
TEXAS A&M
ConocoPhillips
QATAR PROCESS
SAFETY SYMPOSIUM
PROCESS SAFETY IS NOT
ACHIEVED BY ACCIDENT
Reaching Operational Excellenc
Integrity Management
8 – 9 APRIL 2014
QATAR NATIONAL CONVENTION CENTRE
QATAR PROCESS
SAFETY SYMPOSIUM
PROCESS SAFETY IS NOT
ACHIEVED BY ACCIDENT
Reaching Operational Excellence by Asset Integrity Manage
8 – 9 APRIL 2014
QATAR NATIONAL CONVENTION CENTRE


Asset Integrity Management relates to process
safety:
– Offshore Hazard and Risk Assessment
– Operational and Process Support
– Corrosion Production Chemistry
– Process Hazards Analysis
– Production and Integrity Assurance
– Mechanical Integrity
– Pipeline Integrity
– Health, Safety, Environmental Strategies
QATAR PROCESS
SAFETY SYMPOSIUM

Delegates,

On behalf of Texas A&M University at Qatar, welcome to the 6th annual Qatar Process Safety Symposium.

Texas A&M at Qatar is honored to host this influential symposium for the 4th time with longtime partner, ConocoPhillips. ConocoPhillips has been a steadfast collaborator with Texas A&M, both at our main campus and here in Qatar, and we thank them for their partnership which has tremendous benefits for our academic and research programs, faculty, students and graduates.

As practitioners, we realize process safety is not only an essential tool for improving an overall culture of safety; it has significant impact on operations across the board. A vibrant process safety management strategy is fundamental in mitigating safety concerns and support of this strategy at all levels of an institution is necessary for the strategy to succeed and thrive.

Fortunately, this fact is recognized here in Qatar, and we are proud that the Qatar Process Safety Symposium grows each year. We believe it does so because it addresses the unique concerns of process safety experts and practitioners in Qatar industry and the region. The symposium is also a perfect example of how academics and industry can come together to promote best practices and push forward the evolution of process safety in both Qatar and industry, and we appreciate your contributions which add an invaluable and experienced voice to what we hope become new developments in the continuing improvement of process safety here in the region.

This year's symposium theme – Successfully Managing Changes for a Safer Future – could not be more timely as we consider the needs of our industry partners. Texas A&M at Qatar hosts the Mary K. O'Connor Process Safety Center – Qatar, and as the Center demonstrates, safety is not achieved by accident. Education surrounding this topic is the mission of the Center and it pushes forward the idea that process safety is a very intentional process that should be part of our common mission. We are grateful to the Center's partners and its steering committee for their commitment to make safety a second nature.

Together, we can influence development and innovation, encourage engagement in our communities and challenge conventional practices to help develop sustainable and pragmatic models surrounding this essential subject. Thank you for sharing your expertise and experiences with us.

Best wishes,

Mark H. Weichold, Ph.D.
Dean and CEO
Texas A&M University at Qatar

Delegates,

It gives me great pleasure to welcome you to the annual Qatar Process Safety Symposium co-hosted by ConocoPhillips and Texas A&M University at Qatar. Created in 2010, we are proud of the continued success of this symposium, which brings together safety experts from around the world to Qatar — whether professionals, government officials, academics or NGO representatives — to exchange vital knowledge on industrial safety. Now in its sixth edition, this year's Qatar Process Safety Symposium is held under the slogan, "Successfully Managing Changes For A Safer Future" and addresses important topics that are of common interest to all those in the energy industry including safety management, hazardous phenomenon, risk assessment and gas dispersion research and technology.

We at ConocoPhillips always strive to leverage our global expertise and standard of excellence in everything we do to support the Qatar National Vision 2030. Through our outreach, we aim to be an integral part of the economic, social, human and environmental development of the country. Part of this responsibility is towards supporting conferences and symposiums like this, which provide a forum in which to share best practices, lessons learned, talk and debate collective approaches, and engage in a learning experience focused on continuous improvement. Wherever we operate, our most important job is to keep everyone safe, including employees, contractors and the communities near our operations. We remain determined to continue improving the safety and reliability of our operations, as well as contributing to the development of industry-wide safety standards. It is from this commitment to safety that we look forward to welcoming you to the sixth annual Qatar Process Safety Symposium which reflects the growing demand for this important platform of debate, hosting more than 31 speakers from 16 different countries and having grown significantly in both stature and depth since its inaugural edition. I wish you a productive and stimulating experience and thank you for attending.

Stay Safe,

Gary Sykes
President ConocoPhillips Qatar
SAFETY | PEOPLE | INTEGRITY | RESPONSIBILITY | INNOVATION | TEAM WORK

MONDAY, 30 MARCH 2015

7:30–8:30 a.m.	**REGISTRATION AND REFRESHMENTS**
8:30–8:45 a.m	**Introduction**
8:45–9 a.m.	**Welcome** **Dr. Mark Weichold,** Dean and CEO, Texas A&M University at Qatar **Gary R. Sykes,** President, ConocoPhillips Qatar
	Plenary Keynote Speaker
9 – 9:50 a.m.	**"The Foundations for Management of Change in Process Safety — Leadership, Learning and Effective Regulation"** **Judith Hackitt,** Chair, UK Health and Safety Executive
9:50 – 10:30 a.m.	**"Management of Change — What are we (Still) Missing?"** **Richard D'Ardenne,** Technical Manager, ConocoPhillips Qatar
10:30 – 10:40 a.m.	**Awards Ceremony**

10:40–11 a.m.	**COFFEE BREAK AND POSTER SESSION**	
	Track I: Safety Management	**Track II: Hazardous phenomena**
11–11:30 a.m.	**"Dust Explosions Hazard Awareness: Polyethylene and Sulfur Dusts"** **Mohamed Kazmi,** MKOPSC-Qatar	**MKOPSC Research on Advanced Materials and Coatings for Qatari Oil and Gas Environment"** **Safwan Ghannam and Dr. Walid Khalfaoui,** MKOPSC-Qatar
11:30 a.m.–Noon	**"Managing the Safety of Your Assets in a Virtual 3-D Environment"** **Dr. Pascal Legal,** GexCon	**"Corrosion and Hydrogen Embrittlement in Production Systems — Effect on Process Safety"** **Dr. Roy Johnsen,** NTNU, QP Research & Technology Development
Noon–12:30 p.m.	**"Organizational Capability and Culture: The Two Critical Pillars of any Successful PSM Implementation"** **Hervé Vaudrey,** Chilworth — a DEKRA Company	**"Further Analysis of an Offshore Fire Investigation Using SCAT"** **Dr. Aubrey Thyer,** DNV GL
12:30–1:30 p.m.	**LUNCH, NETWORKING AND POSTER SESSION**	
1:30–2 p.m.	**"Preventing the Recurrence of Major Accidents"** **Noora Al-Ghanim,** Qatar Shell	
2–2:30 p.m.	**"Assessing Your Management of Change Process"** **Mike Snakard,** Snakard Consulting Group LLC	
2:30 p.m.	**Wrap up — End of the first day**	

