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Engineering & Scientific Consulting

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Professional Profile

Dr. Hart is a chemical engineer with over a decade of experience in providing technical consulting services to clients in a wide range of settings including industrial and large commercial, chemical plants, refineries, gas production and handling facilities, and commercial transportation. His experience has been distributed between investigating incidents to determine cause and contributing factors as well as providing clients with data and analysis to mitigate risks. Oftentimes these investigation rely upon expertise from additional supporting experts, and he has the experience of identifying, assembling, and managing large multi-disciplinary investigations in order to ensure his clients have the data and information needed to support their analyses.

Dr. Hart is an active professional in local and national chemical process safety communities. In addition to his technical committee memberships and publications, he has served in leadership roles in the field of chemical process safety through the American Institute of Chemical Engineers and Global Congress on Process Safety.

INVESTIGATIONS OF FIRES, EXPLOSIONS

Dr. Hart's has testimony experience with investigations of fires and explosions that have encompassed a broad range of applications - everything from large industrial and chemical plants to residential settings and consumer projects. Specific issues within these projects that have been addressed by Dr. Hart include origin analysis, fire and damage pattern interpretations, fire dynamics, fuel characterization, self-heating (spontaneous combustion), flammable vapor dispersion, ignition source determination – ultimately culminating in determination of the cause and contributory factors of the incident. As a chemical engineer, Dr. Hart has expertise with assessing and evaluating process instrumentation (PI) data in support of his investigations. In addition to his investigation background, Dr. Hart has performed independent research in these areas which have been produced in peer-reviewed journals and conference proceedings.

INVESTIGATIONS INVOLVING HAZARDOUS MATERIALS

Dr. Hart has applied his expertise and training to assist clients in a range of industries with issues related to hazardous materials, including hazardous material characterization, contamination issues, environmental fate, chemical reactions. These projects have included waste handling facilities, chemical production plants, food processing facilities, storage warehouse, and oil and gas plants. Through these projects and his independent studies, Dr. Hart has developed the expertise to identify and assess potential hazard effects for a wide range of hazardous materials – addressing explosion versus flash fire, toxic exposure, degradation and reactivity potential, and process equipment/material incompatibility. Additionally, Dr. Hart has experience in the design of high temperature and high-pressure experimental techniques, chemical analysis, and analytical chemistry methodologies and interpretations.

Dr. Hart has also been trained in the use of the consequence and hazard analysis software tools, both in-house and commercial (such as PHAST, licensed by DNV-GL). Dr. Hart has applied the calculation tools and other consequence and risk assessment methodologies in assisting clients with regulatory permit applications for LNG import/export terminals, assessing project risk in the pre-FEED stages of plant design, conducting facility siting studies, building siting evaluations in support of API 752 and API RP 753, performing EPA Risk Management Plan (RMP) evaluations, evaluating natural gas blowdowns, and in fire and explosion investigations.

PROCESS SAFETY AND RISK CONSULTING

In part due to the emphasis of Dr. Hart's expertise with industrial and chemical plant incident investigations, process safety management has been a core topic addressed by Dr. Hart on dozens of projects. These projects include assisting clients with identifying process safety management breakdowns and potential corrective actions in non-litigation settings, addresses incidents involving process safety programs (such as Lock-out/Tag-out, LOTO, hot work permits, confined space entry, process hazard analysis, PHA) in litigation, and identifying, evaluating, and communicating hazards and risks to project stakeholders (including governmental organizations and the public). Dr. Hart has also performed independent research in process safety and risk, resulting in peer-reviewed publications and conference proceedings, and guest speaker opportunities.

Dr. Hart's career in process safety and risk consulting has not only provided clients with the understanding and appreciation for hazards and risks associated with their projects, but he has also worked with clients to develop novel risk mitigation strategies. Examples include development of flammable vapor cloud mitigation via use of turbulence and obstructions, reducing incident likelihood through novel pipe and equipment barriers, and use of barriers to shield against explosion overpressures and fire radiation effects.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Georgia Institute of Technology, 2011

B.S., Chemical Engineering, University of Wyoming, 2006

Licenses and Certifications

Professional Engineer, Alabama, #PE55794

Professional Engineer Chemical and Mechanical, Florida, #97967

Professional Engineer, Illinois, #62065304

Professional Engineer Chemical, Louisiana, #0045069

Professional Engineer, Mississippi, #34718

Professional Engineer, Texas, #138588

Transportation Workers Identification Card (TWIC)

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Associate Safety Professional (ASP)

Professional Affiliations

American Institute of Chemical Engineers—AIChE (member)

National Association of Fire Investigators—NAFI (member)

National Fire Protection Association—NFPA (member)

Past Professional Affiliations

American Chemical Society—ACS (past member)

