Safety & Health News

AIChE
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

SAFETY AND HEALTH DIVISION
www.shdiv.aiche.org

A Supplement to *Process Safety Progress* Winter 2001

safety forum

TERRORISTS

Industrial and trade magazines and newsletters have had some difficulties relating to the terrorist attacks on September 11th, particularly in the first issue following that date. Just writing about the usual things going on in the appropriate business or industry does not seem to be of sufficient magnitude in light of the biggest news story in the United States in 60 years. Some trade publications have had to stretch content in spite of the significant breadth and implications of the attack.

For example, *Expedition News* wrote about mountaineers offering advice to the military regarding the rugged terrain of Afghanistan. *Special Events Magazine* indicated the significant increase in cancelled events. *International Bowling Industry* pointed out that fears of terrorists did not keep bowlers away from the lanes. *Cheese Market News* highlighted the diversion of perishable milk deliveries from New York City because of bridge closures.

No such reaching is necessary for *Safety & Health News*. Facilities such as petroleum refineries, chemical plants, and petrochemical complexes are indeed potential targets for terrorists. A sense of urgency was clear at the annual meeting of the American Chemical Council in Houston in late October. A town hall meeting, which was closed to the press, permitted the executives present to air concerns, share practices, and discuss needed actions. The meeting was closed on the basis that security takes priority over the public's right to know. Publicly, companies are increasing site security, conducting more background checks than previously, monitoring all interactions among their plants, and modifying mail-handling procedures. A significant future problem is the possible cost of liability and catastrophic insurance.

The term "worst-case scenarios" has suddenly taken on new and, yes, frightening meaning.

The distribution of anthrax through the mail represents another type of terroristic attack. No link has been established at this writing between the September 11th attacks and the anthrax situation. The fact that the latter has been quite limited suggests that another person or group is responsible.

There have been previous chemical and biological attacks in the world. An extreme cult released Sarin into several Tokyo subway stations in 1995, killing 12 and injuring over 5,000 people. That same group tried dissemination of infectious biological agents, but failed.

A religious group spread Salmonella in salad bars in Oregon with the hope they could induce severe illness among voters and influence the outcome of a local election. The group was successful in creating some illnesses but failed to influence the election results.

In 1996, 12 people were infected when Shigella dysentariae was intentionally sprinkled on pastries in a medical laboratory in Texas.

Responding to various threats and incidents, Congress passed the Antiterrorism and Effective Death Penalty Act in 1996 with provisions for criminal prosecution and punishment of persons using chemical or biological agents in terroristic attacks. Subsequently, a list of 36 dangerous biological agents, called Select Agents, was established. The Centers for Disease Control and Prevention (CDC) was charged with the responsibility for establishing rules and procedures relative to use, storage, shipping, disposal, and record keeping which are followed today for institutions legally handling these agents.

(continued on page 10 - see Terrorism)

Safety & Health News is published quarterly by the Safety and Health Division of the American Institute of Chemical Engineers (AIChE). It is distributed to members of the Division as a supplement to *Process Safety Progress*. Publication is funded by the Safety and Health Division, by the Center for Chemical Process Safety (CCPS) of AIChE, and by AIChE.

A. S. West, P.E., *Editor*
3896 Sidney Road
Huntingdon Valley, PA 19006
215-938-7181
e-mail: aswest@worldnet.att.net

SAFETY AND HEALTH DIVISION 2001

John F. Murphy, Chair
U.S. Chemical Safety Board
2175 K Street, NW
Suite 400
Washington, DC 20037-1809
202-261-7622
e-mail: john.murphy@csb.gov

Walter L. Frank, 1st Vice-Chair
EQE International, Inc.
1504 North Broom Street, Unit #3
Wilmington, DE 19806
302-661-0987
e-mail: wlf@eqe.com

Kris Chatrathi, 2nd Vice-Chair
Fike Corporation
704 South Tenth Street
Blue Springs, MO 64015
816-229-3405, x-468
e-mail: kchatrathi@fike.com

Robert P. Benedetti, Past-Chair
National Fire Protection Association
One Batterymarch Park
P. O. Box 9101
Quincy, MA 02269-9101
781-828-4767 (M-W)
617-984-7433 (Th-F)
e-mail: bbenedetti@nfpa.org

Albert I. Ness, Secretary/Treasurer
Rohm and Haas Company
Engineering Division
P. O. Box 584
Bristol, PA 19007
215-785-7567
e-mail: Albert_I_Ness@rohmhaas.com

DIRECTORS

M. Sam Mannan (1999-2001)
Texas A&M University
327 Zachary Engineering Center
College Station, TX 77843-3122
979-862-3985
e-mail: mannan@tamu.edu

Scott W. Ostrowski (1999-2001)
ExxonMobil Chemical Company
Baton Rouge Plant
P. O. Box 421
Baton Rouge, LA 70821-0421
225-359-7400
e-mail: swo@exxon.com

Henry L. Febo (2000-2002)
FM Global
1151 Boston-Providence Turnpike
Norwood, MA 02062
781-255-4771
e-mail: henry.febo@fmglobal.com

Walter Silowka (2000-2002)
Air Products & Chemicals, Inc.
Corporate Engineering Dept.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
610-481-6808
e-mail: silowkw@apci.com

Gary Pilkington (2001-2003)
Abbott Laboratories
Dept. 05-SL, Bldg. AP52S
200 Abbott Park Road
Abbott Park, IL 60064-6212
847-937-3091
e-mail: gary.pilkington@abbott.com

Ronald J. Willey (2001-2003)
Northeastern University
Dept. of Chemical Engineering
360 Huntington Avenue
Boston, MA 02115
617-373-3962
e-mail: willey@neu.edu

