Sam Mannan to Receive Honorary Degree

Sam Mannan, professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University, has been awarded the honorary degree of *doctor honoris causa* by the senate of the Technical University of Lodz in Poland. See page 6.

*Courtesy of Chemical Engineering Dept.*

Call for Papers

Professor Trevor Kletz will turn 90 in October 2012. A special issue of the Journal of Loss Prevention in the Process Industries is being planned to celebrate.

Papers are invited on any topic related to the scope of the journal – chemical and process plant safety. The only additional criterion is that the research described will have been motivated by some aspect of Trevor’s own work over the years. All queries should be addressed to Paul Amyotte (paul.amyotte@dal.ca) who is the editor for the special issue. (Please see page 12 for further details.)

2011-12 CE Schedule—New Look

The Center has released a new format for the 2011-2012 Continuation Education Course Catalog.

Just released this summer, our course catalog has a new look! Course information now includes “Who Should Attend”, course level, such as general, specialist, technical, and advanced, to help you plan for the year. This catalog describes all 55 courses offered by the Center, all of which are available for delivery at your facility! To see the schedule, register, or view our catalogs, go to: [http://psc.tamu.edu/education/continuing-education](http://psc.tamu.edu/education/continuing-education). Also see the 2011-2012 Continuing Education schedule on page 22.
Often times, I am asked questions like, “What direction will PSM take in the future? What are the areas PSM will focus on moving forward? What about prescriptive approaches as compared to performance-based approaches? Will the US start requiring the use of Safety Case? Where is the US with regard to other developed countries in the area of safety? What about the use and application of IST and other technologies?” I have pondered all these questions and tried to frame my response based on the current science and knowledge, industry trends, and my predictions. It is important to emphasize that these are solely my opinions.

I believe that PSM is going to continue to evolve as a performance-based standard. It is not possible for a program like PSM to be prescriptive. So as new technology, procedures, and systems are standardized and accepted by industry, they will become required under PSM. Another factor that is a key issue is that in the US, the PSM and risk management programs currently do not directly take risk or probability into account. As time goes on, that is bound to change. I think that in the future a combination of both probability and consequence (i.e., risk) will be taken into account. Ultimately, whether the US and UK regulations start looking like each other only time will tell. I think there is a good possibility that will occur particularly if the science and technology feeding both regulations is the same.

Some of the PSM elements that industry still seem to be struggling with are process safety information, process hazards analysis, management of change and mechanical integrity. As we move forward, we must find ways to maintain and use the most accurate, up-to-date, and complete process safety information. Note that the entire PSM program is based on the process safety information. So, if the information is bad, then we get “garbage in, garbage out.” With regard to the process hazard analysis, time and again, there have been occasions that PHA’s have not been well done and scenarios that should not have been missed are missed. In this regard, some of the issues that need to be addressed, is selection of PHA facilitators with appropriate experience, education and background; training of PHA participants; occasional audit of PHA’s by third-party experts; re-do of every PHA after the second revalidation (i.e., a PHA from scratch should be performed every 15 years); follow-up and resolution of PHA findings in a timely period. With regard to management of change, there are simply many occasions when a change is not identified and as such not subjected to an appropriate management of change process. What is needed is a very robust process for identification of change and then unfailing adherence to the management.
of change procedures. Finally, I believe mechanical integrity is by far the most complicated and difficult element to implement. Even though the requirement is stated very simply--have written procedures for a list of equipment; the task gets quite complex after that. In short, just identifying which parts and equipment in the process should be covered in the mechanical integrity program becomes a major effort. Then, developing the program in sufficient specificity to the instruments and equipment involved is quite complex. And then, finally complying with each and every inspection and testing process, taking corrective action, and then modifying the program based on continuing observation of the process and equipment performance. I believe that at both process safety information and mechanical integrity implementation can be immensely improved by adopting and using computerized data gathering and analysis software.

With regard to process safety and risk management program, I believe that a fully prescriptive approach is not possible. In fact, a completely prescriptive approach does not make any sense at all. How can one size fit all? How can one program work for all plants irrespective of the hazard and the risk involved? While there are many discussions regarding the safety case approach and its application to the US offshore industry, I believe it is still too early to tell. One thing is clear, however, the US offshore industry is going to see more regulations and I for one hope that these regulations are performance-based and risk-based. On the other hand, there are certain cases where a prescriptive approach is needed, e.g., cases where the outcome is clearly known and the consequences are clearly known as well. For example, lock-out/tag-out must be done whenever energized equipment or anything that could be energized is worked on.

