

3rd Process Safety Management Mentoring (PSM2) Forum 2014

**Topical Conference at the 2014 AIChE Spring Meeting and 10th
Global Congress on Process Safety**

**New Orleans, Louisiana, USA
30 March - 3 April 2014**

ISBN: 978-1-63439-160-3

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact AIChE
at the address below.

AIChE
3 Park Avenue
New York, NY 10016-5991

Phone: (203) 702-7660
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

(1a) Possible vs. Practical: Engineers Must Lead the Development of Practical Technologies	1
<i>William Banholzer</i>	
(18a) Process Safety in the Classroom: The Current State of Chemical Engineering Programs at US Universities	2
<i>Sean J. Dee, Brenton L. Cox, Russell A. Ogle</i>	
(18b) PSM - Just a Job, or a Calling?	10
<i>Claire Fluegeman</i>	
(18c) Preparing and Presenting a College Workshop on Process Hazard Analysis	11
<i>Wayne Buck, David J. Dixon</i>	
(46aa) How to Better Manage the Combined Effects of Barrier (IPL) Impairment and Ongoing Work Hazard Risks	12
<i>Mike Neill</i>	
(46ae) Comparative Consequence Analysis Between LNG Import and Export Terminals through the Use of PHAST and GIS	13
<i>Guido Lamus, Bilkis Islam, Sonny Sachdeva, M. Sam Mannan</i>	
(46ah) Challenges of Explosion Risk Management in Artic Environments	14
<i>Derek M. Engel, Are Brattetrig, Tom Debold, Scott G. Davis</i>	
(46b) Experimental Study On The Relationship Between The Charge Amount Of Polypropylene Granules and Electrostatic Discharges While Silo Loading	15
<i>Kwangseok Choi</i>	
(46e) Management of Change at Shell	24
<i>Soy Tir</i>	
(46f) Inherently Safer Design: Lessons Learned about the Principle of Simplification	25
<i>Russell A. Ogle, Andrew R. Carpenter, Sean J. Dee, Brenton L. Cox</i>	
(46g) On What Do You Base the Safety of Your Process	33
<i>John Wincek</i>	
(46i) The Need for a Unified Process Safety Map	44
<i>Teddy Bucher, John T. Perez</i>	
(46j) How Is Your Process Safety Vision? - Try Pursuing “Perfect Process Safety”	45
<i>Steve Arendt</i>	
(46k) Using Metrics to Improve Emergency Management	46
<i>Rixio E. Medina</i>	
(46l) Flame Propagation in Dust/Air Mixtures Under Reduced Pressure Conditions	47
<i>Hannes Kern, Gerald J. Wieser, Harald Raupenstrauch</i>	
(46n) Using Incident Risk Analysis to Learn from Near Misses	57
<i>Sharon K. Tinker</i>	
(46r) Use of Kpi's for Process Safety	69
<i>Prasad Goteti</i>	
(46s) Pssr: The Easiest and Sometimes Forgotten PSM Element	70
<i>Brian D. Rains</i>	
(46u) Kinetic Identification and Risk Assessment Based on Non-Linear Fitting of Calorimetric Data	71
<i>Charles Guinand, Michal Dabros, Bertrand Roduit, Thierry Meyer, Francis Stoessel</i>	
(46x) Integration of Learned Knowledge into the Technical Information System	86
<i>Craig A. Richardson</i>	
(46y) Control Systems Integrity Review - Selective Application of Controls Systems HAZOP (CHAZOP) Study	87
<i>Steven T. Maher, David Bent, Whye Foong, Senem Weaver, Stephanie Smith</i>	
(47f) Are We in Control of Our Safety Critical Equipment in Drilling Operations?	88
<i>Claudio Castaneda, Luis Rincon</i>	
(49b) Development of Low-Charring Nanocomposites to Aid in Fundamental Understanding of Nanocomposite Flame-Retardancy	92
<i>Logan Hatanaka, Sonny Sachdeva, Agustin Diaz, Zhengdong Cheng, Qingsheng Wang, M Sam Mannan</i>	
(43a) Best Practices in IPL Integrity Management - Case Study in Kuwait Oil Company	101
<i>Chandra Seethepalli</i>	
(47a) Multiple Perspectives on the Role of Safety Leadership in Major Hazard Organisations	102
<i>Julie Bell, Waddah Ghanem, Chrysanthi Lekka</i>	