PROGRAM COORDINATORS

Robert P. Benedetti
(see Past-Chair)

Ephraim A. Scheier
BP Amoco Corporation
200 Westlake Park Boulevard
Houston, TX 77079
281-366-2573
e-mail: ephraim.scheier@bp.com

AWARDS COMMITTEE

Joseph F. Louvar, Chair
Wayne State University
Department of Chemical Engineering
5050 Anthony Wayne Drive
Detroit, MI 48202-9988
313-577-9358
e-mail: jlouvar@eng.wayne.edu

AIChE STAFF REPRESENTATIVE

Clare Bennett
American Institute of Chemical Engineers
Center for Chemical Process Safety
3 Park Avenue
New York, NY 10016-5991
212-591-7319
e-mail: clarb@aiche.org

MEMBERSHIP COMMITTEE

Walter L. Frank
(see 1st Vice-Chair)
John F. Murphy
(see Chair)

PUBLICATIONS COMMITTEE

Daniel A. Crowl, Chair
MichiganTechnological University
Department of Chemical Engineering
Houghton, MI 49931
906-487-3221
e-mail: crowl@mtu.edu

CONTINUING EDUCATION COMMITTEE

Dennis C. Hendershot
Rohm and Haas Company
Engineering Department
P. O. Box 584
Bristol, PA 19007
215-785-7243
DHendershot@rohmhaas.com

Peter N. Lodal
Eastman Chemical Company
Building 18
P. O. Box 511
Kingsport, TN 37662
423-229-2675
pnlodal@eastman.com

Robert W. Ormsby
Air Products & Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
610-481-6715
e-mail: ormsbyrw@apci.com

GOVERNMENT RELATIONS

Walter L. Frank
(see 1st Vice-Chair)

LIAISON TO BOARD OF DIRECTORS

Dennis C. Hendershot
(see Continuing Education Committee)

EDITOR - *PROCESS SAFETY PROGRESS*

Theodore A. Ventrone
P. O. Box 669
Belle Mead, NJ 08502
908-359-3392

WEBMASTER
Chaitanya Belwal
Michigan Technological University
Department of Chemical Engineering
Houghton, MI 49931
906-487-3297
e-mail: cbelwal@mtu.edu

SAFETY AND HEALTH DIVISION UPDATE
John F. Murphy, Chair

The world has changed dramatically since the last time I wrote a Division update. The terrorist attack on our nation on September 11th has changed our views on safety and security from both a personal viewpoint and from a process safety perspective. Chemical processing companies are reassessing their worst-case scenarios from a plant security standpoint. The transportation of many hazardous materials is being seriously reviewed. Certain Risk Management Program data have been removed from the EPA web site. There is some information that the significant ammonium nitrate explosion in Toulouse, France, could have been a terrorist event. There would indeed be value in reviewing the application of inherently safer principles in chemical processing to plant operations in light of recent events. Certainly, the concept of worst-case scenarios and layers of protection in processing facilities should be revisited. It seems to me that the new world we live in now has an even greater need for process safety management.

Process Safety Progress. There is a small task force of Division members and members from the AIChE Publication Committee reviewing the Division magazine, *Process Safety Progress*, to determine if there is a need to change the content and/or format. The Division leadership feels that the magazine has served us well, but periodic reviews have value. AIChE, with help from the Division, will be developing a survey that will be sent to subscribers and to potential subscribers to gather information regarding the effectiveness of the publication and to collect ideas on changes that would make it more relevant to Division members and other process safety professionals. Be sure to complete the survey when you receive it and to give us your frank opinions regarding improvements.

Division Meetings. The 46th Annual Safety in Ammonia Plants and Related Facilities Symposium, organized by Program Area 11c, was scheduled for September 17-20, 2001. In light of the events of September 11th, this meeting was rescheduled for January 14-17, 2002, at the same location, that is, the Le Centre Sheraton in Montreal, Canada. In so far as possible, the program arranged for the previous date will be maintained. More details are shown on page 4 of this Newsletter.

The detailed program for the 36th Annual Loss Prevention Symposium, organized by Program Area 11a, appears on pages 8 and 9 of this Newsletter. The Symposium will be held in conjunction with the AIChE Spring National Meeting, March 10-14, 2002, at the Hilton Riverside Hotel in New Orleans. The Division is working with AIChE staff on developing ideas for improvement of this Symposium, e.g., venue, topics, and format. If you have any ideas, please comment to Bob Benedetti, Ephraim Scheier, or me (see page 2 of this Newsletter for e-mail addresses). The Division strives to make this event relevant to your career.

Division Elections. The Division election for officers and directors was held during November and early December for the first time via electronic balloting. E-mail announcements and ballots were sent to all Division members with known e-mail addresses, while other members were sent hard copy ballots. I would appreciate receiving any comments that you may have on how the electronic balloting worked out. There were probably some glitches on this first try.

The U. S. Chemical Safety and Hazard Investigation Board. I have recently completed my first year at the Chemical Safety Board in Washington and have seen much progress by this agency. This year, the Board has completed the Tosco refinery (Martinez, CA) investigation, and has begun investigations at Bethlehem Steel In Burns Harbor, IN, at BP Amoco in Augusta, GA, and Motiva in Delaware City, DE. The Reactive Chemical Hazard investigation is in progress and will be completed in early 2002. A Safety Bulletin on Management of Change has been published. In addition, the Board has rolled out its recommendations program, a formal process to ensure that the recommendations of the Board have a positive impact on process safety. The Board will continue to hire additional investigators and recommendations specialists in the coming year so that it can produce additional quality investigative reports with recommendations that improve process safety. The CSB is looking for experienced people with expertise in incident investigation, training, and human factors. Industry experience is highly desirable. Employment opportunities are announced on the CSB web site. Feedback from stakeholders regarding the products of the Board to date has been overwhelmingly positive. Details on CSB activities can be found on the web site at:

<**www.chemsafety.gov**>.