Where is the US versus other developed countries in the area of process safety? Most countries in Europe are farther ahead in developing and implementing process safety and risk management programs. This stems from many facts, the most primary one being that population zones are quite congested and the perception of risk is much more mature. The other thing is that regulation and risk management practices are based on risk and not just consequences.

In the area of inherently safer technologies IST--do we see any step change taking place in industry? Yes, in the area of IST, some advances are being made. However, I must note that IST has not yet become part of any legislative or regulatory requirements. Some in the US Congress are still pushing for legislation. DHS has also undertaken significant work in addressing a consensus definition of IST, developing metrics for IST, and developing methods and procedures for IST analysis.

Given all I have just stated above, I think PSM has several areas where we as a community of engineers, scientists and legislators need to be careful how we ‘improve’ our nation’s safety. This is not to say that we should not strive to make improvements, but always with science in the forefront of our decision-making.

M. Sam Mannan
Summer, 2011
Mentzer Scholarship to Support Process Safety

Dr. Ray Mentzer will endow a scholarship for chemical engineering students at Texas A&M University. The Dr. Ray A. Mentzer Scholarship, to be established with a $30,000 contribution through the Texas A&M Foundation, will be awarded to students with a minimum 3.0 cumulative grade point average who pursue a process safety certificate. Exxon Mobil Corp. matching funds will help complete the gift. Now retired from Exxon Mobil, Mentzer is a lecturer with the department, teaches courses related to process safety engineering and advises graduate students and conducts research for the Mary Kay O'Connor Process Safety Center.

Mannan Presents at Meridium Conference

Dr. Sam Mannan presented “Advantages and Pitfalls of Mechanical Integrity and Management of Change Programs” at the Meridium Conference 2011 held in Roanoke, Virginia on May 2-6. He discussed the importance of developing an effective mechanical integrity program that finds and corrects equipment deficiencies to benefit plant safety and economical health. He outlined the advantages and pitfalls of mechanical integrity and management of change programs. The annual conference is for Users of the Meridium’s integrated asset performance management software.

2011 Chemical Sector Security Summit

(DHS Website.) More than 500 partners from around the country gathered in Baltimore on July 6-7 to attend the 2011 Chemical Sector Security Summit. The Summit is an annual forum for information sharing that highlights the collaboration between public and private sectors and the Department of Homeland Security (DHS), to ensure a safer and more resilient industrial homeland.

The 2011 Chemical Sector Security Summit held a vast array of session topics including highlights of DHS Voluntary Programs and Resources, a CFATS and Ammonium Nitrate Update, Theft and Diversion, Securing the Global Supply Chain, Control Systems Security, PS-Prep, Suspicious Activity Reporting, and Personnel Surety, to name a few. In addition to the two day Summit, this year’s event included two additional days of resource demonstrations and workshops.

GE PSM conference held in Louisville

Dr. Sam Mannan gave the keynote presentation at the GE Process Safety Management Summit held in Louisville, Kentucky on July 12.

Fluidyne Training

Claude Souprayen with Fluidyne visited the Center on June 20 and gave the MKOPSC graduate students and staff a training course on the Fluidyn-PANACHE Software.

Training in Colombia

Dr. Sam Mannan will be traveling to Bucaramanga, Colombia to present a Postgraduate and Professional Seminar at the Industrial University of Santander, Bucaramanga, Santander, Colombia and representatives from the Colombian Petroleum Institute ICP-ECOPETROL in Bucaramanga. He will also give a seminar about Process Safety in Barrancabermeja, the main Colombian Petroleum Refinery, ECOPETROL.

Tricia Beifuss Joins MKOPSC

Ms. Tricia Beifuss, has joined the Center as Program Assistant. She will be involved in the coordination of Continuing Education and the M.S. in Safety Engineering program and other activities and events at MKOPSC. We welcome Tricia to the Center.

Dedy Ng Joins Technip

Dr. Dedy Ng, former Assistant Research Scientist at MKOPSC, joined Technip this past May. While at the Center, Dr. Ng led a team of students on their academic research as well as on many projects for our sponsors. While we miss his expertise and energy on our team, we wish Dr. Ng great success in his new career!

