出國報告(出國類別：其他-國際會議)

參加
12th Global Congress on Process Safety
研討會

服務機關：國立雲林科技大學環境事故應變諮詢中心
姓名職稱：廖光裕專案助理
派赴國家：美國
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摘要

本次出國行程為赴美國德州休士頓市參加第 12 屆全球製程安全會議(12th Global Congress on Process Safety)，GCPS 研討會為工業安全領域及製程安全領域首屈一指之國際性專業會議，本年度舉辦時間由 105 年 4 月 10 日至 105 年 4 月 13 日，有來自全球 30 多個國家及地區的 2000 多位專家學者與會，本次會議主要之目的為汲取全球學者專家於可燃性粉塵及石化工業領域之最新研究成果及資訊，此外，並發表論文" Using Social Network Theory to Analyze the effectiveness of Environment, Safety and Health Management for Two Petrol-Chemical Companies"而後續將會把參與會議中所吸收之新知，陸續整理成相關資訊，待日後提供我國相關主管機關及業者參考。

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壹、目的

本次出國考察之目的：

全球製程安全會議 GCPS (The Global Congress on Process Safety)，從 2005 年舉辦至今，已成為國際製程安全領域規模最大的會議，今年為第 12 屆，舉辦會議地點位於德州休士頓，本次與會除了汲取全球學者專家於可燃性粉塵及石化工業領域之最新研究成果及資訊外，並於研討會上投稿發表" Using Social Network Theory to Analyze the effectiveness of Environment, Safety and Health Management for Two Petrol-Chemical Companies)"研究成果，並由國立雲林科技大學環境事故應變中心洪肇嘉主任進行口頭報告。

貳、過程

本次赴德州休士頓參與第 12 屆全球製程安全會議(Global process safety Conference,GCPS)，該會議今年假位於休士頓的希爾頓飯店舉辦，為製程安全領域首屈一指之會議，舉辦時間由 105 年 4 月 10 日至 105 年 4 月 13 日，有來自全球 30 多個國家及地區的 2000 多位專家學者與會，並廣邀全球製程安全領域相關學者發表最新之研究報告，藉由會議中的報告及交流討論，達到教學相長之目的，讓與會者能夠瞭解化工製程安全之最新發展趨勢，並將參與會議所汲取之新知，應用於製程安全上，本次會議主題包含 Committed Culture - Creating Felt Leadership、Human Factors in Chemical Process Safety、Combustible Dusts、Risk Based Approaches to Relief Design 等多項製程安全相關主題，此次參與之研究議題除關於製程安全相關因素及製程參數推估計算分析模組的研究外，另於去年新北市八仙樂園發生玉米粉塵爆之事故，令本人深感到我國民眾對於粉塵爆炸發生機制、爆炸特性及預防作為實有不足之處，故也趁此參與關於塵爆研究相關議題，本次參與議程討論議題有預測關於氫氣及合成氣等燃料氣體之火焰和高壓噴射火災的熱輻射新模組方法 (New Model for Predicting Thermal Radiation from Flares and High-Pressure Jet Fires for Hydrogen and Syngas)、氨氣蒸氣雲爆炸試驗和設施選址意義之後果分析及風險(Ammonia Vapor Cloud

Explosion Testing and Implications for Facility Siting Studies, Consequence Analyses, and Risk)、壓縮機在異常/非設計條件下之性能探討(Compressor System Performance at Abnormal/Non-Design Conditions)、可燃性粉塵危害評估：基於風險之評估方法(Combustible Dust Hazard Assessment: A Risk Based Approach)、爆燃洩壓口尺寸之燃燒速率模組應用 (Using a Burning Rate Model for Deflagration Vent Sizing)、粉塵爆炸-問題及其實際控制措施之本質-包含新制定之NFPA652(美國消防協會 National Fire Protection Association,NFPA)對於粉塵危害評估之要求(Dust Explosions –The Nature of the Problem and Practical Measures for Its Control – Including the Requirements of the New NFPA 652 for Dust Hazard Assessment)及富含二氧化碳混合物之減壓：碳捕獲及儲存設備和強化增產石油系統製程安全的挑戰(Depressurization of CO2 Rich Mixtures: Challenges for the Safe Process Design of CCS Facilities and CO2 EOR Systems)等研究議題，本人另與洪肇嘉教授共同發表” Using Social Network Theory to Analyze the effectiveness of Environment, Safety and Health Management for Two Petrol-Chemical Companies)”。

參、心得：

12 屆 GCPS 製程安全會議相關議題研討及成果發表：

全球製程安全會議（Global process safety Conference）是於美國一年舉辦一次的大型會議，本年度為第 12 屆，在德州休士頓的喬治布朗會議中心舉辦，其主辦單位為美國化學工程協會(American Institute of Chemical Engineers,AIChE)，承辦單位則為化學製程安全中心(Center for Chemical Process Safety ,CCPS)，與會人士皆是世界各國製程安全領域相關人員，並廣邀專家學者發表其研究成果及交流當前最新製程安全相關議題，如各種不同製程潛在之危害、風險評估、相關工業設備介紹及產業管理等，並分享各國於防災減災之作法，進而提升與會人士於製程安全領域之專業能力，該會議由 2005 年開始辦理至今，已成為製程安全領域中最重要、且規模最大者，因議題眾多，故僅能挑選參與我國產業或環境相關性較高之議題，下列為參與議程之摘要範例：

(1) 預測關於氫氣及合成氣等燃料氣體之火焰和高壓噴射火災的熱輻射新模組方法 (New Model for Predicting Thermal Radiation from Flares and High-Pressure Jet Fires for Hydrogen and Syngas)：

概述：目前在製程工業中使用預測火焰和噴射火災的模組，主要是基於烴類氣體所建立，但已發現對於低光度氣體，如氫氣和合成氣之混合物並不準確。本研究針對此類氣體，建立新模組來預測其垂直及水平方向的火焰形狀及熱輻射，該模組將噴氣動力、浮力、風及火焰輻射率等因素作為其計算參數，增加其準確度，並於文中列出相關測試數據及完整方程式供其驗證準確性。

(2) 氨氣蒸氣雲爆炸試驗和設施選址意義之後果分析及風險(Ammonia Vapor Cloud Explosion Testing and Implications for Facility Siting Studies, Consequence Analyses, and Risk)：

