

Perspectives on Process Safety from Around the World 2015

**Topical Conference at the 2015 AIChE Spring Meeting and 11th
Global Congress on Process Safety**

**Austin, Texas, USA
26-30 April 2015**

ISBN: 978-1-5108-0687-0

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© (2015) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2015)

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

Chemical Engineering: Is This the Golden Age?	1
<i>Marvin O. Schlanger</i>	
(7a) Development and Research Activities of Advanced System Safety Laboratory for Safety Education/Culture	2
<i>Atsuko Fumoto, Kazuhiko Suzuki</i>	
(7b) Development of Quantitative Hazard Analysis Method for Inherently Safer Chemical Processes	12
<i>Yuto Mizuta</i>	
(7c) Challenge of Mitsubishi Chemical's Process Safety	25
<i>Masaki Nakagawa</i>	
(61a) Aplicación de Análisis de Causa Raíz y Acciones – Basadas en Análisis de Pareto, Como Herramientas para Reducir LOPC Ocotlan – MEXICO	35
<i>Hugo Hernandez</i>	
(34a) Observaciones Preventivas de Seguridad e Indicadores Como Herramientas de Seguridad de Procesos	49
<i>Ricardo Ceskiavikus, Luis Landa</i>	
(61c) Incidentes Ocurredos En La Industria Del GNL	63
<i>Juan G. Haitzaguerre</i>	
(70aa) Product Failure Rates Vs Site-Specific Failure Rates: Implications for Safety	83
<i>Julia V. Bukowski, William M. Goble, Iwan van Beurden</i>	
(70ad) Exploring Dependencies of Ignition Locations on Probabilistic Explosion Analysis	101
<i>Benjamin Poblete, Scott Klare, Advait Sane, Bharat Tulsyan, Michael Stahl, John Johnson, Andrew Staszak</i>	
(70ae) Process Safety Near-Miss Management System in Takreer Ruwais Refinery: An Effective Tool for Applying Prevention Strategies	102
<i>Debasish Kakoty, Jassim Jawas</i>	
(70af) How Having Updated Heat & Material Balances Commits to Process Safety	103
<i>Nicholas N. Cristea, Dustin J. Smith, Dick A. Baum, Juan Lopez</i>	
(70ai) Safety Culture and Leadership- Independent of Language	111
<i>Kumar Israni, Yaneira Saud, Sandra Lovell, Sarah Acton</i>	
(70c) Best Practice in Application of CAA CAP 437 Guidance for Offshore Helicopter Landing Areas	112
<i>Tim Jones, Chris Robinson, Andrew Grand, Morgan Reed</i>	
(70e) Introducing a Dynamic Calculation Method for Pressure Relief Load and Orifice Sizing	121
<i>Steve Streblov, Jay Riha</i>	
(70f) Quantifying Human Error Probabilities through a Bayesian Network Using Expert Opinion and an Auditing Tool: An Application to the Tokai-Mura Accident	144
<i>Paulo Fernando Frutuoso e Melo, Antonio Carlos Ribeiro, Anna Leticia B. Sousa, Juliana P. Duarte</i>	
(70h) Numerical Modeling of Pool Fire inside an Offshore Methanol Storage Tank	154
<i>Tony Liu, Morgan Reed, Eric Peterson, Irfan Shaikh</i>	
(70i) Credibility of Designing Refrigerated Atmospheric Storage Tank Pressure Relief Systems for a Tornado	155
<i>Syed Usman Ahmed</i>	
(70j) Cultura De Liderazgo y Seguridad – Independientemente Del Idioma	169
<i>Yaneira Saud, Kumar Israni, Sarah Acton, Sandra Lovell</i>	
(70k) Ensure Compliance to NFPA Standards through Corporate Level Combustible Dust Audits	170
<i>Amy Theis, Richard Kwasny</i>	
(70l) Combining Traditional UOP HAZOP Analysis with Dynamic Simulation a New Process Safety / Risk Assessment Tool	171
<i>Scott M. Wozniak, Bill Wiede</i>	
(70n) How Close Is My Operation to a Major Accident?	193
<i>Abouzar Yousefi, Manuel Rodriguez Henrandez, Jaime Martin Juez</i>	
(70o) An Approximate Model for Discharge Density Associated with Critical Flow	205
<i>Henry Foust III</i>	
(70v) A Multilevel Safety EARLY Warning Method Based on Bayesian Networks with Applications for Petrochemical Process	206
<i>Jinqiu Hu, Laibin Zhang</i>	
(70w) Summary of Macondo Inquiries and Recommendations	207
<i>Robin Pitblado</i>	

