I Would Do It All Over Again, If I Had to Choose a Career

by Stanley S. Grossel

I can remember being interested in becoming an engineer when I was still in elementary school (also called grammar school). This was because I enjoyed mathematics and was good at it, and also because I noticed that my cousins who were engineers were working while others were unemployed. This was during the Great Depression here in the U.S., when jobs were not always available. I guess that I had a practical side to me even at that young age. My intended quest of becoming an engineer advanced when one of my teachers in 8th grade (the last year of elementary school) recommended that I take the entrance examination for Brooklyn Technical High School since my grades were very good. At that time, Brooklyn Technical High School was the #1 academic high school in New York City. I passed the exam and started high school in September 1942. I traveled every day from one area of Brooklyn, called East New York, which was at the easternmost end of Brooklyn close to the borough of Queens, to the other end of Brooklyn close to Manhattan, to attend Brooklyn Tech. As I did not know yet in which field of engineering I would enjoy working, I took the College Preparatory curriculum, which emphasized courses that would allow me to enter any college or university. There were other curricula such as Aviation or Chemistry, which were more oriented towards preparing the students for a technician’s position in industry. Fortunately for me, I had two chemistry teachers who piqued my interest in this subject, so I decided to major in chemical engineering when I entered college.

I applied to the Polytechnic Institute of Brooklyn and City College of New York (CCNY). I was accepted at Brooklyn Poly immediately, but had to take an entrance examination for admission to CCNY. I passed the exam and chose CCNY as the tuition was free (as long as one kept up his or her grades) and the only costs that I had were for lab fees and books (a far cry from the

Continued on page 18
I am pleased to report that we continue to make headway in our mission and the various activities that support our mission. In the last year, four additional students completed their PhD’s and three students completed their Masters degrees. These degrees contributed to advances in the understanding of many topics in process safety engineering. Equally significantly, these graduates have now moved into their careers as ambassadors of the Center spreading the mission of the Center. These research activities also led to the publication of several peer-reviewed papers and other publications. In 2005-2006, the Center research program also continued to show success: Various research activities at the Center include Practical Risk Reduction; LNG Vapor Cloud Control and Mitigation Research; Fault Diagnosis for Plant Operations and HAZOP Design/Improvement; Quantitative Risk Analysis on Hydrolysate Post-Treatment Process; Small Business Process Safety Programs; Engineering for Sustainable Development; Propane Incident Data Collection Project; Chemical Stability and Reactivity Analysis for Storage of HAN; Safety Climate, Attitudes, and Decision Making.

During 2005-2006, the Center developed outreach programs with various national and international organizations. The Center is also maintaining an active involvement with the Reactive Chemical Alliance and Reactivity Management Roundtable. On the international front, the Center is continuing its collaborative partnerships with Korea Gas Safety Corporation and Seoul National University, both from South Korea. Currently, we have a sponsored graduate researcher from Korea and another post-doctoral research associate is expected to join the Center in September 2006. Dr. Adam Markowski from the University of Lodz in Poland finished a six-month stay at the Center. Dr. Mannan visited the University of Lodz and established agreements for long-term research collaboration. The Center has also developed exchange programs with Universidad del Santander in Bucaramanga, Colombia and Las Universidad del Zulia in Maracaibo, Venezuela.

The Center continues to provide cost-effective short courses at various Houston locations as well as tailored courses at various plant sites throughout the United States. Recent events in industry have brought additional focus on specific areas of process safety and plant operations that need renewed and focused attention. These areas include facility siting, atmospheric venting and process upset management. To address this need, the Center organized 1-day workshops on each one of these topics. The objective was to provide an open forum for discussion of the issues, gaps in technology, and path forward.

Some of the other outreach and service activities accomplished during 2005-2006 include the following:

- Development of research collaboration with Dr. Maria Papadaki of Leeds University, United Kingdom
- Review and input to the Government Accountability Office report on Chemical Infrastructure Protection
- Review of the National Academy report on, “Terrorism and Chemical Infrastructure – Protecting People and Reducing Vulnerabilities.”
- Provide input to curriculum and program development at the University of Missouri-Rolla.
- Development and implementation of Ethics training course as required by Texas Administrative Code
- Coordination of research and other activities with CCPS
- Continuing collaboration and exchange programs with organizations in Canada, Columbia, India, Indonesia, Japan, Mexico, Poland, Qatar, South Korea, United Kingdom, and Venezuela.

-Continued-
The Center also maintains close relationship and participates in the activities of many professional organizations as well as government agencies. These include the Agency for Toxic Substances and Disease Registry, the American Institute of Chemical Engineers, the American Society of Safety Engineers, the International Institute of Ammonia Refrigeration, the National Fire Protection Association, the Occupational Safety and Health Administration, the UK Health and Safety Executive, the UK Institute of Chemical Engineers, the US Chemical Safety and Hazard Investigation Board, and US Environmental Protection Agency.

M. Sam Mannan

Recent Publications


Center Releases Study on Practical Risk Reduction in the Petroleum Industry

The Mary Kay O’Connor Process Safety Center recently completed a study entitled, “Practical Risk Reduction in the Petroleum Industry.” The objective of this study was to summarize the fundamental concepts of practical risk management within the U. S. petroleum industry and explore the application of inherently safer design concepts within this context. The resulting report begins with a discussion on the comprehensive risk management programs that are currently being used at many petroleum sites to assist in managing risk. There also is a discussion on hazards, inherently safer design, and risk acceptance criteria. This is followed by recommended practices and guidelines for hazard analysis and management that are published by some industrial organizations, e.g., the American Petroleum Institute and the Center for Chemical Process Safety.

The objective of the risk management process is to ensure that all operating hazards are properly identified and prioritized based on their potential consequences and likelihood of failure. Practical risk management includes the elements of cost and technical feasibility. While it may be desirable to eliminate all hazards and their associated risk from the operating environment, in some cases this ultimate goal may not be practical due to financial and technical limitations. Therefore, an effective risk management process provides management a tool to help identify hazards that present the highest risk to the company, its workers and the surrounding community. With this information, management can effectively allocate resources based on risk and focus efforts to continue operating safely.

The risk management process involves identifying, analyzing, and assessing the significance of potential risks, and determining whether cost-effective prevention and mitigation measures are available to reduce their consequences and / or their likelihood of occurrence as low as is practical. Risk management is an ongoing activity with technology, equipment design and operating practices continuously evolving. What may not be practical today may be achievable in the future.