概述：涉及非常低之層流燃燒速度(Laminar Burning Velocity,LBV)燃料與寬敞空間之蒸氣雲爆炸危害(Vapor Cloud Explosion,VCE)的關係，對於設施選址後果分析及風險評估上之研究而言，是一個懸而未決之問題。

本研究即是利用氨氣(LBV 燃料)與甲烷(參考基準)進行 VCE 試驗，進而收集相關實驗數據，作為日後相關設施選址風險評估之參考因素。

(3) 壓縮機在異常/非設計條件下之性能探討(Compressor System Performance at

Abnormal/Non-Design Conditions)：

概述：壓縮機系統性能穩定度對於石化廠場製程安全及設施性能優化是非常重要的，如壓力調節不穩定，可能導致吸入壓力上升或蒸氣出口線路堵塞，導致流量產生巨大的起伏，進而可能導致不必要一些貴重及重要設備之毀損，並造成廠場安全上之危害。

本研究是借 Atlantic 液化天然氣設施的進料氣體壓縮機，於非設計條件下進行相關測試及分析其運轉數據，以確定不同的入口條件對壓縮機性能之影響，其中壓縮比、排出壓力、壓縮熱及流速等參數是優化設施性能之主要因素，並評估不同抽吸壓力、吸氣溫度、及進料氣體之組合物等條件對於操作功率和循環流量之影響，該研究中特別強調的是對製程安全系統設備性能優化和設計限制上之發展。

(4) 可燃性粉塵危害評估：基於風險之評估方法(Combustible Dust Hazard Assessment: A Risk Based Approach)：

概述：該議題討論說明了可燃性粉塵火災和爆炸基本知識之概述及廠場建築物可能存在之可燃性粉塵危害，雖然不意味著能徹底預防可燃粉塵之危害發生，並提供預防及減輕危害之方法，如控制塵埃之措施(集塵設備)及工程控制方法(自動火災控制系統及灑水設備)。

其目的主要是制定一致性的處理可燃性粉塵相關製程之風險評估方法，並設計出一套有效運作之固體處理設施及流程，供從事粉塵相關工作環境之技術人員妥善使用。

(5) 爆燃洩壓口尺寸之燃燒速率模組應用 (Using a Burning Rate Model for Deflagration Vent Sizing)：

概述：雖然 NFPA68(美國消防協會 National Fire Protection Association,NFPA)提供了可燃性粉塵爆燃洩壓口簡化之計算方法，但這些方法受限於參數及設備等限制條件，故限制之外的應用，則無法有效應用，故本文提出了一種燃燒速度模組，作為預測密封容器內之爆炸行為的方法。

目前該研究中已建置數種物質之預測燃燒速度，一旦物質燃燒速度為已知，則可應用各種製程參數和設備進行動態模擬，並依據所得之 KST 值(粉塵爆炸特性參數)，判定其爆炸等級。

(6) 粉塵爆炸-問題及其實際控制措施之本質-包含新制定之 NFPA652(美國消防協

會 National Fire Protection Association,NFPA)對於粉塵危害評估之要求(Dust Explosions –The Nature of the Problem and Practical Measures for Its Control – Including the Requirements of the New NFPA 652 for Dust Hazard Assessment)：

概述：以系統化之方法來辨別粉塵爆炸之危害，並採取預防措施，以確保對於廠場安全之影響，主要重點可概分為下列 7 項：

a、粉塵爆炸特性之了解

b、可燃性粉塵雲環境中可能存在地點之判定

c、潛在之點火源辨別，可能是於正常及非正常條件下存在

d、適當之製程及設施的設計，以消除或減少粉塵爆炸的發生，進而保護人員及設備

e、設備適當的維護，以防止火源及減少粉塵之釋放

f、各類型之點燃危害的靈敏度-如電弧和靜電放電

g、燃燒事件之嚴重程度-如爆炸和閃火

本講座提供一個行之有效的方法以用來識別、評估及消除/控制粉塵爆炸危害之設備，也將提供與會者關於如何篩選原料及相關處置及製程加工之注意事項，另還包括新制定 NFPA652 對粉塵危害評估之要求及標準。

(7) 富含二氧化碳混合物之減壓：碳捕獲及儲存設備和強化增產石油系統製程安全的挑戰(Depressurization of CO2 Rich Mixtures: Challenges for the Safe Process Design of CCS Facilities and CO2 EOR Systems)：

概述：由於工程成本的影響，所以安全減壓系統之設計對於碳捕獲及儲存設備(Carbon Capture and Storage,CCS)和二氧化碳強化增產石油(Enhanced Oil Recovery,EOR)裝置而言是特別重要的，就石油與天然氣加工設備而言，其設備與管道金屬於高瞬降壓操作階段時，其溫度可能會低於-46℃，故於選擇金屬材料時將會對於成本造成負擔，另因二氧化碳會引入複雜之熱力學行為，如未有能準確地計算其狀態的標準方程式、受限之相包(phase envelope)及在固相減壓階段之電位生成，所以對富含二氧化碳混合物之安全減壓系統的設計非常困難，且傳統的設計方法也難以適用。

於本研究中，以一個為燃煤發電廠所設計的碳捕獲及儲存設備為例，提出能準確評估高壓氣體處理設施使用逆態之減壓的方法，且能夠有效的增進其製程效益及降低約數億美元的成本。

本次與會除了汲取全球製程安全領域最新研究成果及收集相關資訊外，並於12 日由國立雲林科技大學環安系洪肇嘉教授口頭報告發表合作撰寫之論文『使用社會網絡理論分析兩石化公司之環安衛管理(Using Social Network Theory to Analyze the effectiveness of Environment, Safety and Health Management for Two Petrol-Chemical Companies)』，該研究報告主要內容為運用社會網絡理論分析台灣兩家大型石化公司之環安衛管理系統運作情形，以問卷及 NodeXL 質性與量化分析組織網絡，作為觀察個別管理系統中成員運作及差異，並借此觀點闡釋其環安衛管理系統的實際運作狀況，其網絡組織成員之關聯性及運作情形可定量分析成五種網絡「類型」及四種「衡量指標」，參考組織及人員的背景資料，再搭配衡量指標數值與網絡圖，則可推論出三種特殊網絡成員類型『網絡核心』、『邊緣人物』及『資訊經紀人』用以探討組織之網絡工作流模式。