TUESDAY, 31 MARCH 2015

8–8:30 a.m.	**REGISTRATION AND REFRESHMENTS**	
	Plenary Keynote Speaker	
8:30–9:15 a.m.	**"What Happens When you Don't Manage Change Well?"** **Trish Kerin,** IChemE Safety Centre	
	Panel Discussion	
9:15–10:30 a.m.	**"Why do Accidents Keep Happening?"** **Facilitator: Dr. Sam Mannan,** MKOPSC	
10:30–11 a.m.	**COFFEE BREAK AND POSTER SESSION**	
	Track III: Risk Assessments	**Track IV: Gas Dispersion — Research and Technology**
11–11:30 a.m.	**"Contribution of Applied Experimental Research to the Assessment of the Risks Associated to the Loss of Containment of LNG on Land"** **Asma Sadia and Syed Quraishy,** MKOPSC-Qatar	**"Study of the Infiltration of Toxic Gases in Non-process Areas and Buildings"** **Atif Ashraf,** MKOPSC-Qatar
11:30 a.m.–Noon	**"The Mechanics of a Quantitative Risk Analysis: Better Understand your Risks"** **Neil Prophet,** IoMosaic	**"New Technology for Toxic and Flammable Gas Detection"** **Larry Hudson,** Scenscient
Noon–12:30 p.m.	**"Applying Technical Risk Assessment to Academic Research"** **Tomasz Olewski,** MKOPSC-Qatar and Texas A&M University at Qatar	**"Quantifying Fugitive Emission Rates Using Optical Gas Imaging Techniques"** **Hazem Abdel Moati,** ExxonMobil Research Qatar

12:30–1:30 p.m.	**LUNCH AND NETWORKING / POSTER SESSION**
1:30–2 p.m.	**"The Role of Science in the Regulatory Process"** **Elaine Harbour,** Middle East Health and Safety Laboratory/HSE
2–2:30 p.m.	**"How can Academia Influence a Safety Culture?"** **Dr. Luc N Véchot,** MKOPSC-Qatar
2:30–2:45 p.m.	**And the Winner is...**
2:45 p.m.	**Wrap up — End of the Symposium**

Plenary Keynote Speaker
Judith Hackitt, CBE
Chair
UK Health and Safety Executive

OPENING ADDRESS

Judith Hackitt was appointed 1 October 2007 for a term of five years and was reappointed chair of HSE for a further three years in October 2012. She previously served as a commissioner between 2002 and 2005, and was awarded her CBE for services to health and safety in 2006.

She is a chemical engineer and graduated from Imperial College in 1975. She worked in the chemicals manufacturing industry for 23 years before joining the Chemical Industries Association (CIA) in 1998. She as director general of CIA from 2002 to 2005 and then worked in Brussels for the European Chemical Industry Association (CEFIC).

Hackitt is a Fellow of the Institution of Chemical Engineers (IChemE) and a member of council. She was president of IChemE from May 2013 to May 2014. She was elected a fellow of the Royal Academy of Engineering in July 2010.

She is also a senior non-executive director and trustee of the Energy Saving Trust and a non-executive director of the High Value Manufacturing Catapult.

THE FOUNDATIONS FOR MANAGEMENT OF CHANGE IN PROCESS SAFETY — LEADERSHIP, LEARNING AND EFFECTIVE REGULATION

ABSTRACT: The UK is a world leader in the regulation of health and safety in the major hazard industries. The chair of its Health and Safety Executive (HSE), Judith Hackitt CBE FrEng, gives her insight into management of change in the process safety industries. HSE has developed its major hazard regulatory regime during the past 40 years and has a mature system, but process safety management continues to offer challenges as industries, technologies and economies change. Hackitt, who has worked in the chemical industries for more than 20 years, will speak about the challenges regulators and industry face, not only in the UK but around the world, as well as ways to tackle them. Find out why leadership, learning and effective regulation are vital.

Plenary Keynote Speaker
Trish Kerin
Director
Institution of Chemical Engineers (IChemE) Safety Center

After graduating from the Royal Melbourne Institute of Technology as an honors graduate in mechanical engineering, Trish Kerin worked for Mobil Oil where she project-managed aviation fuels, installation and design. This was followed by operational roles at the Mobile Altona Refinery, where she supervised shipping and offsite areas. She then moved on to PVC manufacturer Australian Vinyls as risk manager and just prior to joining IChemE, was the national health and safety manager for Wesfarmers Kleenheat Gas.

Kerin is also a graduate of the Australian Institute of Company Directors. She is an associate member of IChemE and a member of Engineers Australia, and holds a diploma in OHS.

During her career in industry, she held a number of representative roles to government committees focused on process safety and major hazards.

Kerin now leads the IChemE Safety Centre, an industry-led consortium whose objective is to improve process safety throughout industries.

WHAT HAPPENS WHEN YOU DON'T MANAGE CHANGE WELL?

ABSTRACT: This presentation focuses on the case study of the BP Grangemouth Refinery explosion in 2000. This case has been chosen because it highlights the ineffective management of changes throughout the life of a facility, not just at one point in time.

On 10 June 2000, there was a leak from the Fluidised Catalytic Cracker Unit (FCCU) at the BP Grangemouth Refinery during a plant start up. This hydrocarbon leak vaporized and spread. It was then ignited, resulting in a serious fire in and around the FCCU. There were no injuries as a result of the fire, but there was significant damage and the fire burned for six and a half hours.

Investigations by the UK Health and Safety Executive determined the immediate cause as being the fracture of an unsupported 6x3" reducing tee due to a fatigue failure. This presentation will explore the various changes that lead up to the fracture of the reducing tee, and how the control and management of these was ineffective.

Plenary Keynote Speaker
Richard D'Ardenne
Technical Manager
ConocoPhillips Qatar

A chemical engineer, Richard D'Ardenne was appointed technical manager of ConocoPhillips Qatar 1 March 2014. Since 2010, he was project integration manager for ConocoPhillips Caspian, where he was responsible for the assurance of the company's investments into the massive Kashagan Project after filling a seconded role inside the project.

D'Ardenne began his career with Phillips in 1980, working in a variety of engineering positions in Pasadena, Texas, USA, supporting the company's plastics business. In 1988, after working three years in plastics marketing in Columbus, Ohio, he returned to Pasadena, working as a production superintendent. D'Ardenne shifted to the company's corporate engineering group in 1990.

After transferring to Borger, Texas, in 1996, D'Ardenne worked as the manager of major capital projects for the Borger refinery, NGL and petrochemical complex. In 1999, D'Ardenne transferred to Irvine, Calif., working on the Hamaca heavy-oil project as project manager, later transferring to Puerto La Cruz, Venezuela, seeing the project through to completion.

Moving to Perth, Australia, in 2005, D'Ardenne was appointed vice president of capital projects and oversaw the completion and start-up of the Darwin LNG plant. In 2009, he became deputy project manager of the Australia Pacific LNG project in Brisbane, responsible for the EIA and subsequent successful application of the environmental permit for the coal seam gas to LNG project.

D'Ardenne represents ConocoPhillips on the board of directors of the Qatargas 3 joint venture. Previously, he served as member and president of the Board of Directors of Colegio Internacional Puerto La Cruz. He is a member of the Project Management Institute.

Born in the USA in 1958, D'Ardenne earned his Bachelor of Science in chemical engineering from Purdue University in 1980. He is a certified project-management professional and a registered engineer in the state of Texas.

MANAGEMENT OF CHANGE — WHAT ARE WE (STILL) MISSING?