(continued on page 4 - see UPDATE)

UPDATE (continued from page 3)

Closing Note. This will be my last Division Update. My term as Chair expires at the end of 2001. I have enjoyed my year as Chair and appreciated the opportunity to serve the Division. I have had much help from the Division officers. I especially want to thank Bob Benedetti and Dennis Hendershot for their mentoring assistance during the year. I am looking forward to continue serving the Division as Past Chair in 2002.

Have a safe day!

John F. Murphy, P.E.

NEW WEBMASTER FOR DIVISION

Chaitanya Belwal, a graduate student in chemical engineering under Dan Crowl at Michigan Technological University, has accepted the appointment as Safety and Health Division webmaster. Chaitanya replaces Alan Nelson who completed his graduate studies at Michigan Tech and is now Assistant Professor in the Department of Chemical and Materials Engineering at the University of Alberta in Edmonton.

The Division thanks Alan for his efforts in establishing and maintaining the web site. Alan wrote to the officers: "I would like to take this opportunity to thank you for your support and dedication to the AIChE Safety and Health Division web site. As you are aware, I have completed my degree at Michigan Tech and am no longer in the capacity to remain as the Division webmaster. However, the infrastructure and support remains at Michigan Tech to ensure the future success of the web site. It was a pleasure to serve as webmaster for the Division and work with each of you." **O**

FIRST SCHECHTER AWARD

On May 4, 2001, the first Annual Stanley J. Schechter Award was made to Kristina R. Gonser by the faculty of the Department of Chemical Engineering at the University of Delaware. The Award has been funded to be given annually with a gift of $1000. It is given by the faculty to a junior chemical engineering student based on academic merit with a preference for distinction in the arts, humanities, and/or social studies. It is the intention of the award that the student best exemplifies the qualities most appreciated by Stan Schechter: breadth of perspective as well as depth of knowledge.

Stan Schechter died in August. He had been very active in the Safety and Health Division, serving as Chair in 1994. **O**

SAFETY IN AMMONIA PLANTS

46TH ANNUAL SAFETY IN AMMONIA PLANTS AND RELATED FACILITIES SYMPOSIUM, January 14-17, 2002, LeCentre Sheraton, Montreal, Quebec, Canada.

The 2001 Ammonia Safety Symposium originally scheduled for September 17-20, 2001, will now be held in January at the previously selected location. This annual symposium has become the world's largest international conference on plant safety. It is organized by Program Area 11c.

Richard L. Johnson of Mississippi Chemical Corporation is Chair of the AIChE Ammonia Safety Committee. Richard Strait of Kellogg Brown & Root is the Program Chair, and Louis Frey of CF Industries, Inc. serves as the Program Vice-Chair.

On Monday, January 14, at 8:00 AM, Kathleen Eisbrenner, Chief Commercial Officer of El Paso Global LNG Company, will discuss "North America Natural Gas Trends."

Cutting-edge research and experiences in making the production of ammonia and related chemicals as safe as possible will be presented in 30 papers over 5 half-day sessions. There will be innovative presentations on incidents, safety developments, safety studies, technological advancements, and maintenance improvements. International speakers will be well represented.

On the morning of the final day, Thursday, January 17, a Roundtable Workshop covering recent metallurgical failures will be held. This session is not recorded to permit open and frank discussions.

For further information, see:

<**www.aiche.org/spring**>.

The 47th Annual Safety in Ammonia Plants and Related Facilities Symposium is scheduled for September 16-19, 2002, at Loews Coronado Bay Resort in San Diego, CA.

SAFETY PEOPLE

Ephraim Scheier, long active in Safety and Health Division affairs and currently a Program Coordinator, is now a Process Safety Engineer in the Upstream Technology Group at BP Amoco Corporation in Houston. He formerly was with Occidental Chemical Company. **O**

THE CCPS PAGE
CENTER FOR CHEMICAL PROCESS SAFETY

REACTIVE MATERIAL HAZARDS

CCPS has just published a Safety Alert on Reactive Material Hazards. This 12-page booklet covers in a practical, down-to-earth manner how a user of reactive materials can learn to handle them safely. Several industry experts distilled their years of experience in safely handling reactive chemicals in preparing this Safety Alert.

This is the first in a new Safety Alert series. These are to be designed to provide useful, concise, and easily readable information on process safety topics. As such, they will be new and valuable additions to the Guidelines and the Concept book series already established by CCPS. There are over 70 publications in these two series of books.

The new Safety Alert is being distributed widely in printed form. It is also available on the CCPS web site at:
<**www.aiche.org/ccps/safetyalerts**>.

The booklet has six sections:

1. Introduction
2. How Do We Handle Reactive Materials?
3. Can We Have Reactive Interactions?
4. What Data Do We Need to Control These Hazards?
5. What Safeguards Do We Need to Control These Hazards?
6. Where Can We Get More Help?

The last section cites several CCPS publications including *Guidelines for Reactivity Evaluation and Application to Process Design* (1995) and *Guidelines for Safe Storage and Handling of Reactive Materials* (1995). **O**

PROCESS SAFETY MESSAGES

The first in the CCPS series of process safety messages for manufacturing personnel has been issued. In this project, CCPS is bringing to the sponsor organizations a new product aimed at improving safety awareness. The intent is to provide materials for delivering important and timely process safety messages for manufacturing personnel. The messages will be one-page documents provided on a regular basis via electronic means. CCPS sponsor companies can choose to use these messages based on their own needs. Anthony A. Thompson of Monsanto and John Herber of 3M serve as Project Co-Chairs. Dan Rivard is the CCPS Staff Consultant. **O**

NEW LOPA BOOK ISSUED

Layers of Protection Analyses: Simplified Process Risk Assessment, 200 pp., ISBN 0-8169-0811-7, AIChE/CCPS, New York (2001), $139.00 (20% discount for members).