經探討後，接觸網絡資料建構出兩家企業的社會網絡關係，發現其組織架構與實際運作方式，有一定程度不同，如此的模式間接影響著人員階級、職務及運用等管理問題，而從兩家個案企業的環安衛管理組織架構與實際運作的分析結果，吾人發現組織之運作是透過無形的社會網絡在密集的人際交流互動下實現，可以說組織在實際運作時與正式組織的樣貌呈現相異，因此可得出下述幾點建議供企業管理者作為發現組織運作實際問題及改善執行效率之重要依據：

(1) 知識傳遞及決策建議與執行的往來流向或運行方面，會因其企業文化不同有所差異，因資訊流通管道不暢通問題，使資訊及知識無法藉組織成員聯繫而延續，使組織整體效益難以發揮至極致，故建議面對新的環安衛議題時，應立即邀請適當重要成員參與（如諮詢網絡裡中心性較高的人員）開會，使環安衛管理系統可迅速反應並執行該議題所需的前置作業或相關措施，提升整個管理系統的績效。

(2) 環安衛管理系統執行組織改造或績效提昇方針時，可納入社會網絡理論工具，除可節省人力資源、提昇文件系統管理制度、簡化作業流程、稽核流程簡化等優點，更可讓環安衛管理具有持續改善並提昇績效的前瞻性。

(3) 企業組織異動或成員調整可參考社會網絡分析結果，對整體組織有助益成員

可適當調整其職位，使其發揮更大功效，若職位功能未能發揮之成員，亦可調任之職務，使團隊每位成員都能竭盡所能解決困難，改善其作業效率。

(4) 由於組織成員之社會網絡會隨著業務週期、工作任務調配而變化，與社會網絡分析中所描述的諮詢網絡或資訊網絡呈現穩定不變有所差異，建議透過不同時間點或實施不同議題時進行調查，可發現結果所帶來之差異，進而瞭解組織中編制的改變及出現不同議題，會對被調查成員帶來何種改變，可提供給管理者進行改善或調整的參考依據。

肆、 建議事項：

參與第 12 屆全球製程安全會議後，吾人就此次出國見聞之可燃性粉塵及石化工業之製程安全及風險評估等相關研究報告，針對我國相關產業提出下述兩點淺見，供主管機關及專家先進酌參：

1. 2015 年 6 月 27 日新北市八仙樂園發生玉米粉塵爆事故，造成約 500 人傷亡，震撼全球，從本次事故發生原因，可以得知我國大多數民眾對於塵爆之基本認知普遍不足，而台灣許多產業，如金屬加工、麵粉、木材加工、染整業及奈米粉體等廠場，皆有此類潛在風險，且一般而言，粉塵爆炸有其下列 3 點特色：

   1、最大特色為多次爆炸，初始爆炸之爆波產生的氣流會將沉積之粉塵攪動上揚，另因爆炸中心區於爆炸完，短時間內會形成負壓區，拉引大量新鮮空氣，與上揚之粉塵混合形成爆炸性氣體，從而再次引發爆炸，如此反覆其破壞力更為強烈。

   2、易造成不完全燃燒，故其災害現場易含有大量一氧化碳使得人員中毒。

   3、與可燃性氣雲爆炸相比，粉塵爆炸壓力上升較為緩慢，高壓持續時間較久，故釋放能量大，影響之範圍也更為廣大。

   上述粉塵爆炸之特色皆可能造成人命財產嚴重的損失，故加強從事相關產業人員及普羅大眾對於粉塵之危害預防及認知、制訂相關管理法規及營造安全作業環境是我國政府權責單位必須面對之議題，而藉由此次參與全球製程安全會議，汲取許多關於粉塵爆炸危害之相關資訊，吾人也可經由執行工廠輔導、危害應變計畫審視及防災演練等良機，宣導相關安全作為，盼能避免諸如八仙事故等憾事再次發生。

2. 石化產業是我國經濟發展重要推手之一，但因使用的原料、衍生之中間產物和最終產物種類眾多，且多數為具有對環境及人體造成危害之化學品，加上近年石化產業大小事故頻繁發生，如雲林六輕離島工業區僅 99-100 年間即發生 7 場事故，使得社會大眾多有抗拒及疑慮等意識存在，長久下來對於其產業發展實為不利，故為能於經濟及環境兩者間取得平衡，除了有賴於政府制訂政策及妥善管理，以有效協助石化產業發展外，業者自身也應從採取製程最佳可行技術及完善之風險評估模式建置等兩方面著手，確實達到減少環境汙染和降低資源耗用，並根據事前詳盡規劃及評估等程序，有效減少產業發展行為對環境及民眾所造成之損害，方有實踐永續發展之可能。

伍、附錄：

一、出國行程及會議議程表

表 1、行程一覽表

日期	行　　程	附　　註
04/09(週六)	搭機前往美國 ● 台灣桃園國際機場至美國休士頓布希國際機場	美國
04/10(週日)	參加 CCPS 製程安全會議	美國
04/11(週一)	參加 CCPS 製程安全會議	美國
04/12(週二)	參加 CCPS 製程安全會議	美國
04/13(週三)	參加 CCPS 製程安全會議	美國
04/14(週四)	休假(未支差旅費)	-
04/15(週五)	搭機回台	美國
04/16(週六)	抵達台灣	臺灣

表 2、GCPS 製程安全會議議程表

SUNDAY, April 10	
9:00 AM – 5:00 PM	GCPS Short Courses
6:30 PM – 8:00 PM	2016 AIChE Spring Meeting and 12th GCPS Opening Reception Location: Conv. Ctr. Exhibit Hall E
MONDAY, April 11	
7:00 AM	Complimentary Breakfast Location: GRB Conv. Ctr. General Assembly Theater Foyer
8:00 AM	2016 AIChE Spring Meeting and 12th GCPS Opening Plenary Session: June C. Wispelwey, AIChE Executive Director and Gregory Stephanopoulos, AIChE President Location: GRB Conv. Ctr. General Assembly Theater C
8:30 AM	AGILE Award Keynote Address: “Transforming a Business for Success” Presented by Andreas C. Kramvis Location: GRB Conv. Ctr. General Assembly Theater C
9:15 AM	Coffee Break Location: GRB Conv. Ctr. Exhibit Hall E
9:40 AM	12th GCPS Welcoming Plenary Session Location: GRB Conv. Ctr. General Assembly Theater C 12th GCPS Introduction and Welcome: Shakeel Kadri (Executive Director, CCPS) and Ronald J. Willey (GCPS Chair) Symposia Introductions: Fred Henselwood (CCPS Chair), Kendall Werts (LPS Chair), Kathy Shell (PPSS Chair), Trey Morrison (PSM2 Chair), Eric Peterson (Spotlight Track Chair), and Marcela Recaman (Regional Perspectives Chair) Presentation of William H. Doyle Award for LPS Best Paper Award, PPSS Best Paper Award, and CCPS Best Paper Award