ABSTRACT: The oil and gas industry constantly goes through cycles that require the need for rigorous management of change (MoC). But with all the work that has been done to develop means and ways to effect change resulting safe outcomes, why do we continue to see accidents and injuries in our industry that should otherwise have been preventable? What are we missing? Or rather, what are we "still" missing in this process?

This presentation will explore one aspect of the management of change process that can be difficult to encompass in the traditional risk analyses and MoC procedures associated with change and which often times do not make the MoC checklist.

Hazem Abdel-Moati
Safety Research Lead
ExxonMobil Research Qatar

Hazem Abdel-Moati serves as the research lead for the LNG Safety Research Program at ExxonMobil Research Qatar (EMRQ). His role at EMRQ has focused on progressing multiple research projects in the field of optical infrared gas imaging and quantification, 3-D training simulation, 4-D enhanced effects in immersive environments, augmented reality work aids, near field ice detection in open ocean and cumulative risk indication/dynamic quantitative risk assessments. In addition to his research role, he is the operational safety coordinator for EMRQ and has once served as EMRQ's functional controls adviser. He is the recipient of the 2013 Qatar Petroleum HSE Excellence and Innovation Award for the IntelliRed™ remote gas detection technology and has five patents pending in the field of optical gas imaging and augmented reality applications. He holds a B.Sc. in chemical engineering from Texas A&M at Qatar and is currently pursuing a M.Sc. in chemical engineering from the same institution.

QUANTIFYING FUGITIVE EMISSION RATES USING OPTICAL GAS IMAGING TECHNIQUES

ABSTRACT: The foundation of leak detection and repair (LDAR) programs in many regions globally is Method 21, which was promulgated by the U.S. Environmental Protection Agency to screen equipment components for potential fugitive emissions. Method 21 uses screening values and empirical relationships developed from field test data to estimate (not measure) the mass rate of fugitive emissions using concentration data measured near the potentially leaking component. Because Method 21 is very labor intensive, compliance with LDAR requirements can be very costly. Optical gas imaging (OGI) technology offers significant productivity improvements that could reduce considerably costs for LDAR compliance. Despite the potential for these cost savings, OGI technology has not been adopted by regulatory agencies for LDAR as a replacement for Method 21 because it has not been considered to be sufficiently quantitative. EMRQ has been developing a quantitative OGI technology, or QOGI, that could become a truly viable alternative to Method 21. The QOGI technology can be deployed using existing gas detection infrared (IR) cameras combined with a companion tablet for real-time processing of measured IR data. The only parameters that the user may need to input are the ambient temperature and the estimated distance to the component being tested. The presentation will discuss the precision, accuracy and detection limits of this new technology, as determined from the significant number of controlled and field experiments that have been run. This new technology, once deployed for LDAR, will significantly reduce the cost of compliance and could potentially provide an approach for reporting fugitive emissions on a measurement vs. estimation basis.

Noora Al-Ghanim
Technical HSE Engineer
Qatar Shell GTL Ltd.

Noora Al-Ghanim has a chemical engineering background from Qatar University. She worked as a process engineer in Qatar Chemicals Company before she joined the process safety team at Qatar Shell in 2012 as a technical HSE engineer within the HSSE department. Currently, she is based in Ras Laffan Industrial City to support the asset in "Goal Zero" of No Harm to People and No Leaks. She is focused on risk management, consequence modeling and quantitative risk assessment. In addition to her normal duties, she is supporting major turnaround in leading the pre-startup safety review for Train-1 of the Feed Gas Processing Unit.

PREVENTING THE RECURRENCE OF MAJOR ACCIDENTS

ABSTRACT: While major process safety incidents are rare, we know about their potential to cause catastrophic consequences, such as injuries and even deaths, as well as damage to the environment, business and reputation. Avoiding a major process safety-related incident within the asset base is a priority and requires a Shell Group-wide approach.

The main causes and key barriers of each major process safety incidents have been analyzed by the Shell Group. The key barriers have been converted into 11 mandatory requirements across all Shell assets, called process safety basic requirements (PSBRs). The purpose is certainly to prevent the recurrence of the known major process safety incidents.

The PSBRs are an integral part of asset integrity and process safety management. This approach reflects on the effectiveness of our systems, such as management of change, permit to work, alarm management, etc.

The presentation will focus on the 11 PSBRs as a tool to learn from major process safety incidents and conclude with the assurance protocols followed by Qatar Shell.

Atif Mohammed Ashraf
Graduate Student — Master of Science in Chemical Engineering
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M university at Qatar

Atif Mohammed Ashraf is currently a Master of Science student in chemical engineering at Texas A&M University at Qatar. His areas of research interest and study include process safety, chemical reaction hazards, carbon sequestration and risk assessment. He graduated from Universiti Teknologi PETRONAS (UTP) in Malaysia in January 2012 with a bachelor's degree (Honors) in chemical engineering. He also holds a minor in environmental engineering from the same university. After graduation he worked as a research assistant for a brief period with PETRONAS in the area of cryogenic separation of CO2 from natural gas. He was co-author on a paper, "Study of Simultaneous Mass Transfer and Nucleation in Cryogenic Packed Bed for the Removal of CO2 from Natural Gas," published in the Applied Mechanics and Materials journal (http://www.scientific.net/AMM.625.229).

Ashraf is a member of the Mary Kay O'Connor Process Safety Center-Qatar (MKOPSC-Q) since he enrolled in the chemical engineering graduate program at Texas A&M at Qatar. His main area of research is the modelling of toxic gas ingress. He utilizes computational fluid dynamics and multizone modeling software to predict the flow of toxic gas, hydrogen sulfide in particular, from the outdoor environment to the indoor environment. This project is funded by MKOPSC-Q's industry consortium. He is also active in the chemical reaction hazards research area in the center where he has been responsible for the experimental study of runaway reaction of peroxides using adiabatic calorimetry.

STUDY THE INFILTRATION OF TOXIC GASES IN NON-PROCESS AREAS AND BUILDING

ABSTRACT: It is crucial to understand and analyze individuals' acute exposure to released toxic gas as accidental or intentional release of airborne toxic gases can cause severe harm to nearby communities. In the industry, majority of the workforce in a non-process area spends their time indoors. Therefore it is of utmost importance to understand and quantify the dynamics involved with the infiltration of outdoor contaminants into the indoors.

Air inside the building is exchanged with the outside building either deliberately by various controlling means: mechanically (HVAC), naturally by infiltration via cracks, gaps and other opening on the building structure. In most buildings the process is a mixture of both. As a consequence of this equilibrium, there exists a relationship between internal and external level of contaminants. This project, funded by Mary Kay O'Connor Process Safety Center-Qatar's industry consortium, aims to develop a model that predicts the toxic gas (hydrogen sulfide) ingress into a non-process area from the outside environment. It also intends to come up with an appropriate emergency repose plan based on the model predictions. A thorough review of the existing and current models to predict the ingress of a toxic gas was also done. Computational fluid dynamics — specifically Large Eddy Simulations (LES) and multizone modeling (CONTAM) — is utilized for exposure modelling. This project will also provide a technical basis for comparison of mitigation strategies. This presentation focuses on the outcomes of the review and preliminary results with the multizone model.