(70x) Operational Risk Management Aided By Continuous Monitoring of Barriers	220
<i>Ed Silva, Sergio Saad</i>	
A Spreadsheet Application for Evaluating Two-Phase Emergency Venting Transients Utilizing an Interface to a Thermodynamic Property Package	224
<i>Subin Hada, Robert D'Alessandro, J. Andrew Jones</i>	
(71a) Anatomy of a Potential LNG Incident	234
<i>Fabiana Weber</i>	
(71ab) Application of Risk Prioritization Matrix of Nonconformities in the Offshore Industry	235
<i>Tatiana Cordeiro, Claudia Morgado</i>	
(71ac) Experimental Study on Gas Explosion in an Obstructed Confined Pipe	244
<i>Rafiziana M. Kasmani, Mimi H. Hassim, Siti Zubaidah Sulaiman, Sina D Emami, Kamarizan Kidam, Roshafima, R. Ali</i>	
(71ae) Uncertainty Analysis for LOPA in the Offshore Industry	245
<i>Sungteak Kim, Kwangpil Chang, Eunhyun Park</i>	
(71af) Quantitative Risk Assessment (QRA) with the Inclusion of Human and Organizational Factors and Maintenance	246
<i>Mehmood Ahmad</i>	
(71ag) Implementing SIS Metrics for Life Cycle Management - Part 1: Proof Testing	247
<i>Keith Lapeyrouse, John Harrison</i>	
(71ah) Dust Explosion Kinetics	248
<i>Russell A. Ogle, Sean J. Dee, Brenton L. Cox</i>	
(71ai) Vapor Cloud Hazards of Enclosed Liquid Flammable Processes	249
<i>Kollin Kenady, Eric S. Becker</i>	
(71aj) Comparison of Results of the Classified Areas of a Typical Hydrogen Generation Unit (GHU) Using the Standards NFPA 497 and API RP 505	250
<i>Gisele Nascimento, James Hall Sr.</i>	
(71ak) The Requirements and Tools to Treat Safety Process Risk Caused By Organizational Changes	251
<i>Salvador Ávila Filho, Esiron T. Dantas, Jonas Duarte</i>	
(71am) Using Unrealistically Optimistic Failure Data: Is It Ethical?	263
<i>Loren Stewart, Iwan van Beurden</i>	
(71an) Dynamic Simulation As a Robust Tool for Optimum Flare Systems Design	273
<i>Faraz Khan, Christopher Ng, Jim Bridgett</i>	
(71ao) Best Practice MOC and Pssr 2014	274
<i>Mike Mike</i>	
(71ap) Application of Risk Analysis in Pilot Plants and Research Labs	275
<i>Kabier Moideenkutty</i>	
(71aq) Integrating Cyber Security Risk Assessments into the Process Safety Management Work Process	276
<i>Harold W Thomas, John Day</i>	
(71ar) Integrating Alarm Management into Your PHA and LOPA Processes	295
<i>Todd Stauffer, Harold W Thomas</i>	
(71as) High Integrity Pressure Protection Systems: Design, Analysis, Justification and Implementation	296
<i>Charles Fialkowski</i>	
(71at) Predicting Far Field Blast Overpressures: An Evaluation of Enhanced Input Parameters for FLACS	297
<i>Meiqian Wang, Morgan Reed, Anh Bui, Eric Peterson</i>	
(71av) Vhe Application of the Bifunctional Environmental Deodorizer for Sulfur and Sour Water in SINOPEC TIANJIN	298
<i>Aijun Wang, Jiliang Chen</i>	
(71aw) Safety-Centered Site Master Planning	299
<i>Steve Clepper, Hollie Schmidt</i>	
(71ax) Exothermic Test for Green Plastics Materials by DSC	314
<i>Jao-Jia Horng, C. J. Wang, K. Y. Liao, J. M. Tseng</i>	
(71az) The Studies of Flame Propagation Simulation in the Municipal Pipeline	320
<i>Fenglei Han, Gangzhe Liu, Mengmeng Du, Ren Sun</i>	
(71b) The Study on the Vulnerability of Urban Oil and Gas Pipeline Network of the Mechanism of Action	327
<i>Su Hu</i>	
(71bb) Application of HAZOP Study On Some Butyl-Octyl Alcohol Plants	328
<i>Jiulai Huang, Junjie Chen, Minbing Sheng, Rangqu Chen, Dong Xue</i>	