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9:15 AM	**Coffee Break** Location: GRB Conv. Ctr. Exhibit Hall E
9:40 AM	**12th GCPS Welcoming Plenary Session** Location: GRB Conv. Ctr. General Assembly Theater C 12th GCPS Introduction and Welcome: **Shakeel Kadri** (Executive Director, CCPS) and **Ronald J. Willey** (GCPS Chair) Symposia Introductions: **Fred Henselwood** (CCPS Chair), **Kendall Werts** (LPS Chair), **Kathy Shell** (PPSS Chair), **Trey Morrison** (PSM^2 Chair), **Eric Peterson** (Spotlight Track Chair), and **Marcela Recaman** (Regional Perspectives Chair) Presentation of William H. Doyle Award for LPS Best Paper Award, PPSS Best Paper Award, and CCPS Best Paper Award

MONDAY, APRIL 11						
	31st Center for Chemical Process Safety International Conference (CCPS)	50th Annual Loss Prevention Symposium (LPS)	18th Process Plant Safety Symposium (PPSS)	5th Process Safety Management Mentoring (PSM^2) Forum	Process Safety Spotlights	Perspectives on Process Safety from Around the Globe
	Committed Culture - Creating Felt Leadership	*LPS 50th Anniversary – Invited Speaker Session*	*To Boldly Go Beyond LOPA and HAZOP I*	*Guidelines for Effective PSM Implementation*	*Human Factors in Chemical Process Safety I*	*Japan's Process Safety Progress*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: James Klein Sunil D. Lakhiani	Co-Chairs: Henry L. Febo	Co-Chairs: John W. Champion Kimberly Mullins	Co-Chairs: Michael Morris Ravi Ramasamy	Co-Chairs: David Weimer Dave Hollaway	Co-Chairs: Masaki Nakagawa Neil Concibido
10:30 AM	"Why All This Talk about Failure? What Happens If We Succeed?" *Peter N. Lodal & Jennifer Mize*	A Lesson Learned by Attending Thirty-Seven Years of Loss Prevention Symposia *Thomas H. Pratt*	Beyond HAZOP and LOPA – Four Different Company Approaches *Karen Study, J. Wayne. Chastain, Chris Devlin & Thomas Mueller*	Saudi Aramco Yanbu NGL Inspection: Improvement Pull Strategy *Lutfi E. Zamai*	A Rank Order Methodology for Assessing HFE Construction Audit Non-Conformances *Kurt Clowers*	Overview of the High Pressure Gas Safety Act in Japan *Kazuhiro Hatayama*
11:00 AM	Moments of Safety Transformation - Developing Strong Safety Leaders *Greg Robinson*	Surviving the Black Swan – Strategies for Process Safety Specialists and Companies to Survive Unpredicted Catastrophic Events *John F. Murphy*		Incident Management System for a Global Company *Justin Trice*	Advanced Procedures: Leveraging a Human Factors Approach for Improving Process Safety Performance *Pranav Kannan*	Process Safety Education Program in Mitsubishi Chemical Group *Masaki Nakagawa*
11:30 AM	Making Process Safety Personal - Engaging the Front Line *Laurence Pearlman & Susie Scott*	A Career in Process Safety: 50 Years of LPS *Arthur M. Dowell III*		Integrating PSM into a Company's Management System *Ignacio Alonso*	Human Factors Considerations in 3D Model Reviews *Sunil D. Lakhiani*	Development and Harmonization of Safety Education Program for Future Generation in Process Safety *Atsuko Fumoto*
12:00 PM	Luncheon with Speaker: **Alan J. McDonald,** Aerospace Consultant and Author of Truth, Lies, and O-rings: Inside the Space Shuttle Challenger Disaster **"Ethics Lessons Learned from the Space Shuttle Challenger Disaster"** Location: Hilton, Second Floor, Ballroom of the Americas C, B, E & F					

MONDAY, APRIL 11						
	31st Center for Chemical Process Safety International Conference (CCPS)	50th Annual Loss Prevention Symposium (LPS)	18th Process Plant Safety Symposium (PPSS)	5th Process Safety Management Mentoring (PSM^2) Forum	Process Safety Spotlights	Perspectives on Process Safety from Around the Globe
	Committed Culture - Obtaining Operational Discipline	*Fires*	*To Boldly Go Beyond LOPA and HAZOP II*	*Tutorials in Process Safety - CCPS*	*Human Factors in Chemical Process Safety II*	*Spanish Session – Implementando Seguridad de Proceso I*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Andrew Goddard Brad Newman	Co-Chairs: Jatin Shah Seshu Dharmavaram	Co-Chairs: John W. Champion Kimberly Mullins	Co-Chairs: Elliot Wolf Sarah Eck	Co-Chairs: Irfan Shaikh, John Jacob	Co-Chairs: Gustavo Correa
1:30 PM	The Safety Leadership Paradox *Charles Cowley*	Revisions to FM Global Property Loss Prevention Data Sheet 7-14, Fire Protection for Chemical Plants *Henry L. Febo*	High/Continuous – Demand Hazardous Scenarios in LOPA *William Mostia Jr.*	Reflecting on the Past: Envisioning the Future: A Vision 2020 Primer *Jack McCavit and Cheryl Grounds*	How to Design Human Factors into a PSM System to Ensure Effectiveness and Deliver Risk Reduction Performance *David Jones*	Design of Strategic Administration System for the Management of Process Safety Recommendations of Reinsurance Broker, Based on the Standards ISO 31000:2009 and PDVSA SI-S-06:2009, for Petroquímica de Venezuela S.A *Juan Duarte Sr.*
2:00 PM	How Committed to Process Safety Is Committed Enough? - Doing Process Safety Cultural Communication As the Inevitable Ethical Dimension for Vision 20/20 *Long Zhang*	New Model for Predicting Thermal Radiation from Flares and High-Pressure Jet Fires for Hydrogen and Syngas *Derek Miller*	Advanced Analysis to Supplement HAZOP/LOPA for Effective Process Design *William R. Banick*	Addressing Human Factors in Process Safety – Corporate and Plant Practices *Chason J. Coelho*	Culture, Competence and Compliance *Radix Andrews*	Todo Lo Que Ud. Siempre Quiso Saber Sobre Sistemas Instrumentados De Seguridad, Pero No Tuvo La Oportunidad De Preguntar *Luis Garcia*
2:30 PM	The Use of Familiar Tool to Diffuse the Feeling of Unease Relating to the Possible Non-Dependability of Barriers of Protection *Alfonsius Ariawan*	CFD Modeling of Jet Fires of Different Configurations *Jin Zhao*	Identify SIF and Specify Necessary SIL, and Other IPLs, as Part of PHA/HAZOP, or Why It Is Not Necessary to "Boldly Go Beyond HAZOP and LOPA" *Art Dowell & William Bridges*	Developing Power, Influence and Leadership for Successful Process Safety Culture *Keith Hunter*	Human Factors and Their Impact on Plant Safety *Luis Manuel Duran & Hampus Schäring*	Implementación De Ventanas Operativas (IOW) En Refinería Latina *Martin Rebollo & José Rizzo*
3:00 PM	**Coffee and Networking Break** Location: GRB Conv. Ctr. Exhibit Hall E					