Dr. Walid Khalfaoui
Assistant Research Scientist
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M University at Qatar

Safwan Ghannam
Graduate Student — Master of Science in Safety Engineering
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M university at Qatar

Dr. Walid Khalfaoui is currently working as an assistant research scientist at the Mary Kay O'Connor Process Safety Center-Qatar (MKOPSC-Q) at Texas A&M University at Qatar. He received his Ph.D. in mechanical engineering in April 2011 from the Université de la Mediterranée in Marseille, France. His Ph.D. thesis was on laser surface melting of magnesium alloys for better corrosion and wear resistance. After his Ph.D., he joined Texas A&M at Qatar as a postoctoral research associate in Professor Bruce Palmer's team to work on the National Priority Research Program (NPRP) project funded by Qatar Foundation on the development of high interstitial stainless steel for downhole application. In 2014, Khalfaoui joined the MKOPSC-Q to lead and develop the corrosion and integrity management research activities of the safety center.

Safwan Ghannam is a graduate student at Texas A&M at Qatar working under MKOPSC-Q. Ghannam received his bachelor's degree in chemical engineering from Texas A&M at Qatar in December 2012. In spring 2013, Ghannam joined the graduate program in chemical engineering at Texas A&M at Qatar and performed his research under the supervision of Dr. Bruce Palmer and Dr. Ahmed Abdel-Wahab on the NPRP project, "Development of New Multifunctional Coating Systems for Protection Against Erosion and Corrosion in Qatar Oil and Gas Production," Ghannam successfully defended his master's thesis, "Study of Corrosion Resistance of Benchmark Coatings Using Electrochemical Impedance Spectroscopy" and will graduate in May 2015.

MKOPSC RESEARCH ON ADVANCED MATERIALS AND COATINGS FOR QATARI OIL AND GAS ENVIRONMENT

ABSTRACT: In recent years, Middle Eastern oil and gas producers have extended their activities to reservoirs that have increasingly higher hydrogen sulphide and carbon dioxide contents. To manage these changes in the oil and gas environment, new materials should be developed to withstand these harsh conditions. These materials have to be performant to ensure a safe and optimized exploitation of the oil and gas, but also they have to be economically viable. To respond to these challenges, researchers at Texas A&M at Qatar and MKOPSC-Q have engaged in corrosion related research projects under the sponsorship of the Qatar National Research Fund. This presentation will give an overview of two research projects:

- development of an economical high interstitial stainless steel alloyed with nitrogen and carbon with superior corrosion resistance to be used in downhole application
- development of a multifunctional internal coating for pipelines with high corrosion and wear resistance in sour environment.

Elaine Harbour
Head of Liaison
Middle East Health and Safety Executive/Health and Safety Laboratory

Elaine Harbour joined the UK Health and Safety Executive (HSE) in 1998 as a regulatory inspector. In addition to undertaking inspection, investigation and enforcement activity across a range of employment sectors Elaine has held a number of roles within HSE. She has been the HSE policy lead on investigation, which included developing HSE's response to major incidents and civil contingency events. Most recently she was responsible for coordinating the work of the 382 independent entities who share enforcement responsibility with HSE, developing a code to ensure they followed an evidence-led, risk-based approach to their regulatory activities. She moved to Dubai in 2014 to provide in-country liaison for HSE and HSL's work with governments across the Middle East.

THE ROLE OF SCIENCE IN THE REGULATORY PROCESS

ABSTRACT: This presentation focuses on the work of the UK's Health and Safety Laboratory, part of the Health and Safety Executive. It will set the context of the UK regulatory regime and outline the work of HSL and the role of good science in building and maintaining the regulatory process. It will provide examples where good science facilitates learning from the past, allows the protection of the present and prepares us for the future.

Larry Hudson
Vice President of Sales and Marketing
Senscient

Larry Hudson holds a mechanical engineering degree from Texas A&M University and currently serves as the vice president of sales and marketing with Senscient.

Hudson has spent most of his 30-year career focused on the oil and gas industry in areas that involve innovation, advanced technology and process safety.

Prior to Senscient, he worked with companies including Siemens, Audubon Engineering, Invensys and Nalco.

He has been fortunate to have been involved with technologies that have brought value and safety to the oil and gas industry. Some of these technologies include real-time optimization for refinery operations, risk analysis for pressure relief and flare header design, advanced technology for chemical control applications, and modular gas plant design technology.

Hudson has an interest in solutions that relate to process safety and has collaborated with the Mary Kay O'Connor Process Safety Council for seven years.

NEW TECHNOLOGY FOR TOXIC AND FLAMMABLE GAS DETECTION

ABSTRACT: Until now, industry norms for toxic gas detection have been limited to single-point detectors placed strategically throughout facilities. This is a suitable detection strategy provided the target gases come in contact with the detector and the detector is working properly.

In light of ever-increasing safety standards, higher involvement with hazardous gases and greater demands for risk reduction, Senscient has commercialized technology that greatly improves toxic and flammable gas detection. This technology employs tuned lasers for monitoring fugitive hydrocarbon gases and toxic gases across an open path. This "open path" detection complements single-point detection to significantly improve the early warning of a fugitive gas release, resulting in improved safety and decreased risk. This technology is ideally utilized to create a detection barrier around the perimeter of a plant, process unit or storage area.

This open-path gas leak detector has been developed using enhanced laser diode spectroscopy (ELDS). ELDS is an advanced, highly robust form of tunable diode laser absorption spectroscopy (TDLAS). ELDS gas detectors are capable of detecting even small fugitive leaks with absolute dependability and zero false alarms. This technology is the quickest, most sensitive and most reliable means of detecting gas leaks or releases that has ever been available.

Dr. Roy Johnsen
Professor of Corrosion and Surface Protection,
Norwegian University of Science and Technology
Qatar Petroleum Research & Technology Development

Dr. Roy Johnsen is currently working as professor in corrosion and surface protection at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. He defended his Ph.D. thesis within modelling of corrosion processes and protection at NTNU in 1985. He has more than 25 years of experience from the oil and gas industry working in both oil companies and service companies. His main focus areas have been corrosion and corrosion protection in seawater environments, hydrogen embrittlement and surface treatment/protection. During the last years his research has also been focused toward tribology and especially tribocorrosion in oil and gas environments. In 2004 he joined NTNU as professor.

Johnsen has published more than 100 papers in journals and on international conferences. He has been a member of NACE International since 1985 and is a member of the Norwegian Academy of Technological Sciences.

CORROSION AND HYDROGEN EMBRITTLEMENT IN PRODUCTION SYSTEMS — EFFECT ON PROCESS SAFETY

ABSTRACT: Corrosion is one of the biggest threats to degradation of metallic materials. For a production system, internal corrosion due to the composition of the fluid transported in the system can cause serious corrosion attacks. One main challenge with these attacks is that it cannot be seen until a leak (or failure) is observed. External corrosion is also a big problem, especially in connection with insulated systems. Corrosion under insulation (CUI) can proceed without being observed due to the fact that insulation prevents the corrosion attacks to be observed. The result is often a leak. A leak — either from internal or external corrosion — can have dramatic consequence both regarding safety, economy and pollution. Hydrogen embrittlement is another important threat to integrity of a component. Atomic hydrogen that is absorbed on a surface will diffuse into the metal and can weaken the metallurgical bonding of the metal lattice. The result is normally a crack/fracture followed by a leak. The most important hydrogen sources are well fluid containing H2S, galvanic corrosion and cathodic protection.

This presentation will focus on selected ongoing research activities related to optimization of material selection and use of coating to reduce the probability of initiation of corrosion and to prevent hydrogen embrittlement.