(47ab) Using Explicit Finite Element Analysis to Simulate the Dynamic Response and Predict the Structural Damage Associated with a Real-Life Process Equipment Failure Due to an Internal Detonation	103
<i>Phillip E. Prueter</i>	
(47ac) Analysis of the Potential Energy Sources of Risk of Tools in Presence of Hazardous Area in Segment of Oil and Gas	117
<i>Leandro Erthal, Caetano Moraes, Denize D. Carvalho</i>	
(47ad) Increase Hazard Discovery and Minimize Errors in Your Process Hazard Analyses, a Graph Theoretical Approach	133
<i>Riffat Qadir</i>	
(47af) Deflagration Incident Case Review	151
<i>Amy Theis, Timothy Cullina, Zachary Hachmeister</i>	
(47ag) Enhanced Lessons Learned Approach from the Bscat Investigation Approach	152
<i>Robin Pitblado, Richard Green, Kate Ascher</i>	
(47ah) Death of "Landlord" or Collapse of "Tomb", Which Matters More? - Some Perspectives of Engineering Ethics and Engineering Philosophy on Enterprise Global Risk Management	153
<i>Long Zhang</i>	
(47aj) New Tools to Aggregate Operational Risk Across an Enterprise of Assets and to Help Govern This Risk through Policy Which Can be Directly Linked to Front Line Decision Making	154
<i>Mike Neill</i>	
(47al) Inherently Safer Design Of Stirred Reactors and Visimix® Modeling Software	155
<i>Yuri Nekhamkin, Leonid Braginsky, Yuri Kokotov</i>	
(47am) An Easy and Accurate Design Of Safety Relief Valve Inlet Piping Systems For Gas/Vapor Relief	168
<i>Guibing Zhao</i>	
(47ao) Off-Gas Flammability Control for a High Level Nuclear Waste Glass Melter System Based on Process Modeling and Pilot Testing	182
<i>Alexander S. Choi</i>	
(47ap) Advancing Process Safety - Major Impact "One "Step at a Time"	183
<i>Keith Lapeyrouse, Sam Solomon</i>	
(47as) "Reducing the Frequency and Lowering the Severity of Human Error: Optimize Performance"	202
<i>Tom Harvey</i>	
(47au) Management of Process Safety Performance Indicators	204
<i>Abdul Aldeeb, Vivek Sud</i>	
(47av) Improving Process Safety Performance for Mature Asset By Implementing of the Process Safety Key Performance Indicator	205
<i>Margaretha Thaliharjanti, Frik Febby</i>	
(47aw) An Innovative Work Flow for Performing Overpressure Protection Analysis Incorporating Process Simulation, Pressure Relief Valve Sizing, and Flare System Analysis	206
<i>Wilfried Mofor, Nick Brownrigg</i>	
(47ax) Risk Based Inspection Applied at Aging Chemical Facilities	207
<i>Jonas Duarte</i>	
(47az) Identifying Early Indicators of Incidents through Near-Misses	208
<i>Deborah L. Grubbe, Ankur Pariyani, Ulku Oktem</i>	
(47b) A Methodology to Determine the Minimum Number of Pha's for Projects	209
<i>Humbert Joseph Howard III</i>	
(47ba) "People" Means Leadership, NOT Simply Mean People - 4 New Dimensions of Process Safety Competency	218
<i>Long Zhang</i>	
(47bc) Evaluating The Need For Depressuring Systems - A Methodology	236
<i>Neil Prophet, Dave Gaydos, John Paschall</i>	
(47bd) The Capability-Demand Gap In US Refining and Petrochemical Console Operations	237
<i>George Dzyacky</i>	
(47be) Process Safety Management (PSM) In Pilot Plants and Research Laboratories	241
<i>Kabier Moideenkutty</i>	
(47bf) Resolving Inherently Safer Design Conflicts with Decision Analysis	242
<i>Russell A. Ogle, Sean J. Dee, Brenton L. Cox</i>	
(47bj) Operating Safely through Integrated Process Safety Management	243
<i>Alfonsius Ariawan</i>	
(47bk) Improving PSM Performance through Workforce Culture Assessment	248
<i>Carl Green</i>	