MONDAY, APRIL 11						
	Committed Culture - Maintaining a Sense of Vulnerability	*Explosions*	*Case Studies in the Use of LOPA and Bowtie/Barrier Methodologies*	*The Day PSM Hit Home – Veteran's Perspective*	*LNG, LPG, and NGL Safety*	*Spanish Session – Implementando Seguridad de Proceso II*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Donald J. Connolley Eric Freiburger	Co-Chairs: Jatin Shah Seshu Dharmavaram	Co-Chairs: Philip M. Myers Humbert J. Howard III	Co-Chairs: Brian Dickson Ray Qi	Co-Chairs: Chad Mashuga Katherine Pearson Harri Kytomaa	Co-Chairs: Felipe Carvalho
3:30 PM	It Happened Here: First-Hand Accounts of Significant Events *Dawn Wurst*	Why Detonation Is the Only Way to Explain Some Vapour Cloud Explosions *Vincent Tam*	One Company's Observations on the Implementation of LOPA *Anne Bertelsmann*	40 Years of Worst Practices – Don't Do This! *Glenn Young*	Multiphase Flow Modeling of LNG Using Smoothed Particle Hydrodynamic (SPH) Techniques *Anh Bui*	Reforzamiento De Componentes No-Estructurales En Edificios Sometidos a Explosiones *David Holgado*
4:00 PM	Investigation Findings and Lessons Learned in the West Fertilizer Explosion *Scott Davis*	Ammonia Vapor Cloud Explosion Testing and Implications for Facility Siting Studies, Consequence Analyses, and Risk Assessments *Darren Malik*	Don't Be Afraid of Conditional Modifiers *J. Wayne Chastain*	Process Safety - You're never too old to learn! *Martyn Brown*	LNG Facility Siting Regulations - Home (USA) and Away (International) *Chaitanya Gottimukkala*	Filosofía De Seguridad De Procesos En BASF *Ricardo Leno Vivas*
4:30 PM	Shelter-in-Place Design Considerations – How Safe is Safe Enough? *Anthony Sarrack*	Catastrophic Domino Effect from Projection of Fragments Associated with Spherical Vessel Explosions *Alejandro Castellano, Nicolás Villalba & Fabio Ocampo*	Layer of Protection Analysis as a Multi-Functional Team Problem Solving Tool *Edward Cialkowski*	Sustainable Productivity & Zero Harm in Practice *Rao Akula*	Flare Reduction Strategies for LNG Plant Design *Meghana Cherukuri*	La Educacion EN Seguridad De Procesos *Karina Isabel Peñaflor*
5:00 PM	**GCPS Electronic and Paper Poster Session and Cocktail Reception** Co-Chairs: San Burnett, Wing Yee, Kumar Israni, & Jianxin Lu Location: GRB Conv. Ctr. Exhibit Hall E					

TUESDAY, APRIL 12						
	31st Center for Chemical Process Safety International Conference (CCPS)	50th Annual Loss Prevention Symposium (LPS)	18th Process Plant Safety Symposium (PPSS)	5th Process Safety Management Mentoring (PSM^5) Forum	Process Safety Spotlights	Perspectives on Process Safety from Around the Globe
	Vibrant Management Systems and Intentional Competency Development	*Facility Siting, Consequence Analysis, and Risk Assessment I*	*Operating Discipline – Greatest Impact on Process Safety Performance?*	*Tutorials in Process Safety – PPSS I*	*Risk Based Approaches to Relief Design*	*Process Safety Activities in China*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Jerry J. Forest Ryan J. Hart	Co-Chairs: Kathleen A. Kas Peter N. Lodal Morgan Reed	Co-Chairs: Colin S. Howat III Brooke Beveridge	Co-Chairs: John Champion Faraz Khan	Co-Chairs: J. Wayne Chastain Freeman Self	Co-Chairs: Dongfeng Zhao Yi Liu
8:00 AM	Process Safety: The Culture of Management System Design, Implementation, and Sustainability *Michael Marshall*	Siting Bulk Hydrogen Storage Systems: Advances in Risk-Informed Siting Procedures in NFPA Codes *Carl Rivkin*	Creating a Culture of Operational Discipline within a Management of Change Process *Stacey Griffith*	Getting the Most from Your PHA – Lessons Learned from A Seasoned Facilitator *Kathy Pearson*	Cost-Benefit Analysis of Designing for Higher Pressure *Juan Lopez*	Fault Propagation Analysis and Causal Fault Diagnosis for Petrochemical Plant Based on Granger Causality Test *Jinqiu Hu*
8:30 AM	Bridging Process and Occupational Safety Cultures for the Process Safety Professionals *Sunil D. Lakhiani*	Is a Two-Inch Hole Adequate for a Siting Study? *Jeffrey D. Marx*	Managing Alarms to Support Operational Discipline *Denise Chastain-Knight*	LOPA Boot Camp – Basic Training with Practical Examples *J. Wayne Chastain*	Practical Risk Based Approach to Pressure Relief and Effluent Handling System Design *Casey Houston*	Research on Urban Dispersion of Oil and Gas Pipeline Accidents *Su Hu*
9:00 AM	Development and Deployment of a Process Safety Curriculum in a North American Pipeline Company *Eli Viloria*	Retrofit of Non-Structural Components on Buildings Subjected to Blast Loading *David Holgado*	Achieving Operational Excellence through a Sustainable Approach within Process Safety *Kumar Israni*	Hazards Inherent to Control Systems: Case Studies and Lessons Learned *Brenton L. Cox*	Overpressure Protection by System Design - Use of High Integrity Pressure Protection Systems *Tariq Alauddin & Adam Robert Dean*	Using Social Network Theory to Analyze the Effectiveness of Environment, Safety and Health Management for Two Petro-Chemical Companies *Jao-Jia Horng*
9:30 AM	**Coffee and Networking Break** Location: GRB Conv. Ctr. Exhibit Hall E					