This process of risk management has served the industry and its workers well over the course of history. Safety statistics collected by the Government and others shows a history of relatively safe operations, proving that the overall pool of risk can be managed effectively. Risk assessment is the application of policies and practices to identify, assess, and control risk in order to protect human life, the environment, physical assets and company reputation in a cost-effective manner. It is a multi-faceted activity encompassing business strategy, economics, resource allocation and public affairs considerations. Well-defined work processes, trained and qualified personnel, and well balanced, cross functional teams with a wide spectrum of experience including safety, design, operations and maintenance experience are essential for successful risk assessment activities.

-Continued-
Decision analysis is another part of risk management, which considers the significance of the risk under study, evaluates the attractiveness of potential risk reduction measures, and decides the course of further action. Once a risk assessment has been conducted and possible risk reduction measures identified, implementation plans are developed considering prioritization of effort and allocation of resources. In some cases, there may be only one practical risk reduction or risk elimination measure. The potential benefits of risk reduction measures must be evaluated against potential implementation risks that are introduced. Considerable judgment is involved in this activity, since the benefits and cost effectiveness of potential risk reduction measures may be difficult to quantify and must be balanced against other operational drivers.

To evaluate existing risk and compare risks of potential alternatives, practical risk reduction must assess the processes in terms of the holistic impact to the greater system. Holistic risk includes two elements. First, all major hazards (flammability, toxicity, corrosion resistance, reactivity, transportation and risk migration) must be considered when evaluating the impact of practical risk reduction measures. Second, practical risk reduction must include a lifecycle analysis from a holistic viewpoint that evaluates each stage on criteria such as economy, quality, productivity, energy conservation and pollution prevention.

The petroleum industry uses a variety of risk assessment methods. The applicability and feasibility of a particular method depends on the nature of the process under study as well as a company’s particular preference. Many processes may require several methods to perform a holistic risk analysis. The resultant holistic risk can be qualitative or quantitative depending on the information available and the method employed. Some companies employ enterprise-specific programs that are adapted and tailored for their particular facilities and activities.

The complete report resulting from this study, “Practical Risk Reduction in the Petroleum Industry,” is available on the Mary Kay O’Connor Process Safety Center website (http://process-safety.tamu.edu).
The July 2005 release of the ANSI Z10-2005 standard, *Occupational Health and Safety Management Systems*, has significant implications for safety and health practitioners and employers—with equal measures of danger and opportunity. In general, the utilization of national consensus standards will be of increased importance to this country as the economy of the United States moves towards more of a global perspective. National consensus safety and health standards, such as ANSI Z10, reflect the opinions of safety and health professionals and end-users working at all levels of the public and private sectors in technology development, manufacturing, training and academia. Adoption of the basic precepts in such standards has many benefits and may protect users of the standard, while furthering the interests of affected businesses. However, the far-reaching implications of such standards in OSHA enforcement actions and in tort litigation also must be recognized. It is also essential to focus on the fact that such standards are voluntary, until such time as they are incorporated by reference into a binding regulation. Even reference to the ANSI Z10 standard in policy documents created by federal or state governments does not convert the nature of the standard from voluntary to mandatory. The goal of the ANSI Z10 standard is to use recognized management system principles, compatible with quality and environmental management system standards such as the ISO 9000 and ISO 14000 series as well as with principles adopted by the International Labor Organization, to encourage integration of safety into other business management systems. However, at the present time, there is no apparent Z10 certification scheme similar to the international recognition program developed pursuant to the ISO standards.

The basic elements of the standard address management leadership and employee participation, planning, implementation, evaluation and corrective action and management review. Thus, in many important aspects, the Z10 standard encompasses the basic tenets that the Occupational Safety and Health Administration (OSHA) first propounded in its draft Safety and Health Management Standard, which was later withdrawn from its regulatory agenda. The complete original text of the non-mandatory guidelines is found in the *Federal Register* 54(18):3094-3916, January 26, 1989. When OSHA announced a proposed rule in its 1990s regulatory agenda, the agency articulated its intent to have a mandatory standard that would include at least the following elements: management leadership of the program; active employee participation in the program; analysis of the worksite to identify serious safety and health hazards of all types; training; and program evaluation. All of these components are present in the ANSI Z10 standard. However, the Z10 standard goes beyond the OSHA draft standard’s requirements because it also contains provisions that address risk controls, audits, incident/accident investigations, responsibilities and authorities.

At some future time, OSHA could adopt Z10 as a mandatory safety and health standard through notice-and-comment rulemaking. But aside from formal rulemaking, ANSI Z10 serves as a valuable reference. It could also have possible enforcement ramifications under the General Duty Clause (GDC) by federal OSHA. It may be employed to satisfy regulatory requirements of certain state-plan OSHA programs. A number of states have enacted laws mandating such programs for some or all employers (e.g., Cal-OSHA’s standard at [http://www.dir.ca.gov/title8/8406.html](http://www.dir.ca.gov/title8/8406.html)), so adoption of ANSI Z10 may satisfy the compliance obligations for employers in those jurisdictions. Insurance companies encourage their client companies to implement safety and health management programs, and therefore use of Z10 may generate monetary savings on insurance (both liability and workers’ compensation).

Aside from mandatory standards, the OSH Act’s General Duty Clause, Section 5(a)(1), outlines every employer’s legal obligation to keep its workplace free from recognized hazards that are likely to cause death or serious physical harm to its employees for which a feasible means of abatement.
exists. Citations for violation of the GDC are issued when the four components of this provision are present and when no specific OSHA standard has been promulgated to address the recognized hazard. These four elements are: 1) the employer failed to keep its workplace free of a “hazard,” 2) the hazard was “recognized” either by the cited employer individually or by the employer’s industry generally, 3) the recognized hazard was causing or was likely to cause death or serious physical harm and 4) there was a feasible means available that would eliminate or materially reduce the hazard. By definition, the GDC requirements of Section 5(a)(1) encompass recognized threats that result in occupational illness or injury. Thus, recognized experts’ findings that a series of actions or conditions are required to prevent harm to workers are likely to satisfy the requirement for GDC applicability under the applicable legal tests. Voluntary guidelines, including standards promulgated by ANSI, have been used to support GDC citations and to enunciate an industry “standard of care” although the consensus standards themselves are not specifically enforceable by the agency. However, although decisions have varied over the years, in at least one case, the Occupational Safety & Health Review Commission (“OSHRC”) has stated that OSHA consensus standards taken from private standard setting organizations “were not intended to be used as mandatory, inflexible legal requirements.”