(71bc) Critical Success Factors for Effective PHAs	338
<i>Arlyn Poppen, John Herber</i>	
(71bd) Security Risks and Countermeasures of Pesticide Formulations Production Process	364
<i>Wenqiang Wan</i>	
(71be) Incorporate Safety During Process Design	365
<i>Krishnarao Guntu</i>	
(71bf) Study on Application of LOPA in HAZOP on China Refinery Design	366
<i>Mingfeng Cai, Zhigang Wang, Hao Zhou, Wenjuan Wang</i>	
(71bg) Field Application of Risk-Based Approach for Fatality Prevention	378
<i>Alfonsius Ariawan</i>	
(71bh) Problems and Resolutions of SIS Engineering Application	379
<i>Ruoqing Wang</i>	
(71c) Developing Process Engineers into Effective HAZOP/LOPA Facilitators	380
<i>Steven T. Maher, Michael A. Nour, Colin Scholtz, Michael B. Saura</i>	
(71d) Investigation of Self-Ignition Risks of Iron Sulfides in the Sour Crude Oil Storage	381
<i>Ping Ping, Dongfeng Zhao, Depeng Kong, Yi Liu</i>	
(71e) Optimal Sectioning of Hydrocarbon Transport Pipeline By Volume Minimization and Environmental Vulnerability Assessment	382
<i>Nancy Alejandra Cano Acosta, John Edgar Fontecha Garcia, Felipe Muñoz Giraldo</i>	
(71f) Assessment of Reliability and Risk at Dynamic Systems: A Discussion of Social-Technical Factors in the Exploration and Production of Oil at Pre-Salt Layer - Brazil	384
<i>Salvador Ávila Filho, Monique N. G. de Abreu</i>	
(71g) Experiment Study on Acoustic Emission Detection of Internal Leakage of Gas Ball Valves	395
<i>Guoxing Han, Changhang Xu, Huandi Shi, Piao Gong</i>	
(71h) Why Do We Still Have Blast Walls on Offshore Platforms?	396
<i>Benjamin Poblete, Michael Stahl, Bharat Tulsyan, Andrew Staszak</i>	
(71i) Dynamic Simulation of Discharge Process Safety and Optimization for Multi-stage Ground Flare	397
<i>Anfeng Yu, Peng Wang, Jiedong Zhang, Wenyi Dang</i>	
(71k) Process Safety in Gas/Oil Transport Implementing Best-in-Class Procedure Management Practices - A Case Study	407
<i>Blair Morgan, Todd Muscroft</i>	
(71l) Predicting Thermal Behavior of Chemicals from Molecular Structure	408
<i>Nadia Baati, Annik Nanchen, Francis Stoessel, Thierry Meyer</i>	
(71m) Audit Management Best Practice – Seek and Ye Shall Find	416
<i>Mike Bearrow, Thelma Kipe</i>	
(71n) Screening Tool for Runaway Reaction Characterization. Optimizing Efforts for Emergency Relief Systems Design	433
<i>Jordi Dunjó, Georges Melhem</i>	
(71o) Facility Siting Challenges	434
<i>Sam Sanati</i>	
(71p) Process Safety in the Midstream Sector Under the Shale and Tight Oil and Gas Boom	435
<i>Sebastian Diaz</i>	
(71q) Lessons Learned during Air Tightness Testing of Shelter-in-Place Buildings at Chemical Facilities	436
<i>Gabriel A. Shelton</i>	
(71r) A Simplified PSM Guidance for Smaller Facilities Using a Risk Based Approach	437
<i>Swarup Bade, Lakshmana Tangirala</i>	
(71t) Unlock the Value of Operational Data	438
<i>Mei-Li Lin, Joseph Stough</i>	
(71u) How to Play a Better Central Role By Blending PSM System into HSE System	439
<i>Liu Bin, Sun Shu</i>	
(71v) Heat Exchanger Design Parameters Effect on Low Pressure Side Maximum Pressures during a Tube Failure	449
<i>John Burgess, Dustin J. Smith, Zubin Kumana</i>	
(71w) Research on Security Access Model of Enterprises in Petrochemical Ports	461
<i>Haoyi Wang, Dongfeng Zhao</i>	
(71x) Introduction to Safety Instrumented System Management	467
<i>Eloise Roche</i>	
(71y) Safety Integrity Level Sil Assessment about Deepwater Bop System	468
<i>Suhua Geng</i>	