TUESDAY, APRIL 12						
	Disciplined Adherence to Standards	*Facility Siting, Consequence Analysis, and Risk Assessment II*	*Practical Methods to Identify, Prepare for and Manage Abnormal Events*	*Careers in PSM Panel*	*Considerations on Overpressure relief Scenarios*	*Spotlights Track -OSHA Regulations and Standards*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: John Wincek Lizbeth Cisneros	Co-Chairs: Kathleen A. Kas Peter N. Lodal Morgan Reed	Co-Chairs: Victor Edwards Katherine Prem	Co-Chairs: Scott A. Haney Nicholas N. Cristea	Co-Chairs: Davide Moncalvo Charles Kozlowski	Co-Chairs: Brian Kolodji Jianxin Lu
10:15 AM	Retrofit Process for New and Revised Process Safety Standards at Air Products *Brian E. Farrell*	Transportation Risk Management - One Company's Approach *Elizabeth Lutostansky*	Human Reliability and Process Safety Metrics: Considerations from an Abnormal Situation Management Perspective *Peter Bullemer*	Panelists Include: *Qingsheng Wang,* Oklahoma State University *Peter N. Lodal,* Eastman Chemical Company *Tim Mullowney,* Phillips 66 *Kevin Shaughnessy,* Dow Chemical Company *Lisa Long,* U.S. Department of Labor - OSHA	RAGAGEP Considerations for Relief and Flare Systems *George Melhem*	Update on OSHA PSM Ragagep Guidance *James Lay*
10:45 AM	Used, Classic, or Antique: Solving the Enigma of Disciplined Adherence to Standards for Existing Equipment *Jack McCavit*	The Environmental Equivalent of a Fatality: Had the UK's Environmental Risk Assessment Methodology Been Applied to Freedom Industries in West Virginia, It Would Have Concluded the Site Was Intolerable before 350,000 People Were Exposed and Lost Their Drinking Water *Mark Manton*	Security and Risk Mitigation: Practical and Cost-Effective Solutions by the U.S. Nuclear Industry *Gary Hayner Jr.*		Considering External Fire to be a Non-Applicable Overpressure Scenario *Jessye Palladino*	PSM/RMP Modernization Programs in California – New Developments and Correlation to Evolution at the Federal Level *Steven T. Maher*
11:15 AM	Importance of Accurate, Consistent Implementation of Pressure Relief and Disposal System Standards and Guidelines *Nancy Faulk*	The Eye-Opener: Communicating Facility Siting Findings to Upper Management *Michael D. James*	Compressor System Performance at Abnormal/Non-Design Conditions **Dylan Grosscup**		Quantification of Double Contingencies in Overpressure Design Philosophy by Fault Tree Analysis *Anthony Lie*	PSM: Keeping Abreast of Legal Developments in Order to Stay Compliant *D.A. Duggar*
11:45 AM	Luncheon with Speaker: **Gord Winkel,** Chair and Industrial Professor of the Engineering Safety and Risk Management Program, University of Alberta **"Making Safety Real – Taking Risk Management to the Next Level"** Location: Hilton Americas, Second Floor, Ballroom of the Americas C, B, E & F					

TUESDAY, APRIL 12						
	31st Center for Chemical Process Safety International Conference (CCPS)	50th Annual Loss Prevention Symposium (LPS)	18th Process Plant Safety Symposium (PPSS)	5th Process Safety Management Mentoring (PSM^2)	Process Safety Spotlights	50th Annual Loss Prevention Symposium (LPS)
	Enhanced Application of Lessons Learned	*Facility Siting, Consequence Analysis, and Risk Assessment 3*	*Process Safety Management Systems – Risk Based*	*Tutorials in Process Safety – LPS 1*	*Refinery Safety 1*	*Combustible Dusts 1*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Ryan J. Hart Jerry J. Forest	Co-Chairs: Kathleen A. Kas Peter N. Lodal Morgan Reed	Co-Chairs: Jack Chosnek Elizabeth Schlee	Co-Chairs: Lisa Long Qingsheng Wang	Co-Chairs: Michael Moosemiller Christopher S. Buehler	Co-Chairs: Walter L. Frank Dave C. Kirby
1:30 PM	LOPA – When the Solution Becomes the Problem! *David Jones & Jean Bruney*	Evaluating the Effect of Obstruction Separation Distance on Flammable Gas Dispersion Using FDS *Haavard Boehmer*	Risk Criteria Selection and the Impacts on the LOPA Process *Aaron Huberman*	Adequate Pressure Relief *Shailesh H. Saraykar*	Feasibility Study for Hydrogen Sulfide (H_2S) Optical Gas Imaging *Yousheng Zeng*	Combustible Dust Hazard Assessment: A Risk Based Approach *Albert Ness*
2:00 PM	Improving Learning through Interactive Case Studies *Trish Kerin*	Transient Large-Scale Chlorine Releases in the Jack Rabbit II Field Tests: Near Source Release Data and Preliminary Analysis *Thomas O. Spicer III*	A Call to Action: Understanding the Key Driver for Continual Process Safety Performance Improvement *David Jones*	Vapor Cloud Explosions *Kelley Thomas*	Design Considerations for Oily Water Lift Stations at Refineries *William Celenza*	Who's Afraid of Combustible Dust? – An Update on Electrical Area Classification **Samuel A. Rodgers**
2:30 PM	CSB Recommendations: Gems, Gewgaws, and Buried Treasure *Scott Berger*	Modelling and Validation of Dispersion Following an Instantaneous Vapor or Two-Phase Release from a Pressurized Vessel *Henk W. M. Witlox*	Risk Based Process Safety Program in R & D Facility *Monica Prasad*	Prevention of Combustible Dust Explosions *Steven D. Emerson*	A Structured and Dynamic Risk Analysis Methodology for Pump Units in Process Industry *Qianlin Wang*	NFPA Combustible Dust Standards – 2016 Update *Susan Bershad*
3:00 PM	**Coffee and Networking Break** Location: GRB Conv. Ctr. Exhibit Hall E					