The Mine Safety and Health Administration (MSHA) has no comparable general duty clause. To date, neither OSHA nor MSHA have referenced the ANSI Z10 standard in any of their standards, but this remains a future possibility that would enhance the stature of the standard in agency enforcement actions. At the present time, ANSI Z10 is strictly voluntary and does not create any specific duties under the OSH Act. Therefore, an employer’s failure to implement the programmatic provisions of this consensus standard—absent from other findings—does not constitute a violation of Section 5(a)(1).

In summary, national consensus standards lack the force and effect of codified rules, which can only be promulgated after notice-and-comment rulemaking under the Administrative Procedures Act., 5 U.S.C. § 551 et seq. And, as noted by the U.S. Court of Appeals in B & B Insulation, Inc. v. OSHRC, Et. Al., 583 F.2d 1364, 1367-1368 (5th Cir. 1978), the law requires only those protective measures which the knowledge and experience of the employer’s industry would clearly deem appropriate under the circumstances.

Another important potential function of ANSI Z10 concerns OSHA’s Voluntary Protection Program (VPP). For over two decades, OSHA has approved worksites with exemplary safety and health management programs as participants in its VPP. Thus, for companies that aspire to attain VPP status, adoption of ANSI Z10 may help to jumpstart the application process and may foster participation by smaller companies that might otherwise be without adequate guidance on how to design and implement such management systems. Data suggest that companies in the VPP have reported injury and illness rates that are sometimes 20% or less than the average for other establishments in their industry.

In tort litigation actions arising from workplace accidents, the presence or absence of a recognized and substantive safety and health management program can be critical in controlling financial liability. Thus, the extent to which OSHA and MSHA reference Z10 in future publications or rulemaking activities will increase its judicial recognition and create a guideline against which employer programs will be benchmarked.

Finally, ANSI Z10 has possible value in constructing settlement agreements or consent orders with federal OSHA, state-plan OSHA agencies and MSHA. Often employers who have systemic safety problems will be encouraged or required, as a condition of abatement or settlement, to design and implement programs that will address management failures in a cohesive manner. The scope and function of Z10 would likely satisfy the enforcement goals of prevention of future safety issues while encouraging penalty reductions to offset the costs of program implementation. There is the strong potential of the standard being included in settlement proceedings for occupational safety and health citations. SH&E professionals should be encouraged to take the following actions:

♦ Obtain a copy of this standard, review the standard and the background materials about it, and discuss it with senior management and

-Continued-
legal counsel so that all parties are aware of what is expected. A legal opinion written by corporate counsel would also be a prudent action to take.

♦ Write and publish a policy addressing Z10 in regard to how it fits in with the organization’s current program and the U.S. Occupational Safety and Health Act.

♦ Write, implement, and document communication structures detailing how information is passed up the communication chain to senior management.

♦ Conduct through assessments to identify significant SH&E exposures and the means used to communicate them to those in a position of authority.

♦ The Z10 Standard places significant emphasis on accountability by senior management. There is some correlation with the requirements of Sarbanes Oxley Act of 2002 Public Law 107-204. It is important to ensure that SH&E audits are independent and that the results are reported and acted upon. Those ES&H practitioners who author/sign those audit reports and who fail to follow-up on the recommended actions may be subject to sanctions such as listed under the new law. The point has been made that they now have a duty that goes beyond just informing management.

♦ Follow the ASSE Code of Conduct.

In summary, ANSI Z10 provides safety and health professionals with a significant new tool to help enhance existing program design or to help smaller employers create a program that can protect workers while at the same time satisfying regulatory entities and insurers, effectuating cost savings and minimizing legal liability.

This article was excerpted with permission from Professional Safety, a monthly journal published by ASSE. The ASSE article (June 2006, Professional Safety) was authored by Adele Abrams, an attorney who represents employers and contractors nationwide in OSHA and MSHA litigation. She may be contacted at at: safetylawyer@aol.com or (301) 595-3520.
Process Upset Management Workshop

A one-day workshop on “Process Upset Management,” was sponsored by Mary Kay O’Connor Process Safety Center in Houston, Texas on July 13, 2006. Recent events in industry have brought additional focus on how we avoid and handle process upsets. From human machine interface design to operator training, the technology underlying process upset management (PUM) continues to evolve and improve. The workshop featured speakers from government, major operating companies, and leading technology firms. The morning session included the following presentations:

- “Overview of process upset management issues,” Harry H. West, MKOPSC
- “Alarm Management Issues Identified During CSB Incident Investigations,” Angela Blair, US Chemical Safety Board
- “OSHA’s Perspective on Alarm Management,” Russ Elveston, Occupational Safety and Hazard Administration
- “Seven Habits in Creating a Highly Effective Alarm Management System,” Eddie Habibi, PAS Automation
- “General Perspectives on Abnormal Situations,” Maarten “Marty” ter Weeme, Huntsman Corporation
- “Applying State Based Control and Alarming for Process Upset Management,” Terry R. Coffman, Dow Chemical Company

The afternoon session consisted of three breakout sessions covering the following three areas of process upset management: Key Process Indicators, Human-Machine Interface, and Operator Training. A CD containing the presentations, minutes, and breakout group deliberations is being prepared and will be mailed to the participants in the near future.
2006
International Symposium

Mary Kay O'Connor Process Safety Center

BEYOND REGULATORY COMPLIANCE,
MAKING SAFETY SECOND NATURE

October 24-25, 2006

at The Brazos Center • College Station, Texas

The Symposium qualifies for 14 PDH (Professional Development Hours) required by Texas Board of Professional Engineers. A one hour Ethics seminar is offered separately.
# Mary Kay O’Connor Process Safety Center - 2006 International Symposium

