simple steps to limit exposure.

! A patent for a hand wipe that can quickly and easily detect the presence of lead on skin and on surfaces such as tables, floors, walls, and window sills has been granted to the Centers for Disease Control and Prevention (CDC). The hand wipe changes color when lead is detected. This permits appropriate cleansing action to take place to remove the lead, such as alerting the worker to wash his or her hands thoroughly. The patent is U.S. No. 6,248,593.

! Many organic and organo-metallic reactions require solvents that are free of water and oxygen. In the laboratory, solvent purification is accomplished by refluxing the solvent in the presence of sodium metal and benzophenone in an inert atmosphere. The reactive metal removes moisture and the ketyl intermediate that forms upon the reaction of the ketone and metal helps to remove any oxygen. Having large quantities of flammable solvents is a safety concern in itself and the dangers inherent in the reflux/distillation purification process exacerbate the hazard. A researcher at California Institute of Technology designed a system based on activated alumina and a copper catalyst to remove the water and oxygen. The new system operates at ambient temperature and without reactive metals. Dry inert gas is used to force solvent over columns containing the moisture-removing activated alumina and the oxygen-removing copper catalyst. Commercial laboratory equipment based on this new method is now available.

! In March, John Ferris was appointed new Special Assistant for Emergency Preparedness at OSHA. He will coordinate the efforts of the Agency to address emergency preparedness and response in workplaces throughout the country. Ferris was a technical expert in chemical emergency preparedness and prevention at EPA prior to joining OSHA.

! OSHA has been emphasizing the "Add Value" theme since OSHA Administrator John Henshaw first announced it during a speech at the National Safety Council Congress in San Diego last October. The message that safety and health "add value to your business, to your health, to your life" is highlighted on the OSHA home page. A description of the "add value" philosophy is now available in a brochure which can be downloaded from **www.osha.gov**. **O**

Division 1st Vice-Chair Scott Ostrowski (ExxonMobil) with Walton-Miller Award honoree Larry Britton and Division Awards Committee Chair Joe Louvar (Wayne State University).

Division 1st Vice-Chair Scott Ostrowski (ExxonMobil) presents a plaque recognizing Past-Chair Walt Frank (ABS Consulting).

SCENES FROM THE 2003 NEW ORLEANS MEETING MARCH 30 - APRIL 3

Lois DeLong, Managing Editor, *Process Safety Progress*.

John Henshaw, Director of OSHA, addresses the Process Plant Safety Symposium luncheon while Ron Darby (Texas A&M), AIChE Spring 2003 Meeting Program Chair, looks on.

Loss Prevention Symposium Vice-Chair Bob Johnson (Unwin Corporation) with Dan Crowl (Michigan Technological University).

MORE SCENES FROM NEW ORLEANS, MARCH 30 - APRIL 3

Principal authors of recent CCPS books participated in a book signing. From left, Bob Johnson (Unwin Corporation), *Essential Practices for Managing Chemical Reactivity Hazards*; Dan Crowl (Michigan Technological University), *Understanding Explosions*; and Stan Grossel (Process Safety and Design Inc.), *Deflagration and Detonation Flame Arresters*. Are appearances on "Fresh Air with Terry Gross" on NPR and "Larry King Live" next?

2002 Loss Prevention Symposium Chair Henry Febo (FM Global) presents the Bill Doyle Award to Dennis Hendershot (Rohm and Haas) for best paper presentation.

Division Chair Kris Chatrathi (CRB Consulting Engineers) with 1st Vice-Chair Scott Ostrowski (ExxonMobil) at the annual Division Executive Committee meeting.

John Murphy (U.S. Chemical Safety Board), Chair of the 2003 Loss Prevention Symposium and 2001 Safety and Health Division Chair.

U.S. Chemical Safety and Hazard Investigation Board Member Irv Rosenthal.

Photos on pages 8 and 9 are courtesy of Dennis Hendershot (Rohm and Haas Company)

TRI-NATIONAL SAFETY ISSUES

Occupational safety and health officials from the United States, Mexico, and Canada have agreed to criteria to recognize excellence in workplace safety and health programs in all three nations. The group also reached a consensus on key elements for establishing occupational safety and health management systems. This is a result of a technical workshop held in Texas and Mexico on March 10-12, 2003, attended by members of a Tri-National Occupational Safety and Health Working Group.