Mentzer Presents at OTC

Dr. Ray Mentzer participated at the 2011 Offshore Technology Conference held at Reliant Park in Houston, Texas in May. He took part in a panel discussion on Process Safety in Offshore Operations.
May and August Graduates

Several MKOPSC students graduated this past May. Carolina Herrera graduated with an M.S. She accepted a position with Sage Consulting. Anisa Safitri graduated with a Ph.D and accepted a position at BP in Houston. Mahdiyati Syukri graduated with an M.S. and is working at Mustang Engineering. Derrick Thomas also received a M.S. and started with DuPont.

In August, Salem Ghamdi graduated with an M.S. He returned to Saudi Aramco. Ruifeng Qi graduated with a Ph.D. and is employed at Huntsman Corp. Peng Lian also graduated with a Ph.D. and accepted a position at Shell.

Students Visiting the Center

Carlos Cardenas and Camilo Rosas are here from the Universidad de los Andes where they studied with Professor Felipe Munoz.

Dorota Siuta is visiting the Center from the Technical University of Lodz where she is a student of Dr. Adam Markowski.

Antonio Lopez Molina, Julio A. de Lira, and Maria Clementina Ramirez are visiting the Center from the Instituto Tecnológico de Celaya in Mexico where they study under Dr. Richard Vazquez.

Jonathan Lizarazo and Sergio Garcia, from the Instituto Tecnológico de Celaya were studying at the Center from March through July of this year.

PhD Student Carmen Helena Osorio Doing LNG Related Research at TAMUQ

Carmen H. Osorio, PhD student at the MKOPSC, spent five months at Texas A&M - Qatar (TAMUQ) where she was involved in a LNG related project under the supervision of Dr. Luc Vechot. Carmen had the opportunity to work on small-scale experiments which are motivated by the need of further understanding of the phenomena involved on cryogenic liquid source term (liquid spill and vaporization) and the quantification of the most important parameters that can affect them. Based on this, Carmen’s work focused on investigating the contributions of the different heat transfer modes, including conduction, convection and thermal radiation, into the vaporization rate of cryogenic liquids. As a result of this work, some publications are underway, including the paper “Laboratory scale analysis of the influence of different heat transfer mechanisms on liquid nitrogen vaporization rate” that will be presented at the MKOPSC International Symposium this year.

During this period abroad, Carmen enjoyed learning from her supervisors and co-workers as much as she enjoyed supervising some chemical engineering undergraduate students working at the safety group. Carmen also had the opportunity to attend and participate in different activities including the Second Annual Safety Symposium at TAMUQ, the BP annual meeting and visit interesting places such as Ras Laffan Industrial City and Ras Laffan Emergency and Safety College (RLESC) situated along Qatar’s northeast coast. Although Carmen’s dissertation research is not related to LNG research, Carmen found this opportunity, given by Center, very rewarding considering the importance to get expertise in different safety fields that can be useful for her professional life.
PhD Students in Summer Internships

Several MKOPSC Graduate students are finishing their summer internships! They are: Alba Pineda is on internship at Shell; Linh Dinh and Byung Kim are also at Shell; Mengtian Wang is on internship at Mustang Engineering; Hai Le is at Huntsman Corp.; Roberto Ruiz is interning at Mustang Engineering and Sean Legg is on internship at Los Alamos Laboratories.

Visitors to the Center

Professor Xuhai Pan Visiting from China

Dr. Xuhai Pan, Associate Professor with the Nanjing University of Chemical Technology in China is spending six months at the Center. He will be meeting with graduate students to discuss their research. His research interests include chemical process safety; runaway reactions prevention; and heavy gas dispersion.

Visiting Professor Richart Vazquez

Visiting research professor Dr. Richart Vazquez met with graduate students to discuss their research while visiting the Center in June. Dr. Vazquez is a Professor of Chemical Engineering at the Instituto Tecnológico de Celaya in Mexico.

Sam Mannan to Receive Honorary Degree

Sam Mannan, professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University, has been awarded the honorary degree of doctor honoris causa by the senate of the Technical University of Lodz in Poland.

Mannan was recommended for the honor by the faculty council of the university’s Faculty of Process and Environmental Engineering. He will be formally recognized at the University of Lodz convocation ceremony, which is scheduled for September 20.