(47bl) Tracking Instrumentation and Controls Reliability	249
<i>Shane Pirtle, Brant Smith, Ad Arnold, Dr. Angela E. Summers</i>	
(47bm) PSSR: The Easiest and Sometimes Forgotten PSM Element	250
<i>Brian D. Rains</i>	
(47bn) Guidelines for Pressure Relief and Effluent Handling Systems, 2nd Edition	262
<i>Georges Melhem, Harold Fisher, Albert Ness</i>	
(47bo) Journey to World Class through Capability Development	263
<i>Lawrence S. Short</i>	
(47bp) Incident Lessons Learned Portal	264
<i>Marco Vela</i>	
(47bq) A Functional System Approach to Criticality Analysis, Fsca	265
<i>Tacoma Zach</i>	
(47br) Can Black Swans be Red Herrings?	268
<i>Stephen Shaw</i>	
(47bs) Emergency Response Plan: It's Above and Beyond Best Practices	269
<i>Sarah Acton, Najmeh Vaez, Suresh Yelisetty, Dennis Butts</i>	
(47bt) Process Safety Hazard Management Plan : Help You in Sustaining Production and Preventing Losses	270
<i>Margaretha Thaliharjanti</i>	
(47bw) Process Risk Assessment and “Safe Area” for a Petro-Chemical Plant in China	271
<i>Jing Yu, S. Dharmavaram, Jiming Wang</i>	
(47bx) Identifying and Quantifying MAJOR Hazard for Platforms Deck Raising Using Synchronous Hydraulic Jacking System	272
<i>Akhmad Harmantoro, Margaretha Thaliharjanti</i>	
(47by) A Creative & Strategic Initiative (Champions Model) In Managing Process Hazard: Process Safety Culture	286
<i>Sharad Rathore</i>	
(47c) Defining Dust Hazard Areas	287
<i>Michelle Murphy</i>	
(47ca) Challenges and Achievements in Implementing Management of Change System at Binh Son Refinery (BSR), Vietnam	288
<i>Bong Nguyen Thanh</i>	
(47cd) Process Safety Culture Applied in Latin America Oil and Gas Industry: Experiences in Ecopetrol Colombia	295
<i>Oscar Barajas</i>	
(47cf) Ammonium Nitrate Condition-Dependent Thermal Decomposition	296
<i>Zhe Han, Sonny Sachdeva, Maria Papadaki, M. Sam Mannan</i>	
(47cg) CFD Modeling for Prediction and Prevention of Runaway Reaction	297
<i>Edna Méndez, Yi Liu, M. Sam Mannan</i>	
(47ch) Sensitivity Analysis of Variables Affecting the Runaway Decomposition of Dicumyl Peroxide	298
<i>Olga Reyes-Valdes, Valeria Casson-Moreno, Luc Vechot</i>	
(47ci) Beyond Phi Factor: Qualified Experimental Data for Emergency Relief Sizing	299
<i>Guibing Zhao</i>	
(47cj) The Effect of Non-Uniform Distribution of Obstacles on Deflagration-to-Detonation Transition (DDT)	313
<i>Camilo Rosas, Hao Chen, Eric L. Petersen, M. Sam Mannan</i>	
(47ck) Dispersion Modeling of a Cloud Generated By Depressurization of a Flashing Multi-Component Liquid System	314
<i>Laurent Nouailhetas, Ralph Mancik</i>	
(47cl) Quantitative Analysis of Environmental and Societal Risk for Onshore FUEL Pipelines	327
<i>Alexander Gutierrez, Lina Parra, Maria Camila Suárez, Felipe Muñoz</i>	
(47cm) Characterization Of Vaporization Rates Of Liquid Nitrogen On Water and Ice	329
<i>Nirupama Gopaldaswami, Luc Vechot, Tomasz Olewski, M. Sam Mannan</i>	
(47cn) Consequences Analysis Associated with the Failure of the Safety Interlock System of Methanator (I-351) of the Ammonia Plant of Fertilizantes Nitrogenados De Venezuela, C.E.C. (FertiNitro)	342
<i>Ruben Garcilazo Sr., Juan Duarte Sr.</i>	
(47cq) Building Siting Evaluation: A New Software Tool for the Determination of Blast Loads from Potential Vapour Cloud Explosions (VCEs)	344
<i>Kehinde Shaba, Nic Cavanagh</i>	