**The Brazos Center, College Station, TX**

**Tuesday, October 24, 2006**

## Time

**Morning**

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<th>Time</th>
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<tr>
<td>8:00 - 9:30AM</td>
<td>9:00 am: State of the Center: Research Program, Current Activities, and Future Direction, Dr. Sam Mannan, Director, Mary Kay O’Connor Process Safety Center</td>
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| 10:00 - 11:30AM | Track I: Chairs: Skip Early, Marc Levin  
1. Reactive Chemicals - I  
   - “Reactive Calorimetry, M. Levin, Shell Global Solutions”  
   - “A Complete Analysis by Calorimeters and Spectrometers for Styrene and its Derivatives,” C.C. Liao, C.M. Shu, National Yunlin University, Taiwan, and M.L. Shyu, University of Miami  
   - “Runaway Chemical Reaction Exposes Community to Highly Toxic Chemicals,” M. Kaszniak and J. Vorderbruggen, U.S. Chemical Safety and Hazard Investigation Board |
| 10:00 - 11:30AM | Track II: Chairs: Kathy Shell, Mike Marshall  
1. Lessons Learned from Katrina and Rita  
   - “Industrial Chemical Releases Associated with Hurricanes Katrina and Rita in Louisiana and Texas,” P.Z. Ruckart, M.F. Orr, ATSDR, and K. Lanier, Louisville Office of Public Health  
   - “HSE & Technical Challenges for the Mars Recovery Project,” D. Knoll, Shell International Exploration and Production  
   - “Hurricane Rita: An Unwelcome Visitor to PPG Industries in Lake Charles, Louisiana,” R.E. Sanders, PPG Industries |
| 10:00 - 11:30AM | Track III: Chairs: George King, Scott Ostrowski  
1. Human Error  
   - “Inherent Safety, Ethics, and Human Error,” M. Papadaki, Leeds University  
   - “Culture and Cultural Change,” R. Goodin, NASA |
| 12:30 - 2:30PM | Afternoon  
2. Safety, Security and Risk Management  
   - “Enhance Process Hazard Analysis by Optimizing the Study Team,” J. Philley, Baker Engineering and Risk Consultants  
   - “Fuzzy Risk Matrix,” A.S. Markowski, Technical University of Lodz, POLAND and M.S. Mannan, MKOPSC |
| 3:00 - 5:00PM | Track I: Chairs: Skip Early, Marc Levin  
3. Reactive Chemicals – III  
   - “Study on Thermal Decomposition Characteristics of AIBN,” X. Li, X. Wong, and H. Koseki, National Research Institute for Fire and Disaster, Japan  
   - “Decomposition of Solvents in Reactive Chemical Processes,” J. Tsui, P. Liu, J. Sisko, and P. Dell’Orco, GlaxoSmithKline  
   - “Layer of Protection Analysis for Reactive Chemical Risk Assessment,” C. Wei, DNV and W.J. Rogers and M.S. Mannan, MKOPSC  
   - “Panel Discussion on Reactive Chemicals,” R. Elveston, U.S. Occupational Safety & Health Administration |
| 3:00 - 5:00PM | Track II: Chairs: Kathy Shell, Mike Marshall  
4. Hazard Management  
   - “Reducing Aluminum Dust Explosion Hazards: Case Study of Dust Inerting in a Buffing Operation,” T.J. Myers, Exponent, Inc.  
   - “Study on the Generation of Perfluorooctane Sulfonate from the Aqueous Film-Forming Foam,” T. Kishi and M. Arai, The University of Tokyo, Japan  
   - “Haloamine Formation in Bromine Recovery Tower – A Case Study Reinforcing the Need for Periodic Review of Process Hazards,” J. Cranston, Alburn Mr Corporation  
   - “Managing a Major Crisis in A Chemical Facility – Are You Prepared?,” D. Belonger, DJBAssociates, Inc.  
| 3:00 - 5:00PM | Track III: Chairs: George King, Scott Ostrowski  
5. LNG  
   - “LNG Experiments – The Answer to Many Questions,” B. Cormier, Y. Wang, and M.S. Mannan, Mary Kay O’Connor Process Safety Center  
   - “Validation of FLUENT Predictions for LNG Spills into an Impoundment,” F. Gavelli, E. Bullister, and H. Kyotomaa, Exponent  
   - “Errors in FERC’s Determination of LNG Vapor Cloud Exclusion Zones,” J. Havens, University of Arkansas  
   - “Videos of Recent LNG Experiments,” M. Moore, Flameout Control |

## 5-7PM Cocktail Reception

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*Centerline, Vol. 10, No. 2*  
Summer 2006
## General Session

### "The Drive to Zero: Dow Chemical's Injury Reduction Journey"

Rich Wells, Dow Chemical Company

### Track I

**Chairs:**
Skip Early, Marc Levin

**Alarm Management and Safety Instrumented Systems**

- "PSM and SIS: Let’s Bridge the ISA 84 Compliance Gaps Now," C. Miller, Exida Solutions

**Safety Culture**

- "Process Safety Improvement – Quality and Target Zero," K. van Scyoc, DNV Consulting
- "Safety – Make It Personal," A. Peters, Parsons Corporation
- "Safety Climate Practice and Its Predictors in the Korean Manufacturing Industry," J.B. Baek, Chungju National University, S. Bae, K.P. Singh, University of North Texas Health Sciences Center

**Atmospheric Venting**

- "ExxonMobil Design Practices for Atmospheric Venting," B. Banick, ExxonMobil
- "Operational and Engineering Learnings on Atmospheric Venting," P. Berwanger, Berwanger, Inc.
- "Screening Atmospheric Relief Devices for Unacceptable Risks," D. Eure, Dow Chemical Company

**Databases and Learning**

- "Recent Case Histories from OSHA," R. Elvinston, U.S. Occupational Safety & Health Administration
- "Searchlights from the Past," T.A. Kletz, Mary Kay O'Connor Process Safety Center

### Track II

**Chairs:**
Kathy Shell, Mike Marshall

**Management for Process Safety I**

- "What Really Went Wrong? – Root Cause Determination Study and Improvement Initiative Results," G.M. Kiihne, BASF Corporation
- "Maintaining Product Certification Compliance of Salvaged/Remanufactured/ New-Surplus Equipment Used in Hazardous (Classified) Locations," C.A. Gagliardi, FM Approvals

**Management for Process Safety II**

- "The Challenges and Pitfalls of Management of Change Programs," N. Keren, Iowa State University and H.H. West, Mary Kay O'Connor Process Safety Center
- "Risk Based Process Safety," J.L. McCavit, J.L. McCavit Consulting
- "Using a Risk-Based Process to Design Inherently Safer and More Reliable Technological Systems," D.A. Jones, AcuTech

### Track III

**Chairs:**
George King, Scott Ostrowski

**Modeling and Simulation**

- "Screening Analysis to Evaluate Whether an In-Building Release Can Have an Offsite Impact," M. Rothschild, Rohm and Haas Company

**Facility Siting**

- "Dow's New Practice for Locating Temporary Portable Buildings," P. Partridge, Dow Chemical Company
- "Considerations for Siting Buildings with Regard to Vapor Cloud Explosions," C. Buchwald, ExxonMobil Chemical Company
- "An Analysis of the Siting Process of an LNG Reception Facility in Taichung Port, Taiwan," E.C. Tsai, National Sun-Yat Sen University, Taiwan
- "Recent Advances in 2-D Explosion Modeling for Onshore Installations," V. Raghunathan and C. Spitzenger, DNV