TUESDAY, APRIL 12						
	Societal Themes	*Chemical Reactivity*	*Case Studies on Organizational Management of Change*	*The Day PSM Hit Home – Young Engineer's Perspective*	*Refinery Safety II*	*Combustible Dusts II*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Bernard Groce Martin Timm	Co-Chairs: Jatin Shah Seshu Dharmavaram	Co-Chairs: Karen Study Jeff Stawicki	Co-Chairs: Brenton L. Cox Kaitlin Keller	Co-Chairs: Michael Moosemiller Christopher S. Buehler	Co-Chairs: Walter L. Frank Dave C. Kirby
3:30 PM	Risk: More Than Just Numbers *Cynthia Spitzenberger*	The Application of a High – Temperature Chemical Equilibrium Program for Assessing Combustion and Other Chemical Reactivity Hazards *Eric Winter*	Restructuring of Process Safety at Air Products *Brian E. Farrell*	React Now to Reactive Hazards: Early Identification is Crucial for Your Safety Concept *Sarah Decker*	Practical Application of Advancing Process Safety Tools for the Petroleum Refining and Petrochemical Industries *Rodney Reibold*	Flameless Vent Testing *Bill Stevenson*
4:00 PM	Assessing Meticulous Verification Effectiveness Utilizing HAZOP and LOPA *John T. Perez*	Guidelines for Chemical Reactivity Evaluation and Application to Process Design after Twenty Years *Marabeth Holsinger*	Becoming "Wiser" in Management of Change *Sean J. Dee*	An Early Lesson and a Late Night: How I Learned the Real Design Expert is the User *Amanda Scalza*	Forge Bonding: A Safer Metal Joining Process *Mathew Rybicki & Daniel Rybicki*	Using a Burning Rate Model for Deflagration Vent Sizing *Michelle Murphy*
4:30 PM	Disciplined Adherence to Standards & Meticulous Verification – The Checks and Balances of Process Safety *Anne O'Neal*	Kinetics and Thermochemistry of Graphite Oxide Explosive Decomposition for Safety in Large-Scale Storage and Processing *Yang Qiu*	Successfully Managing a Changing Workforce – Application to Process Safety Management *Charles A. Soczek*	Personal Growth and Mission Born from Tragedy *Matthew McGinnis*	Safety Practice for Refinery and Petrochmical Plants Durinng the Major T&I (Turnaround & Inspection) *Ayman Natto Sr.*	Dust Explosions –The Nature of the Problem and Practical Measures for Its Control – Including the Requirements of the New NFPA 652 for Dust Hazard Assessment *Vahid Ebadat*

WEDNESDAY, APRIL 13						
	31st Center for Chemical Process Safety International Conference (CCPS)	50th Annual Loss Prevention Symposium (LPS)	18th Process Plant Safety Symposium (PPSS)	5th Process Safety Management Mentoring (PSM^2)	Process Safety Spotlights	18th Process Plant Safety Symposium (PPSS)
	Journey Towards Vision 2020	*Advanced Prevention and Mitigation Techniques*	*The Evolution of Mechanical Integrity – Lessons Learned and What Lies Ahead*	*Tutorials in Process Safety – LPS II*	*Modeling of Relief and Flare Systems*	*Innovative Ideas, Methodology, and Use for Risk Analysis I*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: Samantha Scruggs Marisa Pierce	Co-Chairs: Charles A. Soczek Samuel A. Rodgers	Co-Chairs: Steven D. Emerson Sorin Dan	Co-Chairs: Lisa Long Qingsheng Wang	Co-Chairs: Warren Greenfield Casey Houston	Co-Chairs: Sanjeev Saraf Gregory Frederick
8:00 AM	**Panel with Invited Speakers**	Process Accident Prediction Using Transition-Path Sampling *Ian Moskowitz*	Do You Feel Lucky? Or Do You Want to Identify and Manage Safety - Critical Equipment? *Mike Broadribb*	Chemical Incompatibility *Robert W. Johnson*	In-Breathing Requirement for a Tempered Tank Exposed to Prolonged Sudden Rainfalls *David Moncalvo*	Human Factors Engineering: Applying Prescriptive and Performance Standards Across the Globe *Kyle Wingate & Kerri Maurina*
8:30 AM		Analysis of Overflow Incidents: Searching for Situational Awareness Demons *Palaniappan Chidambaram*	Using Past Incidents as Leading Indicators for Pipeline Integrity Management *Hao Chen*	Basic Concepts in Risk Analysis *Victor Edwards*	Methodology to Determine Relief Load for Trans-Critical Pool Fire *Craig Powers*	Quantitative Risk Analysis for Decision Support in Process Plant Operations *Stein Haugen*
9:00 AM		Inherently Safe Design for Vertical Knock-Out Drums and Vapor/Liquid Separators *George Maliakkal & David Rodriguez*	Best Practices for Performing Data Mining from Unstructured Data for Mechanical Integrity *Brent Stanley & Randy Montgomery*	Intro to Quantitative Risk Analysis *Vinicius Simoes*	Dynamic Simulation Modeling to Protect Flare Headers from Air Ingress *Jesse Mumm*	Depressurization of CO_2 Rich Mixtures: Challenges for the Safe Process Design of CCS Facilities and CO_2 EOR Systems *Apostolos Giovanoglou*
9:30 AM	**Coffee and Networking Break** Location: GRB Conv. Ctr. Exhibit Hall E					