Layer of Protection Analysis (LOPA) is a new, simplified method of risk assessment that provides a middle ground between qualitative process hazard analysis and traditional, expensive quantitative analysis. It also provides an excellent approach for determining the safety integrity level necessary for an instrumented safety system, an approach endorsed by instrument standards such as ISA S84 and IEC 61511.

Beginning with an identified accident scenario, LOPA uses simplified rules to evaluate initiating event frequency, independent layers of protection, and consequences to provide an order-of-magnitude estimate of risk.

Augmented throughout with extensive tables, charts, and examples, this resource provides the information necessary to undertake and complete a Layer of Protection Analysis during any stage in the life cycle of a process.

A Layer of Protection is a design or operating feature that prevents, detects, responds to, and/or mitigates a process hazard event. Each successive layer tends to reduce the likelihood of a process incident that could cause injury or damage. But how many layers of protection are necessary? Too few, and the risk of injury or damage might be too high. Too many, and scarce resources might be invested in the wrong places. This book explains how to make the proper choices. LOPA starts following identification of potential hazards via HAZOP.

For further information about CCPS, contact:

Dr. Jack A. Weaver, Director
Center for Chemical Process Safety
American Institute of Chemical Engineers
3 Park Avenue
New York, NY 10016-5991
212-591-7404 **e-mail: jackw@aiche.org**

CALL FOR PAPERS

The 17th Annual International Conference and Workshop organized by CCPS is scheduled for **October 8-11, 2002,** in Jacksonville, FL, featuring a theme of Risk and Reliability. Papers addressing these related topics, including the relationship of economic value and EHS performance, are solicited. Risk includes hazard identification, consequence modeling, quantitative and qualitative risk analysis, risk management, inherent safety, and facility security. Reliability includes engineering programs that prevent the release of hazardous materials, increase on-stream efficiency, and reduce reactive maintenance costs.

The conference will consist of Plenary Sessions and Workshops. Session themes will include the following:

RISK: Risk is a measure of human injury, environmental damage, or economic loss in terms of both likelihood and magnitude. Areas include risk analysis, risk assessment, risk management, and risk communication.

FACILITY SECURITY: Recent events have heightened security concerns. Although a component of traditional risk analysis, separate discussions are warranted.

INHERENT SAFETY: Experiences in applying inherently safer design approaches to reduce or eliminate hazards associated with a process will be included.

RELIABILITY: Topics of interest include new developments in plant equipment reliability databases and reliability-centered design and maintenance.

CONSEQUENCE MODELING: Of interest are developments for prediction of dispersion from multiphase (aerosol) and multi-component releases and experimental validation of models.

TRANSPORTATION RISK ANALYSIS: Although transportation risk analysis uses the familiar tools and techniques, distribution activities are often housed in separate organizations and responsibility is shared among several parties.

You may submit your proposal via e-mail either in the body of the message or as a WORD document attached to the e-mail. The abstract should be 200 words or less and no more than 2 paragraphs to describe the paper you intend to submit. All contact information must be included. The abstracts should be e-mailed to: **ccpsicw@aiche.org**.

Abstracts are due no later than **February 15, 2002**. **O**

SEARCH FOR PROCESS SAFETY INFO MADE EASY

CCPS now makes finding important process safety resource materials as easy as point and click. The "Smart-Search" system, a searchable electronic index of CCPS process safety book titles, has been developed to help users find answers to difficult process safety questions.

CCPS has published nearly 70 books containing over 16,000 pages addressing many aspects of chemical process safety including management and management systems, engineering design, manufacturing operations, and several very technical aspects of risk assessment and management. Even with descriptive titles, however, it can be difficult to find the right resources.

The "Smart-Search" system produces a list of all CCPS books containing information on the selected subject, along with the Table of Contents and Subject Index for those books. The search items are highlighted.

This resource is free of charge. To access the "Smart-Search" system, users can click on the appropriate icon on either the AIChE Publications web site, or the CCPS home page. The addresses are: <**www.aiche.org/pubcat**> and <**www.aiche.org/ccps**>. **O**

SACHE WORKSHOP CANCELLED

The Safety and Chemical Engineering Education (SACHE) Workshop for university professors, scheduled for September 16-19, 2001, at BASF facilities in Wyandotte, MI, was cancelled in light of the myriad of transportation restrictions imposed at that time and the heightened security at the BASF facility. At this writing, plans are being developed for a rescheduling of this Workshop, perhaps in the Spring of 2002. SACHE is sponsored by CCPS.**O**

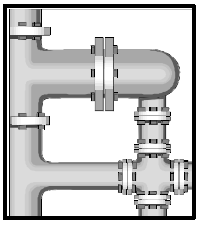
SOLVENT SELECTION GUIDE

The Center for Waste Reduction Technologies (CWRT), an AIChE Industry Technology Alliance as is CCPS, is developing a suite of solvent selection tools to facilitate choosing solvent candidates early in the product development stage to make life cycle EHS impacts/issues visible for each solvent candidate, to facilitate process optimization in late product development, to explore mixtures that do not introduce additional complexity, and to explore designer solvent possibilities. Eight companies are currently collaborating on this project.