Established in 1945, the University of Lodz is one of the leading institutions of higher education in Poland. The 12 faculties of the university provide programs in 38 fields of study and 160 specializations. In addition, the university offers several doctoral programs, more than 90 postgraduate curricula including an MBA program, and programs financed by the European Science Foundation.

Student News

Visitors to the Center

Vazquez

Pan

Pineda

Dinh

Kim

Wang

Le

Ruiz

Legg
Mary Kay O'Connor Process Safety Center

2011 INTERNATIONAL SYMPOSIUM

Beyond Regulatory Compliance, Making Safety Second Nature

October 25-27, 2011

Hilton Conference Center
College Station, Texas

The symposium qualifies for 16.25 PDHs. The Texas Board of Professional Engineers requires 15 PDHs (including 1 PDH in Engineering Ethics).

A one-hour session on Engineering Ethics is offered immediately following the symposium on Wednesday, October 26. See website for more information: http://process-safety.tamu.edu

★★★★

EARLY Registration Ends September 25

Online Registration is available at:
http://psc.tamu.edu/symposia/2011-sym/registration-information

Room block available at: Hilton College Station
PH: 979-693-7500.
Cutoff date for discounted rates: 10/2/11

Sponsor of Symposium Banquet: AVEVA

Sponsor of Symposium Break: EarLy Consulting

Process Safety | Risk Management

Mary Kay O’Connor Process Safety Center • Texas A&M University • College Station, TX 77843-3122
Ph: (979) 845-5981 • Fax: (979) 458-1493 • http://process-safety.tamu.edu
TUESDAY, OCTOBER 25

8:00AM  Frank P. Lees memorial Lecture—The Honorable Lee H. Hamilton

9:00AM  State of the Center: Research Program, Current Activities, and Future Direction, Dr. Sam Mannan, Director

9:15-10:00AM—Break and Exhibit Hall  •  Sponsored by Early Consulting

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<th>Track I</th>
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<tbody>
<tr>
<td>Kathy Shell, Kiran Krishna, Sara Saxena</td>
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<td>Marc Levin, Maureen Orr, Ammar Alkhawaldeh</td>
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<tr>
<td>Safety Culture/Operation Discipline</td>
<td>Incident Analysis</td>
<td>Process Management for Safety I</td>
<td>Consequence Analysis I</td>
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10:00AM  
"Operational Discipline: Does your organization do the job right every time?" B. Rains, DuPont
"Linking Incident Investigation to Risk Assessment," R. Pitblado, DNV
"Process Safety for the Common Folk," J. Chosnek, Knowledge One
"The Use of the FDS Computational Fluid Dynamics Code in Complex Fire Geometries," J. Cornwell, Quest Consultants

10:30AM  
"Leading Indicators for Process Safety," D. Prugh, Chilworth Global
"A collaborative framework for enabling efficient information extraction in accident databases," R. Batres Toyohashi University
"Shell’s Experience Implementing a Manual of Permitted Operations," D. Detman, Shell Upstream Americas
"A Study of in Situ Spreading and Burning of Oil in an Ice Channel," P. Bellino, WPI & University of Alberta

11:00AM  
"Learning from Past Performance – Using Human Factor Data to Guide and Drive Process Safety Improvements," A. Armstrong, Kestrel Management Services
"Incident Analysis," M. Hager, OSHA
"Using CFD to Analyze Gas Detector Placement in Process Facilities," S. Davis, GexCon US

11:30AM  
"Improving Process Safety from the Ground Up," K. Study, The Dow Chemical Company

12:00-1:30PM — Lunch and Exhibit Hall

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<tr>
<th>Risk Assessment/LOPA I</th>
<th>Inherent Safety</th>
<th>Case Histories I</th>
<th>Hazard Assessment</th>
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3:00—3:30PM - Break and Exhibit Hall