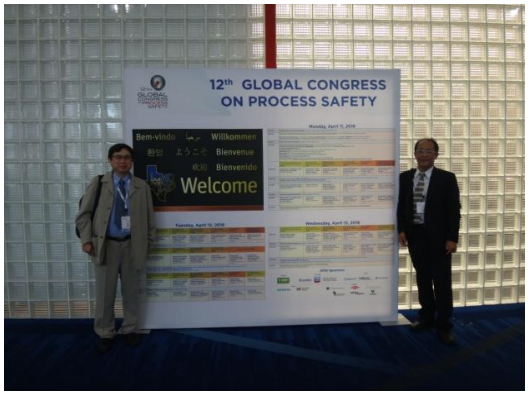
WEDNESDAY, APRIL 13						
	Featured CCPS Projects	*Asset Integrity, Damage Mechanisms, and Condition Monitoring*	*Audit Like Your Life and Assets Are on the Line*	*Tutorials in Process Safety – PPSS II*	*Executive Order 13650 – Improving Chemical Facility Safety and Security: An Update*	*Innovative Ideas, Methodology, and Use for Risk Analysis II*
	Location: GRB Conv. Ctr. 360	Location: GRB Conv. Ctr. 370	Location: GRB Conv. Ctr. 361	Location: GRB Conv. Ctr. 371 A, B, D & E	Location: GRB Conv. Ctr. 362 A, B, D & E	Location: GRB Conv. Ctr. 372 A & D
	Co-Chairs: John Herber Jonas Duarte	Co-Chairs: Robert W. Johnson John F. Murphy	Co-Chairs: James R. Thompson Mike Broadribb	Co-Chairs: John W. Champion Faraz Khan	Co-Chairs: Lisa Long	Co-Chairs: Sanjeev Saraf Gregory Frederick
10:15 AM	New CCPS Guidelines Book: *Guidelines for Recognizing and Responding to Normalization of Deviation* *Jennifer Mize*	Assessing Potential Damage Mechanisms and Selecting Effective Inspection & Testing Methodology for Fixed Equipment *Russ F. Davis*	Revitalizing Auditing Practices - One Company's Journey *Robert Romano*	Effective Operational Discipline Programs *James Klein*	10:15AM-11:00AM Executive Order 13650 Improving Chemical Safety and Security – National Workgroup Update *EPA National Office Rep* *DHS National Office Rep* *OSHA National Office Rep*	Probabilistic Analysis for Smoke and Gas Occurrence Based on CFD Simulations and Frequency Assessment *Rafael Storch*
10:45 AM	A Tool for Evaluation of Process Safety Incidents *Marty Martin*	Pressure Relief Valve Inspection, Testing and Maintenance Intervals *Charles Kashou*	Beyond Compliance Auditing: Drill 'til You Find the Pain Points and Release the Pressure! *Laura Ankrom*	Best-in-Class MOC Implementation – Case Studies *Rainer Hoff*		Leveraging PHA to Develop Requirements for Cyber-Security *Edward Marszal*
11:15 AM	CCPS Certification Process for Process Safety Professional *Chris Devlin*	Verification of In-Service LP Tank Pressure Ratings *Archie Buchman*	How Effective Are Your Safety Controls, Alarms, and Interlocks? The Importance of Functional Safety Auditing *Monica Hochleitner*	Facility Integrity: Learning from the Equipment Lifecycle *Robert Wasileski III*	11:00AM-11:45AM Executive Order 13650 Improving Chemical Safety and Security – Regional Working Group Update *EPA Regional Rep* *DHS Regional Rep* *OSHA Regional Rep*	Pipeline Risk Assessment Using Artificial Intelligence: A Case from the Colombian Oil Network *Alexander Guzman Urbina*
11:45 AM	Luncheon with Speaker: **Mark K. Cox,** Senior Vice President, Chief Manufacturing and Engineering Office, Eastman Chemical Company **"Process Safety Leadership – It's Personal"** Location: Hilton Americas, Second Floor, Ballroom of the Americas C, B, E & F					

WEDNESDAY, APRIL 13	
	Case Histories and Lessons Learned – GCPS Joint Session
	Location: GRB Conv. Ctr. General Assembly Theater C
	Co-Chairs: Derek Miller, Russell Ogle, Mervyn Carneiro
1:30 PM	Case Histories Introduction *Vanessa A. Sutherland, CSB Chairperson*
1:50 PM	CSB Investigation of the West Fertilizer Explosion and Fire *Johnnie A. Banks*
2:20 PM	Process Safety Incidents: Big Picture Revelations *Paul Baybutt*
2:50 PM	*Accidents during Turnarounds, Cleanings, and Other Infrequent Operations* *Michael C. Stern*
3:20 PM	**Break**
3:35 PM	Biomass Industry Explosion Case Study *Amy Theis*
4:05 PM	Atmospheric Tank Explosions: Mechanisms and an Unexpected Case Study *Michael S. Schmidt*
4:35 PM	Explosions in SMPO Hydrogenation Unit *Nick Gonzales*
5:05 PM	**GCPS Concluding Remarks**

主會場留影

洪肇嘉教授發表口頭報告情形

Keynote speaking 情況



與洪肇嘉教授合影

二、研討會報告論文(文章摘要)

Using Social Network Theory to Analyze the effectiveness of Environment, Safety and Health Management for Two Petrol-Chemical Companies

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Keywords: Social Network Analysis Theory, Environment, Safety and Health Management System, Petrochemical Company

Abstract

The social network analysis theory was used to explore two domestic petrochemical companies on their environment, safety and health (ESH) management system and operation effectiveness. Both qualitative and quantitative analyses by NodeXL and statistical tools were applied to through the survey questionnaires to observe the social network and interactions of individual members among two management systems.

The ESH organizational relevance could be divided into five types of network communities and four measurement parameters. From the background information of those individuals, parameters and network diagrams, we could identify three kinds of specialized network personnel, core persons, marginal men and information agents, in order to understand the organization work and information flows and patterns. Two companies showed differences in their International Standard Organization (ISO) based management systems and actual functioning systems. The centrality parameter indicated that some managers lack network connections to others and some members' knowledge could not be adequately used owing to the faults in organization structures. Those problems could lower the effectiveness and efficiencies of management systems. Our analysis also showed positive correlations between the trustworthiness among members as well as network densities and recognition networks. A limited random telephone interviews was done to verify different types of personnel among the networks. This study showed that the network analysis could be a good reference for the high-level managers to understand their ESH system, to evaluate the organization efficiency and to analyze their future development and operation needs.