Key elements for an effective safety and health management system include: (1) management commitment and responsibility; (2) employee involvement and responsibility; (3) worksite analysis; (4) hazard/risk prevention and control; and (5) training. Criteria for recognizing best practices in excellence in workplace safety and health programs, including application and evaluation processes, participation levels, and a recognition strategy, were established.

Topics to be considered at future technical workshops include the collection and reporting of injury and illnesses statistics, the Canadian OSH auditor certification process, the OSH youth education program, and issues specific to Hispanic workers.

The Occupational Safety and Health Working Group was established under the side accord on labor as part of NAFTA. **O**

PUT DOWN THAT PHONE!

The results of a new study at the University of Utah reported recently by the National Safety Council (NSC) explains directly how cell phone use during driving can be a potentially disastrous distraction. The researchers show that conversing on cell phones while driving leads to significant decreases in driving performance. An "inattention blindness" develops which is the inability to recognize objects encountered in the visual field of the driver. Cell phone use creates a considerably higher level of driver distractions than listening to a radio or in conversations with others in the car. This seems to be true regardless of whether hand-held or hands-free cell phones are used. Thus, banning hand-held devices would not likely reduce driver distractions.

The researchers suggest that when drivers are directing their eyes at objects in the driving field, they fail to see them when using a cell phone.

The report appears in the February/March 2003 issue of the NSC *Injury Insights*[tm]. **O**

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, Florida. 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. Papers are scheduled for presentation on subjects such as hazardous incidents, safety developments, safety studies, technological advancements, and maintenance improvements.

The meeting will start with a special keynote address at 8:00 AM on Monday, September 15. In technical sessions on Monday, Tuesday, and Wednesday mornings and afternoons, September 15-17, a total of 32 papers will be presented by experts from around the world.

Three round table workshops will be held on Thursday morning, September 18, addressing operating experiences and mechanical integrity programs, reports on safety incidents, and field repair methods and procedures. Each of the roundtable topics will include brief, unrecorded presentations by panel experts followed by a moderated panel discussion and audience participation.

The Ammonia Committee Chair is Richard Strait of Kellogg Brown & Root. The Program Chair is Kevan Vick of Farmland Industries, Inc.

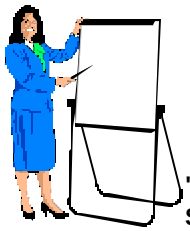
For further information as well as registration and hotel forms, see:

www.aiche.org/conferences/ammonia.

CALL FOR PAPERS

An international conference entitled "Bhopal and its Effect on Process Safety" is scheduled for December 1-3, 2004, at the Indian Institute of Technology, Kanpur, India, on the 20th Anniversary of the Bhopal tragedy. Papers are invited on all aspects of process safety, particularly indicating the progress made since 1984. Papers, after peer review, will be published in a special issue of *The Journal of Loss Prevention in the Process Industries* (Elsevier).

Those interested in presenting papers should indicate specific interests to Professor J. P. Gupta, Department of Chemical Engineering, Indian Institute of Technology, Kanpur-208016 (U.P.), India. The e-mail address is **jpg@iitk.ac.in**. **O**



PAPERS PAPERS PAPERS

"Dust Explosions: Is Your Safety Blanket in Place?" V.Ebadat and C.Laing, *Chem.Eng.* **110**, No.4, 50-54 (April 2003).

In order to protect your facility effectively, you must understand why and how dust explosions occur. Several characteristics must be exhibited by the dust and the suspending atmosphere. The dust must be combustible. The oxygen content of the surrounding atmosphere must be sufficient to sustain combustion. The dust concentration must be between the upper and lower explosive limits. The particle size distribution must be capable of supporting combustion. And, finally, an ignition source of sufficient energy must be present to initiate explosion. Hazard assessment, explosion prevention, and explosion protection techniques are described.

"The Differential Reaction Calorimeter: A Simple Apparatus to Determine Reaction Heat, Heat Transfer Value, and the Heat Capacity," H.Nogent and X.LeTacon, *J.Loss Prev.Process Ind.* **15**, No.6, 445-448 (November 2002).

A new type of calorimeter, commercialized by Setaram SA and designated DRC, appeared about two years ago. This calorimeter is operated in the isoperibolic mode. The heat transfer value, UA, and heat capacities of the reactor contents, C_{pMR}, are determined simultaneously. This paper contains a description of the new calorimeter and its principles of operation.

"The Differential Reaction Calorimeter: Examples of Use," H.Nogent and X.LeTacon, *J.Loss Prev.Process Ind.* **16**, No.2, 133-139 (March 2003).