SAFETY NOTES

! Case histories of two chemical production accidents are described in a Safety Bulletin issued by the U.S. Chemical and Hazard Investigation Board in August 2001. The bulletin, entitled "Management of Change," urges that company personnel systematically and carefully manage process changes when they occur. Although there appeared to be no particular rush to get the processes back on line in both cases, the process change involved in each facility was managed incorrectly resulting in six worker deaths in one and four major worker injuries in the second. The bulletin provides information on modifying procedures to incorporate better safety management of changes. It is available at: <**www.chemsafety.gov**>.

! A major explosion occurred at a fertilizer plant operated by Grande Paroisse in Toulouse, France, on September 21. The death toll was reported to be 29. In addition, 34 of the 650 people hospitalized were judged to be gravely injured. Reports indicate that 300 tons of ammonium nitrate were involved. The operating company is a subsidiary of Atofina, the chemical arm of TotalFinaElf. The plant was destroyed as were some neighboring buildings. Half the window glass in the city of 1 million was blown out. This event is likely to have major impact on regulations and public perceptions in Europe. The French government provided a massive aid and action package to address the human and infrastructure problems created by the explosion. The plant will not be rebuilt.



! Mothballs may be as bad for you as they are good for your wool clothing. The National Toxicology Program reported this year that its recently completed two-year bioassay study on naphthalene showed clear evidence that the chemical substance caused cancer in both male and female rats via inhalation exposure. Scientists and regulators will now determine if naphthalene presents a risk to humans on chemical exposure. The chemical can also enter the human food chain when it is used on livestock.

! Toxicity of chemical products is obviously an important parameter from the safety and health perspective. However, there is increasing public opposition to the use of animal models, particularly for industrial chemicals. Therefore, studies are ongoing for alternative testing using a combination of *in vitro* tests and the prediction of properties based on chemical structure. Now there is a new approach called toxicogenomics which has grown out of the human genome project. It probes human or animal genetic material such as DNA arrays. Scientists can then profile gene changes in cells exposed to the test chemicals. The National Institute of Environmental Health Sciences recently opened a new National Center for Toxicogenomics in Research Triangle Park, NC.

! The National Center for Environmental Assessment (NCEA) of EPA has issued a draft report entitled "Trichloroethylene Health Risk: Synthesis and Characterization." TCE exposure is associated with several adverse health effects including neurotoxicity, immunotoxicity, endocrine disruption, and several forms of cancer. Mechanistic research indicates that TCE-induced cancer is complex, involving multiple carcinogenic metabolites acting through multiple modes of action. An inhalation reference concentration was based on critical effects on the central nervous system, liver, and endocrine system. The mechanistic information suggests some risk factors that may make some populations more sensitive than others. The draft report is available at: <**www.epa.gov/ncea**>.

! The National Fire Protection Association (NFPA) issued a few months ago the year 2000 edition of NFPA 77 on Static Electricity. The purpose is to provide assistance in controlling the hazards associated with the generation, accumulation, and discharge of static electricity. This edition provides more practical information on the prevention of hazards in industrial settings compared to the 1993 edition.

SAFETY SESSIONS AT AIChE SPRING NATIONAL

AIChE SPRING NATIONAL MEETING, March 10-13, 2002, Hilton Riverside Hotel, New Orleans, LA.

36TH ANNUAL LOSS PREVENTION SYMPOSIUM

Symposium Chair	Symposium Vice-Chair
Henry L. Febo	John F. Murphy
FM Global	U.S. Chemical Safety Board

Monday Morning, March 11

LOSS PREVENTION ISSUES WITH VAPOR CONTROL SYSTEMS - This session addresses safety and loss prevention issues that arise due to the need to control vapor emissions from process plant equipment because of EPA regulations. These topics include design and operating considerations for various plant systems.

Chair	Vice-Chair
Stanley S. Grossel	Gary C. Phillips
Process Safety & Design, Inc.	Dow Chemical Company

1. "Operating Outside of the Flammable Range," Larry Britton (Dow/UCC)
2. "Evaluating Vent Manifold Inerting Requirements: Flash Point Modeling for Organic Acid-Water Mixtures," Wayne Garland (Eastman Chemical Co.)
3. "Establishing Ignition Conditions to Tank Manifold at Powell Duffryn Terminal Fire," John Woodward (Wilfred Baker Engineering, Inc.) and James Lygate (International Fire Investigators UK)
4. "Vent Collection System Safety - A Structured Approach to Safe Design," Peter J. Hunt (ABB Eutech, Inc. UK)
5. "Fires and Explosions in Vapor Control Systems: A Lessons Learned Anthology," Timothy J. Myers, Harry K. Kytomas, and Richard L. Martin (Exponent Failure Analysis Associates)

Monday Afternoon, March 11

STATIC ELECTRICITY AND IGNITION CONTROL STRATEGIES - In investigating fires and explosions, the search for the ignition source is often one of the most troublesome tasks. Rightly or wrongly, static electricity often receives the blame after all other credible sources have been ruled out even though - and perhaps because of - it is a phenomenon not well understood by many. This session focuses on practical, proven strategies for controlling static electricity hazards in the process environment.

Chair	Vice-Chair
Walter L. Frank	Joseph F. Louvar
EQE International	Wayne State University

1. "Electrostatic Safety Issues," Vahid Ebadat (Chilworth Technology, Inc)
2. "Requirements for an Ignition Energy Standard," James C. Dahn and Ashok Dastidar (Safety Consulting Engineers)
3. "Electrostatic Accidents Which Keep on Happening," Thomas Pratt and John Atherton (Burgoyne, Inc.)
4. "Electrostatic Hazard Risk Management in Coating and printing on Moving Webs," Mark Blitshteyn (Ion Industrial)
5. "Estimating Flammability Parameters," Larry Britton (Dow Chemical)
6. "Electrostatic Charging in Insulated Tanks," M. Sam Mannan (Mary Kay O'Connor Process Safety Center)

Tuesday Morning, March 12

FIRE/EXPLOSION HAZARDS PROTECTION - Despite advances in technology, fires and explosions continue to constitute the majority of losses in the chemical process industries. This session identifies, analyzes, and offers design guidance on fire and explosion hazards with a view toward the prevention or mitigation of these hazards. Novel and original approaches are included.