American Society for Testing and Materials—ASTM, Committee E27 on Hazard Potential of Chemicals

Session Chair for “Developing an Operational Discipline Program,” 28th Center for Chemical Process Safety International Conference (2013)

Session Chair for “Sustaining and Improving an Operational Discipline Program,” 28th Center for Chemical Process Safety International Conference (2013)

Session Chair for “Risk Management: Journey of Continuous Improvement,” 29th Center for Chemical Process Safety Internal Conference (2014)

Session Co-Chair for “Enhanced Stakeholder Knowledge,” 30th Center for Chemical Process Safety Internal Conference (2015)

Session Chair for “Enhanced Application of Lessons Learned,” 31st Center for Chemical Process Safety Internal Conference (2016)

Session Chair for “Vibrant Management Systems and Intentional Competency Development,” 31st Center for Chemical Process Safety Internal Conference (2016)

Session Co-Chair for “Featured CCPS Projects,” 32nd Center for Chemical Process Safety Internal Conference (2017)

Session Co-Chair for “Manage Risk – The Management Element,” 32nd Center for Chemical Process Safety Internal Conference (2017)

Session Co-Chair for “Manage Risk – The Human Element,” 32nd Center for Chemical Process Safety Internal Conference (2017)

Session Chair for “Process Safety,” 12th AIChE Southwest Process Technology Conference (2020)

Session Chair for “Process Safety,” 13th AIChE Southwest Process Technology Conference (2021)

Publications

Morrison DR, Hart RJ, Reed M, Peterson E. Is your hot work safety zone actually safe? Chemical Engineering Progress 2019 Jan: 52-58.

Ibarreta A, Hart RJ, Ponchaut N, Morrison DR, Kytömaa H. How does concrete affect evaporation of cryogenic liquids: Evaluating liquefied natural gas plant safety. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering 2016; 2(1):011005-1-5.

Cox BL, Dee SJ, Hart RJ, Morrison DR. Development of a steel component combustion model for fires involving pure oxygen systems. Process Safety Progress 2014; 33(3):299-304.

McInerney EH, Hart RJ, Morrison D, Kytömaa HK. New quantitative risk criteria for US LNG Facilities. Process Safety Progress 2014; 33(3):237-46.

Ibarreta AF, Ponchaut NF, Hart RJ, Morrison DR, Kytömaa HK. Using passive methods to reduce flammable release hazards at LNG facilities. FS-World Magazine "Oil & Gas Industry" edition, Spring 2014.

Medina-Ramos W, Mojica MA, Cope ED, Hart RJ, Pollet P, Eckert CA, Liotta CL. Water at elevated temperatures (WET): reactanc, catalyst, and solvent in the selective hydrolysis of protecting groups. Green Chemistry 2014; 16(4):2147-55.

Morrison DR, Hart RJ. Guidelines for identifying and mitigating thermal hazards of sustainable materials. Process Safety Progress 2012; 31(2):174-181.

Conference Proceedings and Invited Presentations

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. American Institute of Chemical Engineers, 2023 Spring National Meeting and 19th Global Congress on Process Safety, Houston, TX, March 12-16, 2023.

Ibarreta AF, Hart RJ, Colella F, Morrison DR. Análisis y Mitigación De Fugas De Material Inflamable En Terminales De Gas Natural Licuado. American Institute of Chemical Engineers, 2022 Spring National Meeting and 18th Global Congress on Process Safety, San Antonio, Texas, April 10-14, 2022.

Morris JM, Yen M, Ibarreta AF, Morrison DR, Hart RJ. Vapor Cloud Explosions in Complex Geometries – Application of the BST Method. American Institute of Chemical Engineers, 2022 Spring National Meeting and 18th Global Congress on Process Safety, San Antonio, Texas, April 10-14, 2022.

Morrison DR, Hart RJ. Risk Analysis in LNG by Rail. Presentation to Committee for the Safe Transportation of Liquefied Natural Gas by Railroad Tank Car – Phase 2, National Academies of Sciences, Engineering, Medicine, Transportation Research Board, November 9, 2021.

Morrison DR, Hart RJ, Morris JM, Wikramanayake ED, Song S. Minimizing Risk of Unit Trains of Hazmat. American Institute of Chemical Engineers, 2021 Spring National Meeting and 17th Global Congress on Process Safety, Virtual Conference, April 18 - 22, 2021.

Morris JM, Zanganeh N, Hart RJ, Morrison DR. What Is the Safest Hazard Assessment Approach for Distances to Storage Tanks? American Institute of Chemical Engineers, 2021 Spring National Meeting and 17th Global Congress on Process Safety, Virtual Conference, April 18 - 22, 2021.

Morris JM, Morrison DR, Hart RJ., Why Storage Tanks Leak and How to Stay Safe? 2021 AIChE Midwest Regional Conference, Chicago, IL.