A comparison of results obtained by the new differential calorimeter DRC from Setaram SA and the Mettler RC1 calorimeter are reviewed. Accuracy of the results are comparable. The DRC can easily be used in the early stages of process development since only small sample quantities are required.

"Asbestos Related Malignancy: Mesothelioma," S.K.Thompson and E.Mason, *Chemical Health and Safety* **10**, No.1, 4-6 (January/February 2003).

Asbestos exposures can result in a variety of diseases, depending upon the type and size of the inhaled particles and their location in the respiratory tract. The mechanical action of the asbestos fiber may lead to cancers as well as non-malignant fibrotic lung changes associated with asbestosis. Persistent irritation by asbestos fibers is the major risk factor resulting in malignant mesothelioma. Tobacco use in combination with asbestos exposure greatly increases the incidence.

"Part 1 - Process Security Management: Assess the Threats, Control the Risk," E.M.Marszal, *Chem.Eng.* **110**, No.1, 42-46 (January 2003).

A methodology for assessing the risk of terrorist attacks on your facility is indicated and suggestions for risk control measures in areas where credible terrorist targets exist are identified. A systematic analysis of the potential for terrorist activities and implementation of security measures that are appropriate to the level of risk are recommended.

"Part 2 - Process Security Management: Set Up Your Plant's Program," P.Baybutt, *Chem.Eng.* **110**, No.1, 48-55 (January 2003).

Although the two differ, process security management can borrow effectively from the proven success of process safety management. A process security management program that parallels PSM is proposed which contains the following elements: (1) a management system; (2) coordination with other organizations; (3) employee involvement and security awareness; (4) process security information; (5) risk assessment; (6) security procedures; (7) training; (8) dealing with contractors; (9) security systems integrity; (10) management of change; (11) incident reporting and investigation; (12) emergency response and crisis management; and (13) reviews, audits, and inspections.

"Endocrine Disruptors: The Next Generation of Regulatory Concern?" P.McGovern and H.S.McDonald, *Water Env. & Technology* **15**, No.1, 35-39 (January 2003).

Potential endocrine disruptors include certain alkylphenols, phthalates, organochlorines, and organotins which are found in pesticides, plastics, personal care products, and pharmaceuticals. These compounds can block, mimic, stimulate, or inhibit the production of natural hormones.

ERRORS (continued from page 1)

This is just one example of how design can impact on the reduction of human error in operations.

Even though human error may be considered to be the major cause of accidents, engineers can avoid being the humans involved in the errors by playing a significant role in accident prevention through proper design, hazard evaluation, and operating knowledge. In engineering activities, the human part of the equation is sometimes overlooked, however, and this may be particularly the case if all of the judgments are made by computer programs.

Sam West

DEFINITIONS

Chemical: A substance that: (1) an organic chemist makes into a foul odor; (2) a physical chemist makes into a straight line; (3) a biochemist thinks can only be a helix; (4) a chemical engineer turns into a profit; and (5) a consumer turns into a law suit.

Compound: To make worse, as in a fracture.

Activation energy: The useful quantity of energy available in one cup of coffee.

Natural product: A substance that earns organic chemists fame and fortune when they manage to synthesize it with great difficulty while Nature gets no credit for making it with apparently little effort in the first place.

REPORT ON CARCINOGENS

The Department of Health and Human Services released the Tenth Edition of the Report on Carcinogens in December 2002. Prepared by the National Toxicology Program (NTP), the report identifies substances that are known or reasonably anticipated to be human carcinogens. A total of 228 substances are now listed.

Among the items newly listed as known human carcinogens are steroidal estrogens and nickel compounds.

Beryllium and beryllium compounds were changed from reasonably anticipated to known human carcinogens.

Included in the new list of reasonably anticipated to be human carcinogens are metallic nickel, styrene-7,8-oxide, vinyl bromide, vinyl fluoride, 2,3-dibromo-1-propanol, and certain dyes.

The Report on Carcinogens was mandated by Congress in 1978. The report does not assess the magnitude of the carcinogenic hazard, nor does it address any potential benefits of listed substances such as pharmaceuticals. Listing in the report does not establish that a substance presents a risk to persons in their daily lives. Such formal risk assessments are the responsibility of health regulatory agencies. Thus. the listing of a substance in the report is not a regulatory action, but listing may prompt regulatory agencies to consider limiting exposures or uses of a substance. The report and fact sheets about the program are accessible at: http://ntp-server.niehs.nih.gov.

Work on the 11th Edition is now in progress. **O**