**Sustainable Engineering & Risk Management**

- "Resilient Engineering Systems: Case Study on a Pipe Design," S.M. Mitchell and M.S. Mannan, MKOPSC

### Special Session: Engineering Ethics - (Register Separately)

**Dr. Sam Mannan,** Mary Kay O'Connor Process Safety Center
**Mary Kay O'Connor Process Safety Center - 2006 SYMPOSIUM REGISTRATION**

**BEYOND REGULATORY COMPLIANCE, MAKING SAFETY SECOND NATURE**

**October 24-25, 2006**

**The Brazos Center • College Station, Texas**

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**Additional Persons Registering:**

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3) _______________________________________________ 5) _______________________________________________

Please indicate preferred track for session attendance:

**Day 1 - First Session:**
- Track I
- Track II
- Track III

**Day 2 - First Session:**
- Track I
- Track II
- Track III

**Second Session:**
- Track I
- Track II
- Track III

**Third Session:**
- Track I
- Track II
- Track III

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**REGISTRATION FEES:**

- Received **by September 11, 2006** - **$495.00** per person
- After **September 11, 2006** - **$550.00** per person

★ Partner, Sponsor, and Advisor membership level organizations receive 40%, 20%, and 10% discounts, respectively.

- **Ordering Proceedings only (Book/CD-Rom set)** - **$65.00**

- **Payment by Check**

  (payable to Mary Kay O’Connor Process Safety Center)

  - **Total Enclosed** $___________________

- **Payment by Credit Card**

  - **MasterCard**
  - **Visa**
  - **American Express**
  - **Diners Club**

  - **CC#** ___________________________________________

  - **Card Holder** ____________________________

  - **Exp.** ____________

  - **Total Charge** $____________________

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Cancellation Policy: Cancellations must be received ten working days prior to the symposium to receive a full refund. After that time, there will be a 30% penalty. All refunds will incur a $25 service charge.

**Accommodations:**

Please indicate you are attending the Mary Kay O’Connor Process Safety Center Symposium when making reservations.

Rooms have been blocked at the following hotels.

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**Travel:**

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**For more information:** Contact Donna Startz

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Centerline, Vol. 10, No. 2  15  Summer 2006
## 2006 Summer-Fall Continuing Education
Mary Kay O’Connor Process Safety Center

### AUGUST

<table>
<thead>
<tr>
<th>Dates</th>
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<tbody>
<tr>
<td>22-23</td>
<td>A Systematic Assessment of Reactive Chemical Hazards</td>
<td>Texas Cooperative Extension office, 3033 Bear Creek Drive, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9:00 AM - 4:00 PM</td>
<td>Sam Mannan / Bill Rogers</td>
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<tr>
<td>29-30</td>
<td>Fundamentals of Process Safety Management (PSM)</td>
<td>Texas Cooperative Extension office, 3033 Bear Creek Drive, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9:00 AM - 4:00 PM</td>
<td>Adrian L. Sepeda</td>
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<tr>
<td>12-13</td>
<td>Engineering Design Practices for Safer Process Plants</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9:00 AM - 4:00 PM</td>
<td>Stanley Grossel / Rudy Frey</td>
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<td>19-20</td>
<td>Root Cause Incident Investigation</td>
<td>Baker Engineering &amp; Risk Consultants facility, Houston</td>
<td>1.4 CEs</td>
<td>$495</td>
<td>8:00 AM - 4:00 PM</td>
<td>Jack Philley</td>
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<td>12-13</td>
<td>Layer of Protection Analysis</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.4 CEs</td>
<td>$495</td>
<td>8:30 AM - 4:30 PM</td>
<td>Angela Summers</td>
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<tr>
<td>26-27</td>
<td>Process Hazard Analysis (PHA) Leadership Training</td>
<td>Texas Cooperative Extension office, 3033 Bear Creek Drive, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9:00 AM - 4:00 PM</td>
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<td>3</td>
<td>Root Cause Incident Investigation (1-day)</td>
<td>Baker Engineering &amp; Risk Consultants facility, Houston</td>
<td>0.7 CEs</td>
<td>$295</td>
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<td>10-11</td>
<td>Introduction to Consequence Analysis</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9:00 AM - 4:00 PM</td>
<td>John Cornwell</td>
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<tr>
<td>31-Nov</td>
<td>Safety Instrumented Systems (SIS) Implementation</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>2.1 CEs</td>
<td>$695</td>
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<td>7</td>
<td>How to Deal with the Media</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>0.6 CEs</td>
<td>$295</td>
<td>9:00 AM - 4:00 PM</td>
<td>Judy Hoffman</td>
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<td>14-16</td>
<td>Responsible Care Management Systems: Internal Audit Training</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.8 CEs</td>
<td>$695</td>
<td>9 AM - 4 PM</td>
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### DECEMBER

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<td>5-6</td>
<td>Security for Chemical Process Industry</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>9 AM - 4 PM</td>
<td>Dave Moore</td>
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<tr>
<td>12-13</td>
<td>Safety Integrity Level (SIL) Verification</td>
<td>SIS-TECH Solutions facility, Houston</td>
<td>1.2 CEs</td>
<td>$495</td>
<td>8:30 AM - 4:30 PM</td>
<td>Angela Summers</td>
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### Registration Fees
Early Registration (4 weeks prior)
Contact: 979-458-1863 • 979-458-0422 (fax) • mary-cass@tamu.edu
### Mary Kay O’Connor Process Safety Center
#### Continuing Education Registration Form

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### Cancellation & Refund Policy

1) If the course is cancelled for any reason, we will provide a 100% refund or the student can transfer their registration fee to the next offering of the same course, or to a different course.

2) If the student cannot attend the course, they may have a substitute attend. Cancellations must be received ten working days prior to the start of the course to receive a refund. After that time, there will be a 30% penalty. All refunds will incur a $25 service charge. The Center will not be responsible for any costs and/or expenses incurred by the registrant when a class is cancelled.

*Email addresses received via this registration form will be added to our email distribution list unless otherwise noted.

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To register online go to: [http://www.texasonline.state.tx.us/NASApp/tamu/ODEManager](http://www.texasonline.state.tx.us/NASApp/tamu/ODEManager) and select courses offered by the Texas Engineering Experiment Station and then you will be linked to the site listing all our courses. Follow the instructions and be sure to wait for a confirmation that your registration was received before exiting the site.

Early registration is 4 weeks prior to course date. See individual classes for fee, (based on course duration).