(47cr) Modelling of Time-Varying Dispersion from Ground-Level Liquid Pools or Vapour Area Sources	345
<i>Henk W. M. Witlox, Mike Harper, Maria Fernandez</i>	
(47cu) Nanotechnology on Removing Arsenic Using Modified Carbon NANO- Tubes (MCNTs)	360
<i>Ahmed Ashiq</i>	
(47cv) Possible Two Physical Hazard Scenarios for Polystyrene Foams, Based on Life Cycle Stages	361
<i>Toyoaki Nakarai, Satoru Yoshino, Atsumi Miyake</i>	
(47cw) Problems Encountered in the Development of a Process Safety Climate Tool	375
<i>Julie Bell, Sarah Binch, Caroline Sugden</i>	
(47d) Upper Explosible Limits for Combustible Dusts	376
<i>Richard Prugh</i>	
(47e) Agglomeration Effect on Combustion and Explosion Properties of Nanoparticles	377
<i>Jiaqi Zhang, Yi Liu, Hao Chen, M. Sam Mannan</i>	
(47g) Shock Interaction with Dust Layers for Different Mach Numbers and Dust Layer Depths	390
<i>Amira Yousuf Chowdhury, Brandon Marks, H. Greg Johnston, Eric L. Petersen, Dr. Sam M. Mannan</i>	
(47h) Numerical Simulation of Cryogenic Boiling	391
<i>Monir Ahammad, Yi Liu, Samina Rahmani, Luc Vechot, Sam Mannan</i>	
(47i) Homogenous-Gaseous and Particle-Gas-Air Combustion in Turbulent Environment: Analytical Formulation and Experimental Validation	392
<i>V'Yacheslav Akkerman, Ali S. Rangwala</i>	
(47j) Application of Leading and Lagging Indicators to Improve Laboratory Operation Safety	393
<i>Tianxing Cai, Qiang Xu</i>	
(47q) Graphic Visualization of IPL Status Enables Better Judgement of Inspection, Maintenance and Repair Priorities and Helps Day to Day Assessment of Operational Risk and Work Management Decisions	394
<i>Mike Neill</i>	
(47r) 2. Successes in Implementing PHA/HAZOP/LOPA in Major Capital Projects in a Steel Company	395
<i>William Bridges</i>	
(47s) Liquid Fuels Release Rate Calculation in Transport Pipelines with Complex Topographical Conditions	396
<i>Carlos A. Manjarres, Jaime E. Cadena, Felipe Munoz</i>	
(47t) Decision Tree to Optimize NFPA 30 Criteria in Fire Protection Systems Applied in Oil and Gas Industry	397
<i>Oscar Barajas</i>	
(47u) Sil Determination of High Integrity Pressure Protection System (HIPPS)	398
<i>Frik Febby, Margaretha Thaliharjanti</i>	
(47w) Comparison of Different Methods to Determine the Activation Energy of Flammable Dusts Mixed with Inert and Inhibitory Materials	399
<i>Christoph Wanke</i>	
(47x) Economical Approach Quantification of Impacts in Major Accidents	400
<i>Alexander Gutierrez, Carlos A. Manjarres, Felipe Muñoz</i>	
(47z) Application of Consequence Analysis in the Development of Emergency Response Plans for Accidental Events in Liquid Fuels Transport Pipelines	402
<i>Carlos A. Manjarres, Alexander Gutierrez, Felipe Munoz</i>	
(53a) How to Influence the Organization	403
<i>John Wincek</i>	
(53c) Blah, Blah, Blah!!! - Effective Individual and Team Communication Lead to Effective PHAs	420
<i>John T. Perez, Ashley Bourne, Andrew Madewell</i>	
(67a) Process Safety Performance Management – a Strategic Approach for Sustainable Improvement	436
<i>Steve Arendt</i>	
(67b) Systematic Analysis and Learning from Process Safety Incidents	437
<i>Stephen James, Fazle Rabbi, Qingsheng Wang</i>	
(67c) “All in” Means “All the Time”	447
<i>Jennifer Mize</i>	
(80a) Typical Elements of Process Safety Management	458
<i>Flavio L B Diniz, Nilda Visco, Tatiana Cordeiro</i>	
(80b) Safety Leadership & Implementation – Independent of Culture	474
<i>Kumar (Chris) Israni, Tianherng (Joshua) Yang, Sarah Acton</i>	
(80c) The Legal Requirements Of The PSM Standard: Finding Your Way	484
<i>Michael T. Taylor</i>	

(103a) Keys to Avoid Making a Dog's Breakfast out of Your MOC System	493
<i>Tim Waugh, Revonda Tew, Mathew Laplante, Dan Pastirik</i>	
(103b) Mechanical Integrity 101 for Process Safety Professionals	511
<i>Robert C. Smith</i>	
(103c) Enabling Performance Management – Producing Vs. Collecting Metrics Data	518
<i>Alfonsius Ariawan</i>	
(111a) Compliance: The Necessary Evil	528
<i>Brian D. Rains</i>	
(111b) Engaging Senior Management In Process Safety: A Case History	536
<i>David J. Kamrath</i>	
(111c) Engaging Employees in Catastrophic Event Prevention	546
<i>Greg Robinson</i>	
(133a) Assessing the Correct Risk in a PHA	554
<i>Jack Chosnek</i>	
(133b) Perspectives on Ragagep	563
<i>Lisa Long, Mike Marshall, Jeffrey Wanko, James Lay</i>	
(133c) Relief Systems Design: Simplifying Assumptions Gone Wrong	564
<i>Nicholas N. Cristea, Jason F. White</i>	
(135a) Executive Order Panel	575
<i>Lisa Long, Scott Breor, Kim Jennings</i>	
(135b) What Have We Really Learned? (25 Years After Piper Alpha)	576
<i>Mike Broadribb</i>	
(135c) Lac Mégantic Accident: What We Learned	593
<i>Jean-Paul Lacoursiere</i>	
(135d) Case Study of the Domino Effect in a Catastrophic Solid Oxidizer Fire	621
<i>Russell A. Ogle</i>	
(135e) Complex Explosion Development in Mines: Case Study - 2010 Upper Big Branch Mine Explosion	632
<i>Derek M. Engel, Scott G. Davis, Kees Van Wingerden</i>	
Author Index	