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<tr>
<th>Consequence Analysis II</th>
<th>Process Management for Safety II</th>
<th>Safety Integrity Level</th>
<th>Dust</th>
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<tr>
<td>4:00PM</td>
<td>&quot;CFD to Model a Time Varying LNG Spill,&quot; E. Peterson, Scandpower</td>
<td>&quot;Rationalized Design of Alarm Sensor Allocation Consistent with Hazard Scenarios,&quot; T. Fuchino, TITECH Japan</td>
<td>&quot;Correlating dust explosion parameters determined in vessels of different size,&quot; D. Castellanos, MKOPSC</td>
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<td>5:00PM</td>
<td>&quot;Managing Forward the Future - Preventing Disaster: Creating Organizational Energy to Find Defective Safety Culture And Overcome Organizational Inertia,&quot; B. Wittkower, IP Kenny</td>
<td>&quot;Use of Fuzzy Logic on SIF Failure,&quot; P. Goteti, Honeywell</td>
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5:30—7:00PM - Cocktail Reception and Exhibit Hall  •  MAIN POSTER SHOW
WEDNESDAY, OCTOBER 26

8:00AM  KEYNOTE LECTURE — Professor Edward J. Calabrese, University of Massachusetts

9:00AM  Presentation of the Annual Merit Award, Harry H. West Service Award and the Lamiya Zahin Memorial Safety Scholarship, Dr. Sam Mannan, Director, MKOPSC

9:15-10:00AM—Break and Exhibit Hall

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10:00AM  "The Implications of Process Safety and Risk Management on Sustainability," M. Gromacki, Dixie Chemical

10:30AM  "Achieving High Performance HMIs," H. Perez, PAS

11:00AM  "Designers' Roles in Plant Safety go beyond Regulatory Compliance - Case Finland," Y. Malmen, VTT


12:00-1:30PM — Lunch and Exhibit Hall

<table>
<thead>
<tr>
<th>Case Histories II</th>
<th>Risk Assessment/LOPA III</th>
<th>Consequence Analysis IV</th>
<th>LNG Consequence Analysis I</th>
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<tbody>
<tr>
<td>&quot;BBN a tool to make LOPA more effective QRA more transparent and flexible and therefore to make safety more definable!&quot; H. Pasman, MKOPSC</td>
<td>&quot;Two-phase jet releases and droplet dispersion: rainfall experiments and model validation II. Rainout experiments,&quot; H. Witlox, DNV Software</td>
<td>&quot;Application of Computational Fluid Dynamics Modeling in Forced Dispersion of LNG Vapor Cloud,&quot; B. Kim, MKOPSC</td>
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3:00—3:30PM - Break and Exhibit Hall

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<th>Consequence Analysis V</th>
<th>Offshore</th>
<th>Failure Analysis</th>
<th>Human Factors</th>
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5:00—6:00PM - Engineering Ethics Session (1 hr)

6:30PM - Dinner & Tour at Messina Hof Winery • Sponsored by AVEVA
THURSDAY, OCTOBER 27

8:00AM — GENERAL SESSION —

8:00AM — “Do you know a Perfect Engineer?” John Prows, Huntsman Corp.

8:45AM — “Process Safety Evolution—An Air Products Case Study,” Shakeel Kadri, Air Products

9:15-10:00AM — Break and Exhibit Hall

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<tr>
<td>Metrics &amp; Performance Drivers</td>
<td>LNG Consequence Analysis II</td>
<td>Risk Assessment/LOPA IV</td>
<td>Process Management for Safety IV</td>
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10:00AM

“PSM Performance: Should PSM metrics vary by industry?” T. Lemm, DuPont

“Scientific challenges underpinning LNG safety,” J. Wen, Centre for Fire and Explosion Studies

“Risk Criteria Protection Layers and Conditional Modifiers,” A. Summers, SIS-TECH

“MOC Scoping? Getting it Right,” R. Hoff, Gateway Consulting

10:30AM

“PSM Metrics Impact on Process Safety Culture,” D. Wurst, Flint Hills Resources LP

“The Influence Of The Different Heat Transfer Mechanisms On Liquid Nitrogen Evaporation Rate: Laboratory Scale Analysis,” C.