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costly situation these days). Here too, I spent many hours on the New York subway system traveling from East New York to the upper end of Manhattan. This trip usually took about an hour and afforded me lots of time to do my assigned reading and some last minute homework. At that time, CCNY had a class registration system that drove strong men (and women) to tears, and possibly, drink. The courses were listed on a huge board and you chose the ones that you wanted and filled them in on a registration sheet. Very often, when you got up to the registrars to get your selected courses approved, the courses had been filled up and you had to start all over again, choosing different or the desired courses that were also given at night. This often resulted in one having to take courses both in the daytime and at night in order to be able to graduate in four years. CCNY had night courses for those people who worked during the daytime and wanted to get a college degree. Due to this form of “inquisition” I spent the last two years (1948-1950) taking classes both in the day and night, which meant that I often left my home at 7:30 a.m. and did not get home until 10 or 11 p.m., with lots of time in between. This is when I got my homework done and did my assigned reading, quite often sitting in an alcove in the tunnels that ran between the buildings on the campus. Also, the chemical engineering students usually had to take some summer courses during the last two years in order to be able to graduate in four years. This was because the number of courses required was really meant for a five-year curriculum, rather than four years, but they neglected to tell us naïve young students that bit of information before we decided to major in chemical engineering.

When I graduated in June 1950 there was a recession in the U.S. at that time, and jobs were not readily available for all graduates (I had some friends who had graduated in 1949 who still had not found jobs in 1950). At about that time, the Korean War broke out, and Picatinny Arsenal, in nearby New Jersey, started hiring chemical (and other) engineers by the droves. I applied there and was hired, but sat around for 8 weeks, doing nothing except reading books on explosives, because I was being checked out by the FBI to receive my “Q clearance.” Shortly after joining Picatinny, I received a letter from my draft board telling me to show up for a physical examination to determine my fitness for duty with the Armed Forces. When I went for my physical exam I was confident that I would be drafted as I was in top-notch shape (I had been weightlifting for about 6 years). However, I had very poor eyesight since childhood (I was wearing glasses from age 6 on), and when it came to the eye examination, the doctors rejected me. It seems that they must have thought that I was more of a liability than an asset, and if I was ever in actual combat, I would most likely shoot some of our own soldiers rather than those of the enemy. Since I was no longer in danger of winding up in the Army, and I was bored to death with not being assigned any meaningful work, I decided to see if I could land a job in industry. I had mentioned this to my father, and he spoke with one of his clients who had a friend who was head of the chemical laboratories at the Lansdale Tube Company (a division of the Philco Corporation). A week or so later, I received a call from Dr. Mike Sadowski (who was also an alumnus of CCNY) inviting me to come for an interview in Lansdale, PA, and he offered me a job (another fine example of the “old boy” network here in the U.S.). I moved to Philadelphia in September 1950 and started work at The Lansdale Tube Company, where I was primarily involved in quality control work for the manufacture of cathode ray and television tubes. I also was involved in pilot plant development work on a new process for making television tubes for color TV sets, but this project never succeeded. Since I was not really doing chemical engineering work as I had hoped to do, I started looking for a new job in the chemical industry.

I saw an advertisement in a local Philadelphia paper that the Barrett Division of the Allied Chemical Corporation was looking for a project engineer, and I applied for the position. I went for an interview and was hired to work in the Plant Engineering Department as a project engineer. I was involved with the design of processes and equipment for the manufacture of tar acids and tar bases chemicals such as benzene, toluene, xylene, pyridine, picolines, phenol, naphthalene, phthalic anhydride, and others. I also handled a lot of routine maintenance projects. I was at last doing what I had been taught in college, and greatly enjoying the work, as it was varied and very challenging.

-Continued-
I was introduced to the principles of process safety and loss prevention when I had to size pressure relief devices such as safety valves and rupture disks. I also had my first experiences with industrial accidents while working at the Barrett Division plant. In 1953 or 1954 the plant experienced a fire and explosion in the cumene area of a new cumene-phenol process plant that used a process developed by Allied Chemical. The cumene was made from LPG, and an instrument line broke, discharging LPG into a trench where it ignited and subsequently caused an explosion. I was a member of the emergency response team, and after we waited a suitable time to make sure that no more explosions would occur, we quickly got over to the area where the fire and explosion occurred to see if there were any injured personnel that we could rescue. We found about 3 or 4 injured people, and I helped to pull one person out of the wreckage. At first I thought that he was a black man, but then we discovered that he was a white man who was so badly burned that he appeared black. Fortunately, he survived his burns and had numerous skin graft operations, but was never able to return to work. The other injured people were able to come back to full-time work after a period of time. The second incident occurred in the cumene hydroperoxide (CHP) decomposer vessel where the CHP is split into phenol and acetone. The vessel had a rupture disk, which was, however, undersized as the kinetics of the CHP decomposition evidently were not correctly known, and a runaway reaction occurred. The vessel ruptured and parts of it were hurled several hundred feet away, and windows in buildings surrounding the plant were shattered. Fortunately, nobody within or outside the plant were killed or injured, but the plant was shut down for some time until a new decomposer vessel was built and a larger rupture disk designed and installed. This was my first experience of the hazard known as a runaway reaction.

Working at the Barrett plant had some unexpected and unusual fringe benefits. I took a bus from my lodgings to and from the plant every day. I noticed that every time I worked in the building where pyridine was made, I always got a seat on the crowded bus going home. Even though I changed my regular clothes and shoes into work clothes and shoes every morning when I came into the plant, and back again in the evening when I left for home, the pyridine evidently still clung to my skin, and nobody wanted to be near me on the bus if it could be avoided. The plant also made moth balls from naphthalene for sale to hardware and other stores. My mother was a strong believer in using lots of moth balls to protect woolen clothing in her closets from being eaten by moths, so when she found out that we made these at the plant, I had a standing order to bring her a bag every time I came home to get a fresh change of clothing (usually every two weeks). I also learned how astute the neighbors who lived near the plant were. The process that we were using for making phthalic anhydride (PA) had what was known as “switch condensers,” that is while one condenser was on-line condensing out the PA vapors, the other condenser was being heated up to liquefy the PA, which had sublimed on the tubes, to recover it as liquid. The neighbors had learned from experience that whenever the condensers were switched, there was an emission of air and PA droplets into the air inside and outside the plant fenceline. So, whenever any neighbor wanted a new paint job for his or her car, he or she would park it outside the plant, and sooner or later, the car would be covered in hardened PA droplets. The plant management wrote this expense off as a maintenance item.