Morris JM, Hart RJ, Morrison DR. Vapor Dispersion: How Safe Is Your Safety Factor? 2020 Virtual Spring Meeting and 16th Global Congress on Process Safety, Virtual Conference, August 2020.

Colella F, Ibarreta A, Hart RJ, Morrison DR, Watson H, Yen M. Jet Fire Consequence Analysis, Offshore Technology Conference 2020.

Hart RJ, Morris JM. Hazard Identification and Risk – What can go wrong? 11th AIChE Southwest Process Technology Conference, October 1-2, 2019. Sugar Land, Texas.

Colella, F, Hart, RJ, Ibarreta, A, Watson, H, Yen, M, Jet Fire Consequence Analysis, Gastech 2019, September 17-19, 2019, Houston, Texas.

Hart RJ, Morris JM, Morrison DR. Sensitivity Analysis of Transport Conditions on Liquefied Gas Hazards. American Institute of Chemical Engineers, 2019 Spring National Meeting and 15th Global Congress on Process Safety, New Orleans, Louisiana, March 31 - April 3, 2019.

Morrison DR, Hart RJ, Reed M, Peterson E. Hot work safety zones - What if there is a leak? American Institute of Chemical Engineers, 2018 Spring National Meeting and 14th Global Congress on Process Safety, Orlando, Florida, April 22-25, 2018.

Hart RJ, Garcia ME, Morrison DR. What is the safest way to move LNG? American Institute of Chemical Engineers, 2018 Spring National Meeting and 14th Global Congress on Process Safety, Orlando, Florida, April 22-25, 2018.

Ibarreta AF, Hart RJ, Morrison DR, Kytömaa HK. LNG Facilities- Changing Regulations. NFPA Conference and Expo, Boston, Massachusetts, 2017.

Hart RJ, Morrison DR. Understanding Tolerable Risk Criteria - Considering the Growth of LNG Transportation. American Institute of Chemical Engineers, 2017 Spring National Meeting and 13th Global Congress on Process Safety, San Antonio, Texas, March 26-29, 2017.

Morrison DR, Hart RJ. Fire science and investigation. Invited lecture to BME 4093 - Special Topics: Forensic Engineering, Lawrence Technological University, Detroit, MI, November 11, 2015.

Hart RJ, Morrison DR. The hazard we know: Comparing transportation risk of LPG and LNG. American Institute of Chemical Engineers, 2015 Spring National Meeting and 11th Global Congress on Process Safety, Austin, TX, April 26-30, 2015.

Ramirez JC, Morrison DR, Hart RJ, Hetrick TM. Atmospheric venting of flammable gas to a "safe area": comparing guidelines to calculations. SPE-15HSSE-P-305-SPE-MS. SPE E&P Health, Safety, Security, & Environmental Conference - Americas, Denver, CO, March 16-18, 2015.

Dee SJ, Cox BL, Hart RJ, Farina R, Morrison DR. Effects of cooking on the thermal ignition behavior of vegetable oil. Proceedings, 2015 Fire and Materials Conference, San Francisco, CA, Interscience Communications Limited, London, pp. 889-904, February 2015.

Hart RJ, Morrison DR. Rail transportation risk assessment comparison: Ethanol versus LNG. 6th CCPS Latin American Conference on Process Safety, Buenos Aires, Argentina, September 15-17, 2014.

Ramirez JC, Morrison DR, Hart RJ, Hetrick TM. Venting flammable gas to a "safe area": An objective review of best practices and guidelines. American Institute of Chemical Engineers, 2014 Spring National Meeting, 48th Annual Loss Prevention Symposium, New Orleans, LA, March 30-April 2, 2014.

Morrison DR, Hart RJ. Utilizing risk assessment for Safe LNG bunker operations. Lloyd's Maritime Academy LNG Bunkering Seminar, Miami, FL, November 18-19, 2013.

Morrison DR, Hart RJ, Kytömaa HK, Ibarreta AF, Ponchaut N. How does concrete affect evaporation of cryogenic liquids: Evaluating LNG plant safety. American Society of Mechanical Engineers 2013 International Mechanical Engineering Congress and Exposition, San Diego, CA, November 15-21, 2013.

Cox BL, Dee SJ, Hart RJ, Morrison DR. Development of a steel component combustion model for fires involving pure oxygen systems. American Institute of Chemical Engineers, 2013.

Spring National Meeting, 47th Annual Loss Prevention Symposium, San Antonio, TX, April 28-May 2, 2013.

Hart RJ, Morrison DR, Ibarreta AF, Kytömaa HK. Guidelines for relative hazard ranking of refrigerants and siting considerations for LNG liquefaction units. American Institute of Chemical Engineers 2013 Spring

National Meeting, 13th Topical Conference on Gas Utilization, San Antonio, TX, April 28-May 2, 2013.