“A Formulation to Optimize the Risk Reduction Process Based on LOPA,” C. Ramirez-Marengo, Instituto Tecnológico de Celaya

“Implementing Instrument and Process Control Mechanical Integrity and Reliability Improvement,” P. Skweres, SIS-

11:00AM

“Public Health Consequences of Acute Hydrofluoric Acid Releases 2002-2010,” A. Anderson, ATSDR

“ANSYS-Fluent CFD model of a Liquid Nitrogen evaporation rate,” Y. Liu, MKOPSC

“Risk is a function of likelihood and consequence,” M. Schmidt, Bluefield Process Safety

“Real-time Alarm Management in Today’s Process Plants,” L. Stegman, PAS

11:30AM

“Better Risk Assessment Yet to Come,” G. Silva, AE Solutions

“Process Safety Offshore: The Happening Place,” I. Sutton, AMEC Paragon

12:00 — Box Lunch — SYMPOSIUM CLOSED

Mary Kay O’Connor Process Safety Center
Invites you to EXHIBIT at the
2011 International Symposium
Making Safety Second Nature

Booth fee: $1250
Includes:
• 10’X10’ booth
• electrical hookup
• table/chairs
• listing in meeting programs, print and online
• One complimentary registration is provided.

Register Online: http://psc.tamu.edu/symposia/2011-sym/exhibitors
Contact Donna Startz – donnas@tamu.edu, 979-845-5981
**MKOPSC Faculty Fellows**

**Juergen Hahn,** associate professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University has been named associate editor for "Automatica," the flagship journal of the International Federation of Automatic Control (IFAC). "Automatica" publishes papers on original theoretical and experimental research and development in the control of systems, involving all facets of automatic control theory and its applications.

As associate editor, Hahn will be responsible for obtaining expert reviews for submitted papers and making publication recommendations.

Dr. Hahn, was also named to the policy committee of the International Federation of Automatic Control (IFAC). IFAC, founded in 1957, is a multinational federation of National Member Organizations (NMOs), each one representing the engineering and scientific societies concerned with automatic control in its own country. The federation promotes the science and technology of control in the broadest sense in all systems - engineering, physical, biological, social or economic - in both theory and application. IFAC is also concerned with the impact of control technology on society. (Article adapted from department news story.)

**Recent Publications**


Call for Papers – Happy 90th Birthday, Trevor

A special issue of the Journal of Loss Prevention in the Process Industries is being planned to celebrate the 90th birthday of Professor Trevor Kletz (which will occur in October 2012). Papers are invited on any topic related to the scope of the journal – chemical and process plant safety. The only additional criterion is that the research described will have been motivated by some aspect of Trevor’s own work over the years. The relevance of Trevor’s process safety teachings with respect to the submitted manuscript should be briefly explained in the introduction and his work should be cited in the manuscript. Our intention is to celebrate Trevor’s many contributions to process safety research and practice in honour of his long and prolific career.

Manuscripts must be submitted by no later than December 31, 2011 using the Elsevier Editorial System (EES) available at http://ees.elsevier.com/jlp/. Be sure to select the appropriate choices from the drop-down menus for article type and requested editor. Also note the journal requirements for length and style (in particular the requirements for referencing) available at http://www.elsevier.com/wps/find/journaldescription.cws_home/30444/authorinstructions.

All submissions will be peer-reviewed in accordance with normal journal practice. It is our intention to have the submission, review and revision process completed by May 31, 2012 for publication of the special issue during July 2012. Depending on the response to this call for papers, it may not be possible to publish all submitted papers in the special issue. Should this happen, the journal editorial team will select the papers to appear on the special issue, with the remaining papers being considered for a regular issue of the journal.

Trevor is aware of the special issue and, in his words, is surprised, honoured and grateful for this recognition from his colleagues. Please pass this call for papers on to any of your personal contacts who might be interested in submitting a paper.

All queries should be addressed to Paul Amyotte (paul.amyotte@dal.ca) who is the editor for the special issue.
The D.D. Williamson Vessel Explosion was presented by Alberto Benavides. The B-SCAT methodology was used to present this case study. This methodology makes use of the SCAT analysis with a Bow-Tie (AND Gates) in order to demonstrate the causes, progression and consequences of the incident investigated. The B-SCAT methodology was developed by DNV and is planning to be implemented in Governors’ BOWTIE XP software.

Jiang presented general statistics data for storage tank fires that happened all over the world, and especially focused on two cases from CSB: the Partridge Oil Field and Barton Solvents fires. The presentation emphasized the causes of these two incidents – maintenance error in welding and statics spark due to loose linkage as well as other common causes for storage tank fires. The presentation discussed several lessons that CSB derived from these two incidents and gave three recommendations for storage tank safety in the future.

Research conducted by Sean Legg, PhD Candidate in Chemical Engineering

Sean Legg is advised by Dr. Carl Laird, Center Faculty Fellow and faculty member in the Artie McFerrin Department of Chemical Engineering.