One of the first things that I did when I relocated to Philadelphia was to apply to Drexel Institute of Technology to be admitted to pursue a master’s degree in chemical engineering. Drexel, like CCNY, offered classes at night for people who were working in industry during the daytime. I was accepted, and started on my way to an advanced degree in chemical engineering in the Fall of 1951. I received my M.S.Ch.E. in June 1957. However, since I left Philadelphia for Brooklyn in October 1955, I had to return on weekends for about a year to complete the laboratory part of my thesis, which was on “Viscosities of Non-Aqueous, Non-Electrolyte Solutions.” I also became active in the local sections of the AIChE and the American Chemical Society.

Although I enjoyed the work that I was doing and the people that I worked with at the Barrett plant were great, I was getting a bit homesick, and my parents were urging me to see if I could get a job closer to home, so I began to look around. I answered an advertisement...
in a New York newspaper for a position with the Chemical Construction Corporation (Chemico), and went for an interview. I was offered a job which paid quite a bit more than I was getting at the Barrett Division, and the job also involved process design work, which I loved, so I accepted the position and moved back home with my parents. At the time that I joined Chemico, it was owned by the American Cyanamid Company and served as its corporate engineering department, so I immediately became involved in projects for Cyanamid. These included projects for their new acrylic fiber (Creslan) plant, a new grass roots plant for making acrylonitrile and its precursors, and other Cyanamid products. I also worked on other non-Cyanamid projects (for other clients) for the manufacture of ammonia, sulfuric and nitric acid, and sulfur recovery. I also was involved with the preparation of company-wide design manuals for several processes, and took part in several plant start-ups. Here too, I was working on things that I loved to do, and gaining a lot of experience.

Although it is nearly 50 years ago since I participated in the start-up of the acrylonitrile plant in Fortier, LA, I still can remember two incidents which illustrate the strange things that can happen during a start-up. The first incident involved the efforts to bring a liquid feed into a process unit. For some strange reason, the flow through the piping was at a greatly reduced rate than it should have been. All the valves were checked and it was found that they were all open. After much head-scratching we decided that there must be an obstruction in the piping. We opened up some flanges in the piping and, much to our surprise, found a dead cat wedged in the pipe. It seems that the cat chased a field mouse into the piping, and the operators, who were not aware of this, closed up the pipeline with the cat in it. The second incident involved a packed tower that was experiencing very high pressure drops. The tower and packing were made of carbon steel. I, and several other engineers, did some pressure drop calculations and came to the conclusion that the packing must be blocked. Sure enough, when we opened up the tower, we found that the packing had experienced severe corrosion, and the rust had fused together, severely restricting the flow area. It was determined that the tower had been packed several weeks before it was to be brought on-stream, and with the high air humidity in Fortier, LA, the packing became quickly rusted, and nobody had checked it to see if it was okay. That taught all of us a lesson about the need to seal off equipment or coat it with oil when it is in a hot, humid climate, and is made of carbon steel.

I worked for Chemico from October 1955 until the Autumn of 1958. I was planning on getting married in February 1959, and needed a larger salary than Chemico was willing to pay me, so I began seeking a higher paying position.

When I came back to Brooklyn in 1955 I applied to the Polytechnic Institute of Brooklyn for admission to the doctoral program in chemical engineering, going to school again at night, after working during the day. I pursued the program for a D.Ch.E from January 1956 until the Fall of 1961, when my wife and I, and my son moved to Clifton, NJ. At this point I had to drop my course work towards a D.Ch.E since I found it impossible to commute to Brooklyn from Clifton several times a week. I felt a bit disappointed since I had almost completed most of the required course work and needed only to finish up the remaining few courses and then work on my thesis. However, we were expecting a second child, and I felt that my wife needed me at home to help her. I could not justify in my mind spending several evenings away from home going to Brooklyn to finish up my degree, and leaving my wife to take care of two little children by herself.

In the Fall of 1958 I answered an advertisement from The Lummus Company who were looking for several process design engineers. I had an interview with several top management people, and one of them turned out to be one of my previous professors at CCNY. At his

-Continued-
recommendation, I was hired and started to work for Lummus in October 1958 (again, the “old boy” network helped to get me a job). I worked for a few months at Lummus’s Manhattan headquarters, and then the whole engineering staff moved to a facility in Newark, NJ. I commuted from Brooklyn in a car pool with others for a few years until we finally bought a house in Clifton, NJ, and we moved in on January 31, 1963 in the middle of a raging snowstorm. Fortunately, the movers got all of our furniture into the house before the snowstorm got real bad.

When I was at The Lummus Company, I worked on the process design of a variety of processes and projects for the production of organic, inorganic, petrochemical, and light hydrocarbon (ethylene) chemicals. I also was involved with the start-up of a number of these plants. I got more deeply into process safety/loss prevention when I was assigned to prepare an Ethylene Plant Flare Systems Design Manual. This manual was used in all of the Lummus offices worldwide. Based on this manual, I, and a colleague, prepared and presented a paper on “Safe Design of an Ethylene Plant” at the 1968 AIChE Loss Prevention Symposium. The paper was published in Volume 2 of the AIChE Loss Prevention Manual and in a European technical journal.

I was then approached by the chairman of the AIChE Loss Prevention Symposium Programming Committee (Area 11A), who asked me if I was interested in becoming a member of the Committee. I checked with my manager and he gave me permission to do so, and I joined the Committee in 1969. I still am a member of this Committee after all of these years.

In December 1968 I was called by a friend of mine with whom I had worked at The Lummus Company, and who had left to join Hoffmann-LaRoche, Inc. (HLR) as Engineering Manager for their new grass-roots Vitamin C and Derivatives plant that was being designed in-house. He said that they needed experienced process design engineers, and he offered to get me an interview with the manager of the Process Design Section in the Process Development Department. At that time, HLR was a wonderful company to work for as they paid above-average salaries, started everyone with two weeks vacation the first year, had a drug prescription plan (I think that it was free at that time), had a profit-sharing plan, and paid bonuses twice a year (2 weeks salary in June and 4 weeks salary in December). It usually was almost impossible to land a job at HLR unless someone in your family already worked there, or unless you had specific expertise that they needed. I came for my interview with the Process Development Department and Process Design Section managers and was offered a position as a Senior Process Design Engineer. My friend exerted some pressure on the Personnel Department (the term Human Resources was unknown at that time) to expedite my hiring before the end of the year so that I could be eligible for the June 1969 bonus, and I officially started at HLR as of December 31, 1968.

I was immediately involved in the design of several areas of the Vitamin C and Vitamin C Derivatives plant, including start-up of these. Over the 25 years that I was employed at HLR, I also was involved with the design of many other processes such as Vitamin E, Biotin (Vitamin H), Sulfur drug intermediates, Leva-Dopa, Interferon, Accutane, and other vitamins and pharmaceuticals. After quite a number of years doing primarily process design work (with process safety and loss prevention always in mind), I was appointed Head of the Engineering Methods & Standards Section of the Corporate Engineering Department, which position I held until retiring in January 1994.