Chair	Vice-Chair
William A. Thornberg	Erdem A. Ural
HSB Industrial Risk Insurers	Fenwal Safety Systems

1. "Explosion Protection of Metal Dusts," John F. Going (Fike Corporation), Jef Snoeys (Fike Europe), and Volker Krone (Fike Deutschland)
2. "Flammability Potential of Selected Halogenated Fire Suppression Agents and Refrigerants Mixed with Air at Room Temperature and Elevated Pressure," Erdem A. Ural (Fenwal Safety Systems)
3. "A New Dust Explosion Vent Sizing Methodology," David C. Kirby (Wilfred Baker Engineering, Inc.), Erdem A. Ural (Fenwal Safety Systems), Kris Chatrathi (Fike Corporation), and Robert G. Zalosh (Worcester Polytechnic Institute)
4. "A Synergistic Approach to Internal Vapor Cloud Explosion Predictions," Gary A. Fitzgerald (ABS Consulting, Inc.)
5. "Efficiency of Flameless Venting Devices," Kris Chatrathi and John F. Going (Fike Corporation)
6. "Understanding the Role of Process Chemistry in Fires and Explosions," A. A. Aldeeb, W. J. Rogers, and M. Sam Mannan (Mary Kay O'Connor Process Safety Center)

Tuesday Afternoon, March 12

FLAMMABILITY AND COMBUSTIBLE LIQUIDS STORAGE - This session involves papers associated with the operation and maintenance of storage vessels and facilities of all sizes and services. Mitigation methods for pressurized vessels and equipment under fire conditions and related topics are included.

Chair	Vice-Chair
Kris Chatrathi	Scott W. Ostrowski
Fike Corporation	ExxonMobil Chemical Company

(continued on page 9)

MEETING, NEW ORLEANS, LA, MARCH 10-13, 2002

Tuesday Afternoon, March 12 (continued)

1. "Risk Management in the Relocation and Redesign of Central Chemical Storage Facilities," Philip W. Myers (Advantage Risk Solutions,Inc.)
2. "Relieving Style Drums: Design and Protection," John A. LeBlanc (FM Global)
3. "Development of an Engineering Tool to Quantify the Explosion Hazard of Flammable Liquid Spills," Francesco Tamanini (Factory Mutual Research)
4. "Environmentally Driven Changes in Foam Fire Protection," Christopher Hanauska (Hughes Associates, Inc.)
5. "The Survivability of Steel and Aluminum 33.5 lb. Propane Cylinders in Fire," A. M. Birk and Jonathan D. J. VanderSteen (Queen's University)
6. "Fire Tests to Study the Effect of Pressure Relief Valve Behavior on the Survivability of Propane Tanks in Fires," A. M. Birk, Jonathan D. J. VanderSteen, M. H. Cunningham, and C. R. Davison (Queen's University)

Wednesday Morning, March 13

REDUCING REACTIVITY AND RUNAWAY HAZARDS - This session covers new research on chemical reactivity hazards, improved methods of characterizing reactive materials, and improved methods of managing the risks associated with reactive chemicals, with emphasis on inherently safer approaches.

Chair	Vice Chair
Robert W. Johnson	Robert W. Ormsby
Unwin Company	Air Products & Chemicals Inc.

1. "Runaway Reactions in the Aluminum, Aluminum Chloride, HCl, and Steam System: An Investigation of the 1998 Condea Vista Explosion in Baltimore, MD," Ali Reza and Abid Kemal (Exponent Failure Analysis Associates) and Peter E. Markey (Condea Vista Co.)
2. "Accident Involving the Thermal Decomposition of a Solid Mixture Containing Sodium Dichloro-isocyanurate," Andrew R. Carpenter and R. A. Ogle (Packer Engineering)
3. "Chemical Reaction Hazard Identification and Evaluation: Taking the First Steps," David J. Leggett (Wilfred Baker Engineering)
4. "Thermodynamic Availability Analysis Applied to the Characterization of Reactive Materials," Timothy I. Elwell and Daniel A. Crowl (Michigan Technological University)
5. "Release of Hazardous Reaction Products During a Thermal Runaway Reaction," R. J. A. Kersten, W. A. Mak, and G.Opschoor (TNO Prins Maurits Laboratory) and M. Cortes (Institut Quimic de Sarrià)
6. "The Chemical Safety Board's Reactive Chemical Hazard Investigation," Giby Joseph, Lisa Long, Kevin Mitchell, and John F. Murphy (United States Chemical Safety and Hazard Investigation Board)

Wednesday Afternoon, March 13

CASE HISTORIES AND LESSONS LEARNED - Reviews of process safety incidents and near misses provide valuable learning opportunities. Papers detailing case histories and lessons learned are included in this session.