Detecting Gas Release Events in Petrochemical Facilities

Given hundreds of potential gas detector locations, a stochastic programming formulation is developed for determining the optimal placement of these sensors for detecting gas release events in a petrochemical facilities. Using a rigorous dispersion model with actual geometry from the process facility, hundreds of different scenarios are simulated using FLACS with different leak locations, process conditions, and weather properties. Pyomo, a python-based optimization package, is used to formulate the multi-scenario, mixed-integer programming problem. Using CPLEX to solve the formulations, different objective functions are explored. Optimal results are presented for the minimum number of sensors required to detect all scenarios, the minimum expected time to detect events using a fixed number of sensors, and a robust formulation that minimizes the maximum time to detection across all scenarios. In all these examples, the formulation can be solved efficiently for real, large-scale problems.
The Mary Kay O’Connor Process Safety Center will host a banquet on the second evening of the Symposium. This special event will include a tour of the Messina Hof Winery, a Texas vineyard established in 1977, and fine dining at the vineyard’s Vintage House Restaurant. The evening will also include live entertainment featuring local culture.

Messina Hof is located at
4545 Old Reliance Road
Bryan, Texas 77808

Contact: Donna Startz
donnas@tamu.edu
979-845-5981 (p)
979-458-1493 (f)

For more information, please visit our Web site at:

http://psc.tamu.edu
# 2011 - 2012
## Continuing Education Schedule

Classes offered in Houston, TX and at your facility!

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<td>3111</td>
<td>Reactive Chemical Hazards Assessment</td>
<td>Dr. Bill Rogers</td>
<td>PCCT Center</td>
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<tr>
<td>9/6 – 9/7</td>
<td>3102</td>
<td>Pressure Relief Systems – Best Practices</td>
<td>Dr. Abdul Aldeeb</td>
<td>Siemens</td>
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<td>Process Hazard Analysis Leadership Training</td>
<td>Mr. Skip Early</td>
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<td>9/13– 9/15</td>
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<td>SIS Implementation</td>
<td>Dr. Angela Summers</td>
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### CUSTOMIZED COURSES

All courses above are available to be delivered at your company site! The instructor travels to the facility and the short course is tailored to the specific needs of the facility.

*Facilities in Houston, TX:
  * SIS-TECH Solutions – 12021 Featherwood Drive, Suite 120
  * Siemens – 4615 SW Freeway, Suite 900
  * Phoenix Contact Customer Technology (PCCT) Center – 3993 W. Sam Houston Pkwy, Suite 500

[http://psc.tamu.edu/events/2012-schedule-of-classes](http://psc.tamu.edu/events/2012-schedule-of-classes)
Upcoming Events

October 25-27, 2011
2011 INTERNATIONAL SYMPOSIUM
Mary Kay O'Connor Process Safety Center
College Station Hilton Conference Center
—Early registration ends September 25

January 24-26, 2012
67th Annual Instrumentation Symposium
for the Process Industries
Texas A&M University
College Station, TX

September 6 – 7
8:30am – 4:30pm
3102 • Best Practices – Pressure Relief Systems
Instructor: Dr. Abdul Aldeeb
Location: Siemens; 4615 Southwest Fwy, Suite 900, Houston, TX
1.4 CEUs/ 14 PDHs
Register for this course

September 13 – 14
8:30am – 4:30pm
2052 • Process Hazard Analysis Leadership Training
Instructor: Mr. William F. Early
Location: Phoenix Contact; 3993 W. Sam Houston Pkwy N., Suite 500, Houston, TX
1.4 CEUs/ 14 PDHs
Register for this course

September 13 – 15
8:30am – 4:30pm
2073 • SIS Implementation
Instructor: Dr. Angela Summers
Location: SIS-TECH Solutions, LP; 12621 Featherwood, Houston, TX
2.1 CEUs/ 21 PDHs
Register for this course

GAS EXPLOSION HAZARDS FOR LNG FACILITIES
AN ADVANCED COURSE • Qatar • 4th—5th SEPTEMBER 2011
Presented by GexCon & Mary Kay O’Connor Process Safety Center

Contact:
Mary Kay O’Connor Process Safety Center
Texas A&M University
3122 TAMU
College Station, TX 77843-3122
Phone: 979/845-3489

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