Mohamed Kazmi
Graduate Student — Master of Science in Safety Engineering
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M university at Qatar

Mohammad Kazmi is currently a graduate student in the Master of Safety Engineering graduate program at Texas A&M University. He joined the MS SENG program in November 2013, being the first student based at Texas A&M University at Qatar to register in this master's program administrated by the Texas-based Mary Kay O'Connor Process Safety (MKOPSC). Mohamed is currently preparing a thesis, "Dust Explosion Research: Application to Sulfur and Polyethylene." He is a member of MKOPSC-Q and works closely with the local industry on his research topic.

Mohammad holds a bachelor's degree in electrical and computer engineering from Texas A&M at Qatar with a minor in political science.

Mohammad is pursuing his NEBOSH certificates in oil and gas operational safety, environmental awareness and occupational health and safety.

DUST EXPLOSIONS HAZARD AWARENESS: POLYETHYLENE AND SULFUR DUSTS

ABSTRACT: Combustible dust explosions can lead to potentially catastrophic consequences. Looking at historical accidents, dust explosions have caused extensive property damage and fatalities in process plants. A study from the U.S. Chemical Safety Board showed that from 1996 to 2005, a total of 106 dust explosions resulted in 16 fatalities and 126 injuries, at an estimated cost of $162.8 million in damages to the facilities. Even if the dust explosion phenomena have been known for a long time (i.e., coal dust explosion), there still seems to be a lack of awareness on dust explosion hazards in the industry. Similarly dust explosion research received much less attention than flammable vapors and gas explosion.

Given the relevance of dust explosion research to the Qatar industry, mainly related to the safe operation of polyethylene and sulfur manufacturing processes, the Mary Kay O'Connor Process Safety-Qatar (MKOPSC-Q), under the drive of its local industrial steering committee, has decided to invest in combustible dust explosion research.

The presentation will provide an understanding of the phenomena associated to combustible dust explosions, illustrated with selected dust explosion incident cases. A description of the characterization techniques of key dust explosion properties (e.g., minimum explosion concentrations, minimum ignition energies and temperature) and their sensitivity to dust physical properties (concentration, particle size and moisture content) will be done. The last part of the presentation will provide an overview of the research progress on polyethylene and sulfur dust explosion performed at MKOPSC-Q.

Dr. Pascal Le Gal
Vice President, Division MEACIA, GEXCON

Dr. Pascal Le Gal is the vice president at GEXCON covering software sales, support and training in the Middle East, Africa, Caspian countries, India and Australia. Le Gal is based in the recently established GEXCON Dubai office. Prior to joining GEXCON, Le Gal was the regional manager Middle East for DNV GL. During his 10-year tenure at DNV and DNV GL he held a number of senior technical and commercial positions. Le Gal joined DNV September 2004 in London as a reliability consultant specializing in asset optimization and risk management. Then Le Gal transferred to the software business unit taking product management responsibility for the risk assessment and performance forecasting software tools. Since May 2010 Le Gal has been based in the Middle East and has worked with a number of local clients on oil and gas projects related to asset integrity, risk and reliability assessment, structural assessment and safety management. Le Gal also worked as a computational fluid dynamics (CFD) expert at Atkins and at the Ford Motor Company involved in process, safety and performance engineering projects and climate control systems design respectively. Le Gal brings more than 17 years of experience in the industry spanning from product development, product design, process safety and risk assessment, system performance optimization analysis, software sales and business development. He holds a Ph.D. and an M.Sc. from Cranfield University, UK, as well as an engineering degree in thermodynamics from INSA, Rouen, France.

3-D RISK MANAGEMENT FRAMEWORK FOR PROCESS SAFETY: BUILDING ON COMPUTATIONAL FLUID DYNAMICS"

ABSTRACT: Computational fluid dynamics (CFD) represents the current state of the art in consequence and risk assessment, accident investigation and optimization of safety measures for hazards that involve fluid flow with or without chemical reactions (e.g., fire and explosions). Realistic representation of flow-related accidental scenarios in complex geometries requires a sufficiently detailed representation of the boundary conditions, including the actual geometry. The use of less accurate methods should be discouraged, as results are calculated based on empirical correlations and extrapolation derived from a limited number of controlled experiments. The industry has invested, and continues to invest, significant resources in establishing detailed three-dimensional (3-D) geometry models for CFD simulations. At the same time, detailed and interactive 3-D viewers are available to design engineers and operators in the oil and gas industry. Such tools allow the users to get familiar with the installation, visualize and verify design options, quickly select optimum equipment layout and communicate changes.

Investing in 3-D models is not only beneficial for the CFD simulations required for quantitative risk assessment (QRA). It can also be used for reviewing complex design options early on in a project in an intuitive manner, communicate effectively potential safety concerns, investigate various operational issues, and develop emergency preparedness and emergency response plans.

The objective of the presentation is to outline the possibilities — and highlight some limitations — associated with the implementation of a 3-D risk management (3DRM) framework. Full implementation of a 3DRM system (Skjold & Siccama, 2013) in a process plant entails extensive use of a site-specific geometry model throughout the lifetime of the facility. The 3DRM concept may include various integrated applications for viewing and reviewing CAD models in a seamless manner, generating the scenarios to be considered as part of QRAs, post-processing CFD results, and easy display of results in the CAD geometry. The 3DRM system should also allow for semi-automatic inclusion of event frequencies, depending on equipment categories, from databases, personnel densities onsite and population distribution offsite, consequence models from a library of simpler and more advanced CFD models, to name a few.

The software and hardware technology required for implementing 3DRM is available today. However, the actual realization of 3DRM requires active involvement from a dedicated end-user. The 3DRM concept developed by GEXCON is a must have to predict the risks associated with process safety, as well as to facilitate the understanding of risks and increase knowledge in a visual and easy-to-grasp manner throughout the whole organization.

Dr. Sam Mannan
Regents Professor, Artie McFerrin Department of Chemical Engineering, Texas A&M University
Executive Director, Mary Kay O'Connor Process Safety Center, Texas A&M Engineering Experiment Station

Dr. M. Sam Mannan is Regents Professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University and director of the Mary Kay O'Connor Process Safety Center in the Texas A&M Engineering Experiment Station. Before joining Texas A&M University, Mannan was vice president at RMT Inc., a nationwide engineering services company. Mannan's experience is wide ranging, covering process design of chemical plants and refineries, computer simulation of engineering problems, mathematical modeling, process safety, risk assessment, inherently safer design, critical infrastructure vulnerability assessment, aerosol modeling, and reactive and energetic materials assessments. He was co-author of Guidelines for Safe Process Operations and Maintenance published by the Center for Chemical Process Safety of the American Institute of Chemical Engineers. He is the editor of the third and fourth editions of the three-volume authoritative reference for process safety and loss prevention, Lees' Loss Prevention in the Process Industries. Mannan has published 167 peer-reviewed journal publications, three books, seven book chapters, 183 proceedings papers, 12 major reports and 188 technical meeting presentations.

Mannan is the recipient of numerous awards and recognitions. In September 2011, the Technical University of Łódź in Poland conferred the Doctoris Honoris Causa on Mannan. In 2012, he was awarded the Bush Excellence Award for Faculty in Public Service.