My manager knew of my great interest in process safety/loss prevention and encouraged me to become more active in this field. I became the process safety “guru” in the Process Design Department and worked with the Corporate and Plant Safety Departments to help write most of the process safety standards. He also always found money for me to attend the yearly AIChE Loss Prevention Symposia, and also to go to meetings of the Safety Committees of the Chemical Manufacturers Association and the National Association of Manufacturers. When DIERS was formed, I was able to convince him (and the Vice President of Corporate Engineering) to let me become involved with this activity, and I was very active in helping to write chapters in two of the books issued by DIERS. Also, when CCPS was formed, I again was able to convince them to come up with the money to join CCPS. I became -Continued-
the HLR technical representative to CCPS, and was chairman of two committees and wrote chapters for several of the Guidelines books.

Among the safety standards that I wrote for HLR were the following: Normal and Emergency Venting for Atmospheric Storage Tanks Containing flammable or Combustible Liquids; Normal and Emergency Venting and Related Design Aspects of Pressure Vessels, Equipment, and Reactors; Manifolding of Vessel Vents; Design Guide for Vapor Phase Activated Carbon Adsorption Systems; Interlocking and Nitrogen Inerting Requirements for Batch Centrifuges; Guidelines for the Safe Design and Operation of Batch Hydrogenation Facilities.

I early on recognized that hazard analyses would be very helpful in avoiding accidents and got permission from my manager to hire R. Ellis Knowlton to come to HLR and present a training course for HAZOP leaders. Mr. Knowlton was with Chemetics International Corporation Ltd. in Vancouver, B.C. and had worked at ICI when the HAZOP technique was being developed there by Trevor Kletz and others. He had also modified the HAZOP techniques for application to batch plants, which was what most of our plants were. Although there were several of us qualified to lead HAZOPs, it turned out that I led most of them during the years that I worked at HLR. I came back later, after I had retired, as a consultant, and led a number of HAZOPs on new and older processes that had never had a hazard analysis done.

In October 1993 I turned 65 and decided to retire in January 1994 when I would have worked at HLR for 25 years. This gave me what I needed to retire fully vested in all of the company’s benefits. The word of my impending retirement reached the ears of the Director of Corporate Safety and he called me to ask if I would be willing to come back as a consultant and to help them out as they were shorthanded. I said that I would do so providing that I only worked for half a day (except when something urgent came up), as I was, after all, supposed to be retired. I worked there as a consultant for about three years, doing routine process safety work, reviewing processes to improve their safety, and doing a number of HAZOP reviews.

When I was asked to come back to HLR as a consultant, I decided to incorporate as an “S corporation” (which left only my company liable for any law suits, rather than myself). I decided to specialize in consulting work in process safety/loss prevention; powder and bulk solids storage, handling, and processing; air pollution control, and process design of batch plants. I also have done some lecturing in process safety and powder/bulk solids handling, as well as writing 3 books and chapters for several others. I have been doing this for the last 12 years, and enjoying myself greatly as I only accept jobs when I feel like it and if it does not interfere with the travel plans of my wife and myself.

Since I began working I always felt that being involved in committee work of the AIChE and other technical societies and organizations would be beneficial to me, as well as helping to spread process safety/loss prevention knowledge. I have been fortunate to be able work on a number of AIChE committees and groups, including Area 11A (Loss Prevention Symposium Programming), Area 11B (Process Plants Safety Symposium), DIERS, CCPS, and SACHE. I was fortunate to be awarded two contracts to write books for CCPS. The first was on Deflagration and Detonation Flame Arresters, which I wrote by myself, and published in 2002; the second was on Guidelines for Safe handling of Powders and Bulk Solids, which I wrote in collaboration with Professor Robert Zalosh of the Worcester Polytechnic Institute, and published in January 2005. I also was hired as a subcontractor by the Arthur D. Little Company (major contractor to CCPS) to write four chapters of the book Guidelines for Design Solutions for Process Equipment Failures, which was published in 1998.

I also have written two sections of the chapter on Process Safety for the new 8th edition of Perry’s Chemical Engineers’ Handbook. One section, which I wrote by myself, is on Emergency Relief Device Effluent Collection and Handling, and the other section, written in collaboration with Dr. Larry Britton, is on the subject of Flame Arresters.

Other activities include involvement with the Journal of Loss Prevention in the Process Industries and the DIERS Users Group. When the JLPPI was being
planned, they asked Trevor Kletz for his recommendation for the North American Regional Editor, and he recommended me. I held this position for 10 years, and since then have been the Book review Editor. When the DIERS Users Group was established, I volunteered to be the editor of the Awareness Newsletter and have been publishing this quarterly newsletter of abstracts of relevant articles since October 1984. I am still doing this on a regular basis.

I was honored to be elected as an AIChE Fellow in 1980, and have received the Norton Walton/Russell Miller Award of the Safety and Health Division. I have also been chairman of the North New Jersey section, recipient of its Key Award, and have had a scholarship established in my name for seniors at the New Jersey Institute of Technology and Stevens Institute of Technology.

In 2005 I was greatly honored (and also surprised) to receive the Merit Award of the Mary Kay O’Connor Process Safety Center.

I also have had the privilege of being a member of the NFPA Explosion Protection Systems Committee since 1983 and am presently involved with updating NFPA 68 and NFPA 69, as well as preparing a new guideline, NFPA 68A, on Explosion Protection in Pipe Systems.

Over the years, I have been asked from time-to-time if I would choose chemical engineering as a career if I had to do it all over again. I have always replied with enthusiasm that I would indeed. I have been doing work that is greatly enjoyable and interesting to me, as well as getting to meet and know, as friends, many outstanding chemical engineers, especially in the field of process safety/loss prevention. I have found most of them more than willing to share their experience and knowledge (providing that it was not confidential or proprietary) with me to help me solve potentially dangerous problems or situations. Becoming a chemical engineer, and specializing in process safety and loss prevention is the second smartest choice that I have ever made. The first choice, of course, is marrying my wife who deserves elevation to sainthood for putting up with my idiosyncrasies for over 47 years.
2006 CALENDAR

Thursday, August 17, 2006
Steering Committee Meeting
10 AM - 3 PM
Texas A&M University - Room 256, Jack E. Brown Building

2006 SYMPOSIUM
October 24-25, 2006
The Brazos Center
College Station, TX

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