Chair	Vice-Chair
Michael I. Griffin	Susan R. Cyganiak
Cincinnati, OH	Pharmacia

1. "Review of Accidents and Lessons Learned," Joseph Louvar and S. G. Balasubramanian (Wayne State University)
2. "The Hazards of On-Line Maintenance: A Case Study of a Multiple Facility Incident at the Tosco Avon Refinery, Martinez, CA," Donald Holmstrom, Stephen Selk, and Steven Wallace (United States Chemical Safety and Hazard Investigation Board)
3. "Connections: How a Pipe Failure Resulted in Resizing Vessel Emergency Relief Systems," Dennis C. Hendershot, Alan G. Keiter, Jim Kacmar, Joseph W. Magee, and Paul C. Morton (Rohm and Haas Company)
4. "Major Incident Prevention Program - Ten Years of Learnings," Frank Renshaw (Rohm and Haas Company)
5. "Lessons Learned from an Explosion in a Large Fractionator," John L. Woodward and J. Kelly Thomas (Wilfred Baker Engineering) and Brian D. Kelly (Syncrude Canada Ltd.)
6. "Turning Tragedy into Triumph: How Process Accidents Can Benefit Companies, Employees, and Ultimately Customers," Douglas Lenz, Michael Pinsky, John Rovison, Gerald Hodgson, Michele Master, Paula Scott, and Robert Mulholland (FMC Corporation)

Abstracts of the papers in all six of the Loss Prevention Symposium sessions can be found at: <**www.aiche.org/spring**> or on the Safety and Health Division site at <**www.shdiv.aiche.org**>.**O**

SAFETY SHORT COURSES

The following two short courses are offered in New Orleans on Sunday, March 10, 2002:
"Understanding Plant Accidents: A Workshop on Causes and Prevention" presented by Roy E. Sanders of PPG Industries and
"Understanding and Controlling Static Electricity" presented by Vahid Ebadat of Chilworth Technology.
For more information, visit the web site at:
<**www.aiche.org/spring/shortcourse/index.htm**> **O**

DIVISION BANQUET

C. A. D'Angelo, Vice President and Chemical Operations Manager of FM Global, will discuss "A Loss Prevention Perspective of Property Insurance for the Chemical Process Industry" at the Annual Division Banquet on Monday, March 11, 2002, in New Orleans. The topic is particularly timely for process safety engineers. **O**

CENTRE AND NETWORK INAUGURATED

On November 14, 2001, the Frank Lees Centre for Safety and Loss Prevention and the EPSRC Network in Process Risk and Loss Prevention were inaugurated at the Department of Chemical Engineering, Loughborough University, England.

The aim of the **Frank Lees Centre for Safety and Loss Prevention** is to foster world-class research in safety and loss prevention that is pursued both within and between several departments at Loughborough University. This research collaboration seeks to integrate the approaches offered by different disciplines. Collaborating departments are Chemical Engineering, Computer Science, Mathematical Sciences, and CHaRM (The Centre for Hazard and Risk Management).

Professor Frank Lees worked in the Chemical Engineering Department at Loughborough from 1967 until his death in 1999. He wrote the standard work *Loss Prevention in the Process Industries*, was a key figure on the Advisory Committee on Major Hazards (ACMH) set up after the Flixborough explosion (1974), and served as an adviser to the Piper Alpha investigation. Frank and his team in the Plant Engineering Research Group contributed extensively to the advancement of knowledge about hazard and risk assessment.

The Chemical Engineering and Computer Science Departments at Loughborough were awarded a grant by the UK Engineering and Physical Sciences Research Council **(EPSRC)** to establish a network in **Process Risk and Loss Prevention**. Founder members of the network include 9 industrial and other organizations, and 7 UK university departments.

The objectives of the network are: (1) to share and disseminate best practice and research ideas within the membership and with wider academic and industrial sectors; (2) to identify areas of research and development that will be of benefit to industry and academia and to support the establishment of this work; (3) to increase the capability of the participating organizations and more generally the UK base in awareness and understanding of process risk and loss prevention and help improve performance in this field; and (4) to help participating departments achieve international academic excellence in the field of chemical process safety.

The Network Coordinator is Malcolm L. Preston, until recently SHE Manager for ICI and now associated with Loughborough University. **O**

TERRORISM (continued from page 1)

Anthrax infection as such is not a new phenomenon in the United States. Workers around farm animals are susceptible to the skin form as were workers in certain textile mills. For example, goat hair, typically imported from Iran, Iraq, Pakistan, and India, was used up through the 1950s in the manufacture of cloth for coat liners. The hair sometimes arrived contaminated with anthrax spores. Workers did on occasion get the skin form of the disease.

In 1957, four workers died from inhalation anthrax at a New England mill. Scientists then set out to determine how many spores a person needs to breathe to get infected. The study, one of the few published about this deadly form, appeared in the *American Journal of Hygiene* in 1960. One of the authors, Philip Brachman, indicated that it wasn't clear why workers didn't usually develop inhalation anthrax, but it was probably because the doses were too small. The researchers, working for the agency now known as the Centers for Disease Control and Prevention, concluded that over an eight-hour day, approximately 1,300 spores may be breathed in without causing infection. The current CDC range is that 8,000 to 12,000 spores are needed to cause inhalation anthrax invection.

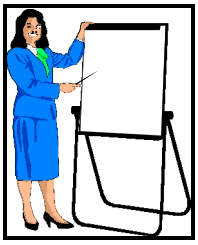
Safety issues in the chemical process industries have reached a new dimension. Suppose there is an air attack on the plant facility? Suppose a truck bomb explodes at the plant fence line? Suppose biological or chemical agents are introduced into a tank of material entering or leaving the plant? Suppose the mail at the site is biologically contaminated? Indeed, worst-case scenarios are mindboggling.

Sam West

POWER OUTAGE ALERT

EPA has issued a chemical safety alert that discusses safety and environmental concerns of electrical power outages in a plant. The first step is to identify and rank the process operations and equipment that pose the most serious potential for fire, explosion, or release of hazardous materials in the event of an electrical interruption. The results of this hazard evaluation should be used to ensure that all process operations and equipment will reach a fail-safe mode if power is lost. Likewise, when power is restored, safety devices should keep the process in a safe condition until it is ready to resume normal operations. The full text of the alert is available at:

<**www.epa.gov/ceppo/p-small.htm**>.