Ibarreta AF, Hart RJ, Morrison DR, Kytömaa HK. A View of the evolving LNG regulations and associated exclusion zones from an industry perspective. American Institute of Chemical Engineers 2013 Spring National Meeting, 13th Topical Conference on Gas Utilization, San Antonio, TX, April 28-May 2, 2013.

McInerney E, Hart RJ, Morrison DR, Kytömaa H. New quantitative risk criteria for U.S. LNG facilities. American Institute of Chemical Engineers 2013 Spring National Meeting, 47th Loss Prevention Symposium, San Antonio, TX, April 28-May 2, 2013.

Hart RJ, Morrison DR. Chemical process safety and sustainable materials hazards. American Institute of Chemical Engineers 5th Annual Midwest Regional Conference, Chicago, IL, January 31-February 1, 2013.

Dee SJ, Hart RJ, Hetrick TM, Morrison DR. Hot surface ignition of bearing grease in horizontal and vertical orientations. ISFI 2012, Maryland, October 15-18, 2012.

Hart RH, Morrison DR. Jetting and Flashing of LNG. DNV User Conference, Katy, TX, October 16-17, 2012.

Morrison DR, Hart RJ, Kytömaa HK. Guidelines for jetting and flashing LNG vapor exclusion zone analysis. American Institute of Chemical Engineers, 2012 Spring National Meeting, LNG Plant Safety and Protection Session, Houston, TX, April 1-5, 2012.

Hart RJ, Morrison DR. Thermal safety of ionic liquids. American Institute of Chemical Engineers, 2012 Spring National Meeting, 46th Annual Loss Prevention Symposium, Houston, TX, April 1-5, 2012.

Ogle RA, Morrison DR, Hart RJ. Thermodynamic models for leak detection of natural gas in salt cavern storage. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October 19, 2011.

Morrison DR, Hart RJ, Heckel P. Exposing the blurry lines between personal safety and process safety education: contrasting NIOSH prevention through design (PtD) with CCPS Sache. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October 18, 2011.

Morrison DR, Hart RJ. Guidelines for identifying and mitigating thermal hazards of sustainable materials. American Institute of Chemical Engineers, 2011 Spring National Meeting, 45th Annual Loss Prevention Symposium, Chicago, IL, March 13-15, 2011.

Hart R, Switzer J, Rohan A, Fahdel A, Eckert CA, Liotta CL. Design and development of reversible ionic liquids for post-combustion CO2 recovery. Oral presentation, International Chemical Congress of Pacific Basin Societies, Honolulu, HI, 2010.

Hart R, Switzer J, Rohan A, Fahdel A, Eckert CA, Liotta CL. The design of reversible ionic liquids for post-combustion CO2 recovery. Oral presentation, American Institute of Chemical Engineers' Annual Meeting, Salt Lake City, UT, 2010.

Hart R, Cope E, Eckert CA, Liotta CL. Nearcritical water for facile deprotection reactions and benign urea production. Oral presentation, American Institute of Chemical Engineers' Annual Meeting, Salt Lake City, UT, 2010.

Hart R, Eckert CA, Liotta CL. Unique class of sustainable solvents: Reversible ionic liquids. Oral presentation, 239th American Chemical Society National Meeting, San Francisco, CA, 2010.

Hart R, Cope E, Eckert CA, Liotta CL. Design and development of a sustainable DMSO substitute: piperylene sulfone. Oral presentation, 239th American Chemical Society National Meeting, San

Francisco, CA, 2010.

Hart R, Cope E, Pollet P, Eckert CA, Liotta CL, Kjell DP. Nearcritical water for the benign removal of N-Boc protecting groups. Oral presentation, American Institute of Chemical Engineers' Annual Meeting, Nashville, TN, 2009.

Hart R, Blasucci V, Eckert CA, Liotta CL. Development of one-component reversible ionic liquids for energy applications. Poster presentation, American Institute of Chemical Engineers' Annual Meeting, Nashville, TN, 2009.

Hart R, Liotta CL, Eckert CA. Structure-property relationships for the optimization of reversible ionic liquid solvents. Oral presentation, American Institute of Chemical Engineers' Annual Meeting, Philadelphia, PA, 2008.

Hart R, Eckert CA, Liotta CL. Design of optimal solvent systems for post-combustion CO2 recovery. Poster presentation, Interuniversity National Consortium (INCA) Green Chemistry Summer School, Venice, Italy, 2008.

Hart R, Dilek C, Llopis-Mestre V, Lu J, Liotta CL, Eckert CA. Chemical equilibria in ‘smart' ionic liquids. Oral presentation, American Institute of Chemical Engineers' Annual Meeting, Salt Lake City, UT, 2007.