Mannan received his B.S. in chemical engineering from Bangladesh University of Engineering and Technology (BUET) in Dhaka, Bangladesh, in 1978, and his M.S. in 1983 and Ph.D. in 1986 in chemical engineering from the University of Oklahoma.

PANEL DISCUSSION: WHY DO ACCIDENTS KEEP HAPPENING?

Dr. Tomasz Olewski
Associate Research Scientist
Mary Kay O'Connor Process Safety Center-Qatar

Dr. Tomasz Olewski is an associate research scientist at the Mary Kay O'Connor Process Safety Center-Qatar. He started his career in process safety in 2007 at the Department of Safety Engineering of Technical University of Lodz, where he was a faculty member and consultant of risk assessment for numerous large oil and chemical plants in Poland. He joined Texas A&M University at Qatar in 2009 to support a five-year project on LNG safety (involving laboratory and medium-scale experimental work) funded by the BP and greatly supported by Qatar Petroleum. He is currently leading research on LNG safety and risk assessment at MKOPSC and is involved in teaching the numerous process safety continuing education courses offered by the center.

Olewski holds a Ph.D. in chemical engineering, M.Sc. and Engineer Degree in environmental engineering, and diplomas in electrical and automatic engineering and safety in industrial processes.

APPLYING TECHNICAL RISK ASSESSMENT TO ACADEMIC RESEARCH

ABSTRACT: Risks associated with academic research are often perceived as much lower than the large-scale process industry. While the potential for losses may be lower at laboratory scale (because of much limited inventories), the number of reported lab accidents, with associated financial losses or even fatalities, all around the world show that there is a need to better control the risks associated to academic experimental research. This need was very strongly emphasized by the U.S. Chemical Safety Board following their investigation of major fatal laboratory accidents in the previous years.

Improving the risk control in laboratories starts by a solid understanding of the concepts of hazard and risk, which is often lacking in people who do not belong to the safety and process safety fields. While hazard corresponds to the potential for harm (usually independent of the scale), risk results from the combination of the severity and the likelihood of a hazard. The more the controls, prevention and mitigations methods in place, the lower the risks.

A variety of different hazards exist in academic and research laboratories at universities, and the risks associated with lab activities may be significant if not properly controlled. Yet the perception that such laboratories are "low risks" so inherently "safer" may mistakenly remain.

The presentation will discuss an approach to implement the principles of risk assessment, widely used in the process industry, in an academic environment through selected case studies.

Neil Prophet
Senior Partner
ioMosaic

Neil Prophet is a senior partner with ioMosaic and has more than 15 years experience in all areas of process safety, both in the U.S. and internationally. He has consulted, written, presented and taught in many areas of process safety, including quantitative risk analysis (QRA), consequence analysis and facility siting. His publications and presentations have been for AIChE, ASSE and ioMosaic's Training Institute, among additional relevant industry organizations. His consulting experience with regard to QRAs has covered natural gas transfer facilities, oil refineries, specialty chemical manufacturers and various operating facilities. Prophet also managed a risk study of a tank farm and wharf area that included a comprehensive QRA, HRA (health risk assessment) and SVA (security vulnerability assessment).

THE MECHANICS OF A QUANTITATIVE RISK ANALYSIS: BETTER UNDERSTAND YOUR RISKS

ABSTRACT: Quantitative risk analysis (QRA) as a technique for managing and understanding risks dates back to the 1970s, initially applied in the aerospace, electronics and nuclear power industries. During the 1980s the technique was refined and applied to the chemical and petrochemical industries.

Until recently, the level of detail of a QRA study has been limited by the availability of high-speed computing resources. Results for coarse QRA studies were typically presented in terms of overall individual risk, or societal risk, with little opportunity to segment or analyze the risk results in more detail.

This presentation outlines the main steps involved in conducting a QRA study, and the main inputs and outputs in such a study. It also discusses how closer examination of these results can enable risk analysts to better understand, manage, and mitigate risks at their facility to reduce the probability of initiation of corrosion and to prevent hydrogen embrittlement.

Asma Sadia
Graduate Student — Master of Science in Chemical Engineering
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M University at Qatar

Syed Quraishy
Loss Prevention Engineer
Applus+ VELOSI
Graduate Student — Master of Science in Chemical Engineering
Mary Kay O'Connor Process Safety Center-Qatar
Texas A&M University at Qatar

Syed Quraishy is working as a loss prevention engineer for Applus+ VELOSI. He is involved in several FEED and EPIC projects related to hydrocarbon, power and infrastructure industry for reputed clients, such as QP, Maersk Oil, Parsons, Mott MacDonald and RasGas. He is a TÜV (Rheinland)-certified functional safety engineer and has plans to gather versatile experience in process safety and risk engineering

After his bachelor's degree in chemical engineering from BUET, he worked for Chevron Bangladesh (2009-2012) where he gathered experience in design, safe operation, troubleshooting and HSE management systems. In 2012, he joined the graduate program in chemical engineering at Texas A&M University at Qatar and the Mary Kay O'Connor Process Safety Center-Qatar as a graduate research assistant. His research work, sponsored by BP Global Gas SPU and in collaboration with Qatar Petroleum, has been focused on the vaporization rate modeling due to accidental spill of cryogenic liquid over solid substrate. He is currently completing his master's degree.

Asma Sadia is currently a graduate student in the Master of Science in Chemical Engineering Program at Texas A&M University at Qatar. After completing her Bachelor of Science in chemical engineering from the same university in spring 2013, she joined the chemical engineering graduate program in August 2013 and has since worked as a graduate research assistant in the Mary Kay O'Connor Process Safety Center-Qatar (MKOPSC-Q). Her research focus is on the experimental study of the vaporization of cryogenic liquids on solid substrates as part of a major research project funded by the Qatar National Research Fund (QNRF), "Source Term Modeling of LNG Vapor Formation by Experimental Investigation and CFD Simulation."

She successfully defended her master's thesis in February 2015 and plans to pursue her doctoral studies in chemical engineering with a focus on the energy-water nexus. She recently won a 2015 Qatar Energy R&D ORYX GTL Student Award that recognizes master's and Ph.D. candidates or recent graduates for their outstanding research achievements as part of studies that could impact industry in Qatar.

She is the vice president of the Chemical Engineering Honor Society (OXE) and is a member of Honor Society (PKP), Engineering Honor Society (TBP), American Institute of Chemical Engineers (AIChE) and MKOPSC-Q.

CONTRIBUTION OF APPLIED EXPERIMENTAL RESEARCH TO THE ASSESSMENT OF THE RISKS ASSOCIATED TO THE LOSS OF CONTAINMENT OF LNG ON LAND

ABSTRACT: Qatar, as the world's largest LNG exporter, has played a key role in the global LNG trade by accounting for about 32 percent of the global LNG exports and helped in achieving the highest global trade growth increment of 2.7 percent. Many safety challenges are associated with the production, handling and transportation of LNG due to its hazardous properties (flammable and cryogenic liquid). In particular, the assessment of the risks associated to the loss of containment of LNG on land or water (in terms of severity and frequency) are of utmost importance for the safety of LNG production and transportation facilities. The evaluation of the severity of a loss of containment event starts by the prediction of the vapor generation rate (source term) and the dispersion of the flammable vapor. While significant research efforts have been invested on dispersion modelling, there is a lack of extensive research on source term, which affects the quality of dispersion model predictions and subsequently the risk assessment. This presentation gives an overview of the research work performed at the Mary Kay O'Connor Process Safety Center-Qatar that aims to fill the research gaps in source term modeling for LNG spills on land. A particular emphasis will be put on the part of the work that focuses on the experimental measurement of the conductive heat transfer mechanism from the ground to the liquid pool and its modeling. Selected experimental results obtained at small scale (laboratory) and medium scale (wind tunnel at Ras Laffan Industrial City) on the effect of type of cryogenic liquid (pure or binary mixture), type of solid substrate (high vs. low conductivity) and ground surface roughness on the vaporization rate of a cryogenic liquid will be shown.