(71z) Lessons on Achieving Cost Effective ISA 84 SIS Lifecycle Sustainability	469
<i>Carolyn Presgraves</i>	
The Application of the Bifunctional Environmental Deodorizer for Sulfer and Sour Water in SINOPECT TIANJIN Company	470
<i>Aijun Wang, Jiliang Cheng</i>	
Dust Explosion Incident Analysis, Prevention and Control	474
<i>Anka Ge, Lijing Zhang</i>	
(88a) Research on Safety Management Assessment Technology in Oil Tank Farms	489
<i>Dongfeng Zhao, Mei Dong, Zhiqiang Zhao</i>	
(88b) Study on Separation Distance Determination of LNG Filling Station on Water	501
<i>Gujun Wan, Wenyi Dang, Zhifeng Wu, Zhongshu Han, Yongzhong Bai</i>	
(88c) A Case-Study of a Fire Incident of Trichlorosilane Process and Response Measures	510
<i>Jao-Jia Horng, Kuang-Yu Liao, Ke-Hun Liou, Paochiang Yuan</i>	
(115a) Case Analysis of Oil and Gas Pipeline Deflagration Accidents	523
<i>Shi Li, Hong Shen, Dongfeng Zhao</i>	
(115b) Research of Process Safety Management Platform Architecture Based on Internet of Things	531
<i>Guoliang Yang, Zongzhi Wu, Rujun Wang</i>	
(115c) Application of Quantitative RBI on Hydrocracking Unit	539
<i>Shuang Liang, Fangwei Luo, Xiang Li</i>	
(205a) Fire from the Cascading Failure of an Oxygen Supply System	547
<i>Delmar Morrison, Vijay Kumar, Sean J. Dee, Brenton L. Cox, Mohammad Al-Shamary, Abdulqader Al-Qabandi</i>	
(205b) Lessons Learned from an Incident at a Cryogenic Gas Processing Facility	568
<i>Adrian Pierorazio</i>	
(205c) 1996 Amines Plant Explosion	580
<i>Jerry J. Forest</i>	
(205d) U.S. Chemical Safety Board's Final Investigation Report on the Chevron Richmond Refinery Pipe Rupture and Fire	588
<i>Lauren Grim, Mark Wingard, Steve Cutchen, Dan Tillema, Amanda Johnson</i>	
(205e) Bhopal 30 Years Later	591
<i>Ronald J. Willey, Daniel A. Crowl</i>	
Author Index	