PAPERS, PAPERS, PAPERS

"History and Background of the Threshold Limit Value Committee of the American Conference of Government Industrial Hygienists," E.K.Weisburger, *Chem. Health & Safety* **8**, No.4, 10-12 (July/August 2001).

This paper traces the origins of establishing levels of chemical substances to which normal healthy workers can be exposed for eight hours a day without harm to their physical or mental being. Early work in this area was carried out in 1883 at the Munich Hygiene Institute considering the effects of carbon monoxide, ammonia, and hydrogen chloride. In the United States, the Bureau of Mines examined the acute effects of new commercial organic compounds in guinea pigs. By the 1910s, various industrial physicians were reporting recommended levels for industrial chemicals. In 1938, the American Conference of Government Industrial Hygienists (ACGIH) was organized to provide uniformity in industrial hygiene practices. Within three years of being founded, a committee on threshold limits was established. By 1961, the TLV list was published in a separate booklet. Over the years, the levels for most compounds have decreased as data became available. Dealing with carcinogens has been a concern in recent decades. There is evidence to show that TLV values are effective.

"Setting a Threshold Limit Value (TLV): The Process," G.L.Kennedy, Jr., *Chem. Health & Safety* **8**, No.4, 13-15 (July/August 2001).

Information on how the ACGIH Threshold Limit Value Committee establishes appropriate TLV values for approximately 700 specific chemical substances is presented in this paper.

"Adiabatic Calorimetric Decomposition Studies of 50% Hydroxylamine/Water," L.O.Cisneros, W.J.Rogers, and M.S.Mannan, *Journ.Hazardous Materials* **82**, No.1, 13-24 (2001).

The thermal behavior of 50% by weight of hydroxylamine-water solutions and derivatives of hydroxylamine was studied using adiabatic calorimetry and glass sample cells to measure several variables including onset temperature, heat rate, rate of pressure change, and effects of metals.

"The Chemical Accident Risk Assessment Thesaurus: A Tool for Analyzing and Comparing Diverse Risk Assessment Processes and Definitions," A.J.Ignatowksi and I.Rosenthal, *Risk Analysis* **21**, No.3, 513-532 (2001).

The Chemical Accident Risk Assessment Thesaurus (CARAT) is a database of the laws, regulations, guidance documents, and definitions of terms related to the risk assessment of accidental releases of chemicals from fixed facilities. The database also contains information on the application of risk assessment methodologies to specific examples of potential chemical releases. The Organization for Economic Cooperation and Development (OECD) urged the development of CARAT to improve the communication among countries regarding the risk assessment of hazardous installations. Entries into CARAT contain information from various international, national, and regional agencies. There are five searching tools for retrieval of information from CARAT. The paper describes the database organization and searching methods.

"Adiabatic Calorimetry Using Directly Agitated Test Cells," C.Gonzales et al, *J. Thermal Analysis and Calorimetry* **58**, 183-191 (2000).

This paper explains why directly agitated test cells are sometimes required in order to obtain good adiabatic calorimetry data that can be used with confidence to predict large scale plant behavior. Experiments for methyl methacrylate polymerization are reported. Simple procedures are presented for calculating real thermokinetic parameters from data which includes energy dissipation from the stirrer drive system.

"Developing a Sound Safety Program," R.S. Jasniecki, *Chem.Eng.* **108**, No.8, 97-100 (August 2001).

Guidelines are proposed for a consistent framework for developing and documenting hazard and safety analyses in the chemical process industries. A "safe operating envelope" should be defined for all facilities, commensurate with the potential risk as part of the "safety baseline." Consistency in safety management and documentation will boost site safety.

AND MORE PAPERS

"Peroxides and Peroxide-Forming Compounds," D.E.Clark, Chem.Health & Safety **8**, No. 5, 12-21 (September/October 2001).

This review paper serves as a guide to the hazards and safety issues associated with the use, handling, and storage of inorganic and organic peroxy-compounds and peroxide-forming compounds. The relatively weak oxygen-oxygen linkage is the characteristic structure of such substances. As a class, peroxides are exceptionally prone to violent decomposition that can be initiated by heat, mechanical shock, or friction, especially in the presence of certain catalysts and promoters.

A list of potential peroxide-forming chemicals is included in the paper.

The Appendix covers Safety Guidelines for Handling Organic Peroxides and a Safety Checklist for Chemical Reactions Involving Peroxides.

"Control the ΔP on the PRV Inlet Line," W.Y.Wong, *Chem.Eng.* **108**, No.10, 129-132 (September 2001).

The total non-recoverable pressure loss between the protected equipment and the pressure relief valve (PRV) should not exceed 3% of the set pressure of the valve. Pilot-operated pressure relief valves equipped with a remote sensor can be used where the inlet line pressure loss is excessive. Many installations use 4-, 6-, or 8-in. pipe on the basic inlet manifold. It is almost impossible to comply with the 3% rule with these sizes. Solutions to this problem and seven recommendations for installations are presented.

"Evaluating Occupational Claims of Chemical-Induced Injury," R.D.Harbison and J.McCluskey, *Chem.Health & Safety* **8**, No.4, 6-9 (July/August 2001).

Modern assessment of occupationally induced disease is complicated by many biases of perception and by misinterpretation of both the information provided on Material Safety Data Sheets and of regulatory standards and guidelines.

Knowledge of the mechanism by which a chemical substance produces an effect in test animals is essential for attempting to extrapolate the results to humans. For regulatory purposes, however, the mechanism of toxicity is not required. Empirical data must be available to indicate that the chemical exposure is capable of causing the observed or alleged injury. An objective methodology for establishing a cause-and-effect relationship is discussed. Adding to the methodology are the additional epidemiological considerations that identify important disease risk factors. **O**