Mike Snakard
Managing Director
Snakard Consulting Group LLC

Mike Snakard is the managing director of Snakard Consulting Group LLC, a specialty consulting company focused on providing high-end consulting services in the areas of health, safety, security, environment, risk assessment and loss prevention. He got involved in process safety management after the Phillips 66 Explosion in Pasadena, Texas, in 1989 and was involved in the redesign of that facility following the principles of process safety management. He was the acting process safety management coordinator at the major refinery in California in the 1990s and spent six years in Qatar as vice president and country manager for a major A&E firm focusing on EHS-related issues. He started his own company in 2013 and has provided process safety management consulting services and training to companies around the world. Snakard has a B.Sc. in chemical engineering from Villanova University (1988) and an MBA from the University of Houston (1995).

ASSESSING YOUR MANAGEMENT OF CHANGE PROCESS

ABSTRACT: Change happens. Whether it be physical modifications to the process, changes in modes of operation, software updates, or personnel or organizational restructuring, change introduces risk into process operations. The management of change (MoC) element within a process safety management (PSM) program provides a mechanism whereby the risks potentially introduced by change can be assessed and, if required, mitigated. How well a facility manages change within the organization and within the operating plant can be assessed through their PSM auditing and measurement and metrics programs.

The auditing of a company's MoC program and the use of key performance indicators (KPIs) for measurement and metrics does not follow a one-size-fits-all philosophy. Rather, to get the most benefit from an internal audit, and from the use of KPIs specific to the MoC process, these efforts must be tailored to the maturity and effectiveness of the company's MoC process.

This presentation will discuss internal audit techniques to specific to a company's MoC process and propose KPIs to measure performance to maximize the benefits of these efforts, whether your MoC process is in an early stage of development or is highly developed and perceived to be highly effective.

The purpose of this presentation is to provide companies with a road map for auditing and measuring performance of their MoC process regardless of the maturity and the level of confidence the company has in the effectiveness of the program.

Dr. Aubrey Thyer
Principal Consultant
DNV GL, Manchester

Dr. Aubrey Thyer is a principal consultant working for DNV GL at their Manchester office in the UK. He has 25 years experience of conducting technical safety studies, practical fire and explosion testing, and incident investigations, gained while working for the UK Health & Safety Executive. For his last five years of employment in HSE, he was one of Her Majesty's inspectors of health and safety in HSE's Offshore Division, covering fire, explosion and risk-assessment issues.
His major work areas have been offshore and nuclear safety, fire safety, practical fire and explosion testing, U.N. Dangerous Goods classification and testing, chemical/process safety studies and incident investigation.
As well as working in the UK, he has played major roles in the development of safety management systems and procedures for the global mining industry, and the development of international standards and guidance documents. His incident investigations or technical studies have also required him to appear as in court in the UK, Hong Kong and Ireland.

FURTHER ANALYSIS OF AN OFFSHORE FIRE INVESTIGATION USING SCAT

ABSTRACT: This presentation covers the findings of a fire investigation that occurred as a result of the overbunkering of oil used in the production of oil-based drilling muds.
In common with many incidents, the overbunkering and subsequent fire occurred as a result of the failure of multiple barriers, including hardware, programmable elements and procedural controls. These failures are examined to build a picture of the sequence of events leading to the fire, along with the probable ignition mechanism of the oil.
The barriers are first examined in the context of a standard Bowtie analysis to identify escalation factors associated with deficiencies in barrier performance as a means of providing a picture of the incident to show how such multi-element failures can occur.
Following this initial analysis using a Bowtie approach, the barriers were analysed using the DNV GL SCAT (systematic causal analysis technique) charts to the identify which were effective, partially effective or which failed, as well as identifying the underlying root causes of the incident in an industry standard format.

Hervé Vaudrey
Regional Director EMEA, France
Chilworth — a DEKRA company

Hervé Vaudrey graduated as an Engineer ESPCI (Physics & Chemistry Paris) in 1993. Prior to joining Chilworth in 2004, Vaudrey worked for 10 years in the chemical industry (Rhone-Poulenc and Rhodia) undertaking process safety audits, risk analysis (HAZOP, dust explosion assessments), incident investigation, process safety education and process safety laboratory management. In 2004, he joined Chilworth France as technical director growing quickly this start-up. End 2008, he became the European director for Chilworth Global, supervising all the European subsidiaries of Chilworth Global in England, France, Germany, Italy, Spain, Netherlands and the activities in Turkey, Middle East and Africa. Since the acquisition of Chilworth Global by DEKRA in August 2011, he is the regional director EMEA of the process safety business line of DEKRA Industrial, a fast-growing group of more than 100 people dedicated to process safety services.

His main areas of expertise are process safety management, gas and dust explosions, electrostatics hazards, thermal hazards and risk analysis. Vaudrey has led numerous industrial incident investigations especially pressure events, dust and gas explosions of electrostatic origin, self-ignitions and thermal runaways. He is an experienced lecturer in a wide range of process safety subjects in the past 15 years. He has given more than 100 process safety trainings and lectures worldwide (France, UK, Spain, Germany, the Netherlands, India, China, UAE, Saudi Arabia) in French, English and Spanish, many under the Chilworth Process Safety Academy. He is also an active member of CCPS Europe.

ORGANIZATIONAL CAPABILITY AND CULTURE: THE TWO CRITICAL PILLARS OF ANY SUCCESSFUL PSM IMPLEMENTATION

ABSTRACT: Each PSM model identifies a number of PSM elements that comprise essentially a checklist of activities suggested for organizations wishing to manage process hazards. Most hazardous process industries have adopted one or more versions of these models, and yet we continue to see many serious and catastrophic incidents each year. The piecemeal approach reflected in any of the PSM models is a root cause of our limited progress in reducing process incidents. The activities, typically identified as PSM program elements, are not independent but rather must be glued together by two overarching elements that determine their value and sustainability: capability and culture.

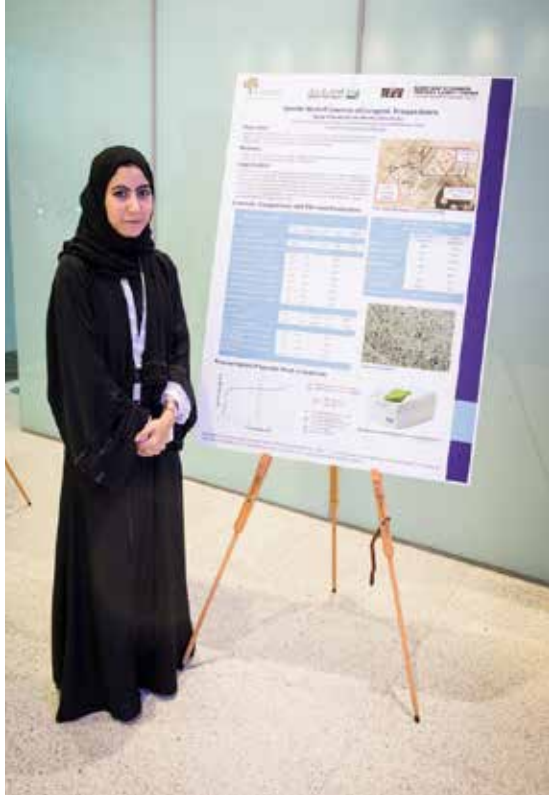
Through several real examples of poor and best practices, gained during various process safety assessments in small to very large organizations from various sectors of the process industry (petrochemicals, chemicals, oil and gas), the aim of this talk is to exemplify the critical role of those two pillars in ensuring that a PSM implementation is really effective in reducing process safety events.

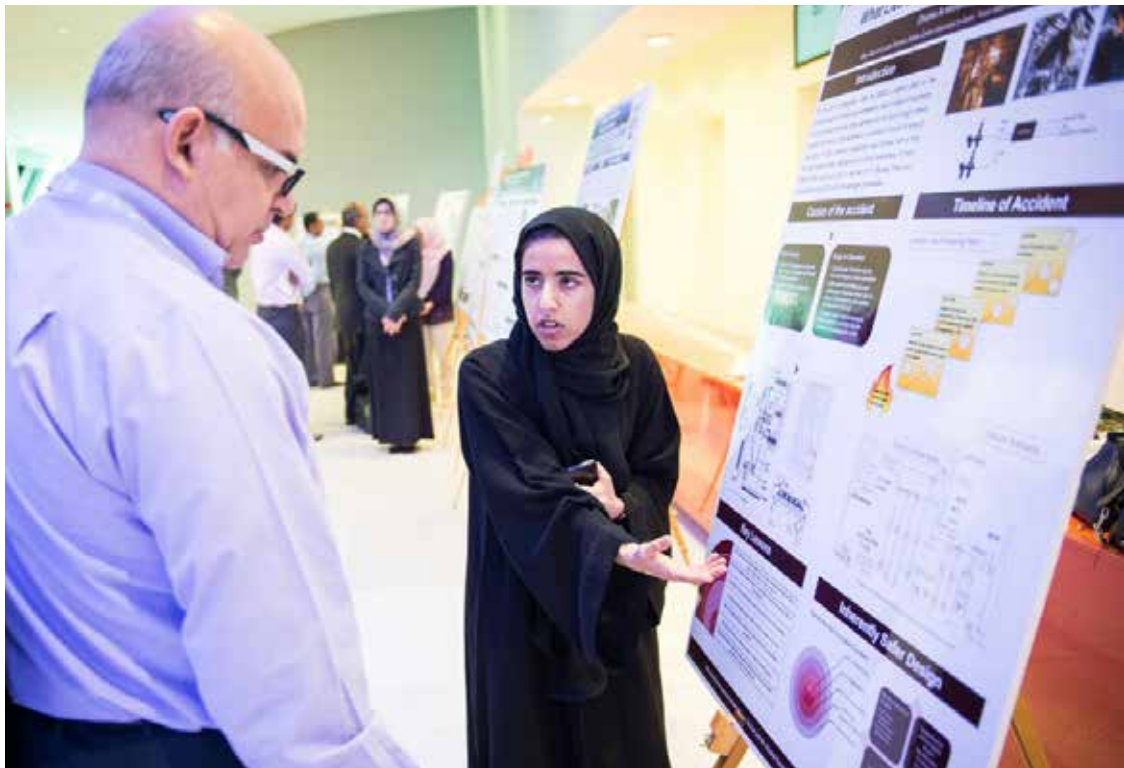
Dr. Luc N Véchot
Assistant Professor of Chemical Engineering,
Texas A&M University at Qatar
Managing Director, Mary Kay O'Connor Process Safety Center-Qatar
Chairman, Qatar Process Safety Symposium Organizing Committee

Dr. Luc Véchot is an assistant professor of chemical engineering at Texas A&M University at Qatar and the managing director of Mary Kay O'Connor Process Safety Center-Qatar. He obtained a Ph.D. in chemical engineering from the École Nationale Supérieure des Mines de Saint-Étienne (France) in 2006. In 2007, He joined the Fire and Process Safety Unit of the Health & Safety Laboratory (HSL) in Buxton, UK, as a process safety engineer. Véchot joined the faculty at Texas A&M University at Qatar in 2010 where he took over the lead of the process safety research and teaching activities at the university.
Véchot has worked on process safety related research topics for the past eight years in collaborations with universities, public laboratories and industries. He focused his researches on exothermic reaction hazards and calorimetric hazard screening techniques, runaway reactions and adiabatic calorimetry, pressure relief design applications for untempered peroxide systems and accidental releases of water reactive chemicals.
Véchot has been the chairman of the Qatar Process Safety Symposium organizing committee since 2011.

HOW CAN ACADEMIA INFLUENCE A SAFETY CULTURE?

Abstract: Teaching process safety in engineering curriculum in general and in chemical engineering curriculum in particular is becoming more crucial, giving the worldwide advancement and developments in process industries. While conventional courses on chemical process safety are a very good way of providing the fundamentals of process safety to engineering students, involving these students into process safety related research activities is a wonderful opportunity to plant the seeds of a long lasting safety culture. This presentation discusses the experiences gained from teaching process safety via research to chemical engineering student at Texas A&M University at Qatar under the umbrella of the Qatar branch of the Mary Kay O'Connor Process Safety Center.





LIST OF POSTERS

Apply Fundamental Studies to Elucidate the Protection Mechanism(s) to Make Intelligent Choice for Coatings in Oil and Gas Applications
Nasser Al Jassem, Elizabeth Sikora, Barbara Shaw, Brajendra Mishra, Bruce R. Palmer and Luc Véchot

Small-scale Experimental Study of the Vaporization of Cryogenic Liquid on Solid Substrates
Asma Sadia, Tomasz Olewski, Luc Véchot

Study of the Corrosion Resistance of Benchmark Coatings Using Electrochemical Impedance Spectroscopy (EIS)
Safwan Ghannam, Nasser Al Jassem, Walid Khalfaoui, Bruce R. Palmer

Study of Dust Explosion — Application to Polyethylene and Sulfur Manufacturing Industry
Mohammad Kazmi, Jack Atwal, Tomasz Olewski and Luc Véchot

Development and Characterization of High-strength Steel for Downhole Application in Sour Environment with Superior Corrosion and Wear Resistance
Walid Khalfaoui, Eun Kyung Lee, Nasser Al-Jassem, Brajendra Mishra, Bruce R. Palmer

Thermal Decomposition Phenomenon of Cumene Hydroperoxide Under Runaway Conditions
Nepu Saha, Tala Refka, Atif Mohammed Ashraf and Luc Véchot

Dynamic Modelling of the Venting of a Reactor Vessel Containing an Organic Peroxide Under Runaway Conditions
Rym Kanes, Marcelo Castier and Luc Véchot

Study of toxic gas ingress in a non-process area
Atif Ashraf, Konstantinos Kakosimos and Luc Véchot

Computational Modeling for Dense Gas Dispersion For Variable Stability Classes
Mohamed Amine Chakroun, Kakosimos Konstantinos, Luc Vechot

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