Exponent®
Engineering & Scientific Consulting

Ryan Hart, Ph.D., P.E., ASP, CFEI

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Professional Profile

Ryan Hart, Ph.D., P.E., is a principal engineer in Exponent's Thermal Sciences practice and director of the Houston office. He has over 15 years of experience in chemical process safety and industrial incident consulting. He specializes in fire and explosion investigations, hazardous materials incident cause analysis, hazard and risk assessments, and process safety management consulting for law firms, insurers, industrial operators, and government agencies.

Dr. Hart provides technical consulting services to clients in a wide range of settings including industrial and large commercial complexes, chemical plants, refineries, and gas production and handling facilities. 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. These investigations often rely on expertise from additional supporting experts, and he has broad experience identifying, assembling, and managing large multidisciplinary investigations to help 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.

Oil & Gas and Petrochemical Facilities

For over 15 years, Dr. Hart has been assisting clients in the oil and gas industry with a wide array of technical issues that arise at upstream, midstream, downstream, and petrochemical facilities. From leading large, multi-party investigation teams in response to incidents, to assisting clients with dispute resolution (including testifying in international arbitrations), to providing proactive process safety consulting and permitting support, Dr. Hart has provided clients with rapid and efficient engineering consulting services. In many of these projects, Dr. Hart has represented clients with regulatory agencies (including PHMSA, FERC, FRA, CSB, and OSHA), providing credible and reliable subject matter expertise so that clients can get back to business as quickly and safely as possible.

His extensive experience investigating incidents for a wide range of oil and gas clients has provided the foundation for Dr. Hart to address a range of standard-of-care and duty-of-care issues ranging from emergency response, operating and maintenance procedures, safe work practices (including confined space and hot work permits), management of change (MOC), and hazard identification and communication (HAZCOM).

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Fire and Explosion Investigations

Dr. Hart has testimony experience in investigations into 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 Dr. Hart has addressed in these projects include origin analysis, fire and damage pattern interpretations, fire dynamics, fuel characterization, self-heating (spontaneous combustion), flammable vapor dispersion, and ignition source determination — ultimately culminating in determination of the cause and contributory factors of the incident. As a chemical engineer, Dr. Hart has expertise in 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. Additionally, Dr. Hart is a Certified Fire and Explosion Investigator (CFEI).

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 materials characterization, contamination issues, environmental fate, and 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 consequence and hazard analysis software tools, both in-house and commercial (such as PHAST, licensed by DNV-GL) to evaluate hazards resulting in releases of hazardous materials, including flammable vapor dispersion, vapor cloud explosions (VCEs), jet fires, pool fires, and toxic/asphyxiant dispersion. 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 investigating fires and explosions.

Process Safety Management and Risk Consulting

As a certified Associate Safety Professional (ASP), Dr. Hart makes process safety management a core component in many of his 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, and process hazard analysis, or 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, Oklahoma, #36956

Professional Engineer, Texas, #138588

Phast Advanced Modeling

Transportation Workers Identification Card (TWIC)

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

Associate Safety Professional (ASP)

Certified Fire and Explosion Investigator (CFEI)

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

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. Process Saf. Prog. 2025; 1-7.

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

Rivera-Castro G, Diebol J, Reding N, Hart RJ, Morrison DR. Driving Down Error: Case Studies and Tools for Reducing Human Error in Truck Driver Loading and Unloading Operations, 2026 Spring National Meeting and 22nd Global Congress on Process Safety, Houston, Texas, April 12-16, 2026

Khaled H, Reding N, Ibarreta AF, Hart RJ, Morrison DR. Vapor Cloud Explosions in a Series of Complex Geometries – Application of the BST Method, 28th Annual Mary Kay O'Connor Safety & Risk Conference, Houston, Texas, October 22, 2025.

Reding N, Rivera-Castro G, Hart RJ, Morrison DR. Chemical Loading and Unloading: Risks at the Intersection of the Truck Driver and the Facility, AIChE Southwest Process Technology Conference. September 2025.

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. 10th CCPS Latin American Conference on Process Safety, Barranquilla, Colombia, September 19, 2024.

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.

Project Experience

Oil & Gas and Petrochemical Facilities

- Acid Release at Texas Chemical Plant – Investigated the standard of care of truck unloading concentrated acid at a chemical plant, resulting in a spill and exposure. Analysis included hazard identification and communication, personal protective equipment (PPE), contractor training, and DOT regulations.
- Oklahoma Multi-Well Facility Fire – Investigated the fuel source for a fire that occurred during flowback operations at a new multi-well facility in Oklahoma. Analysis included the process configurations, equipment performance, SCADA data, and buyback gas characterization.
- Caribbean Refinery Upset – Investigated multiple upset events at a refinery. Specific scope related to evaluating the potential for process upset conditions to result in emissions event via carryover at the flare stack. Analysis included the process configuration, unit operation performance, process information (PI) data, and flare stack CEMS data.
- U.S. Refinery Explosion – Investigated an explosion at a heater within the Delayed Coker Unit at an actively operating refinery with adjacent new construction activities (SIMOPs). Analysis included scene inspection, cause of explosion, damage assessment, evaluation of standard of care for SIMOPs and unit restart operations.
- South Texas Multi-Well Fire – Investigated a fire that occurred at a recently expanded multi-well facility located in South Texas, resulting from the rupture of a vertical heater treater separator. Analysis included the process configuration, SCADA data, equipment performance, and standard of care for unit trip and subsequent restart.
- Hot Oil Truck Fire in North Dakota – Investigated a hot oil truck fire that was operating in the oil and gas fields in North Dakota, involving an LPG heater. Analysis included scene examination, evaluation of fire patterns, vehicle maintenance and operation, and fire origin and cause.
- Chemical Plant Fire in Louisiana – Designated expert in a matter concerning a fire that occurred at a chemical plant. Fire occurred during restart following turnaround due to contaminants in process lines which cause piping ruptures and pyrophoric material release. Analysis included evaluation of process operating conditions, process instrumentation (PI) data, restart procedures, facility siting, damage assessment, and emergency response procedures.

- Pump Truck Failure in West Texas – Investigated a hose failure during pump operation at a wellsite. Analysis included pump truck design, operation, and maintenance procedures.
- Refinery Fire in Louisiana – Designated expert in a matter concerning a fire that occurred during turnaround maintenance at a refinery. Analysis included safe work practices, turnaround preparation procedures, process conditions, process fluid characterization, refinery owner and contractor duty of care, hazard identification and communication, and fire origin and cause.
- Explosion and Fire at LNG Terminal in U.S. – Investigated an explosion and fire that occurred at an LNG terminal located on the Gulf Coast. Analysis included process conditions, process design, safe work practices, and owner duty of care for maintenance activities.
- Gas Loss Analysis at U.S. LNG Terminal – Provided engineering consulting support for the evaluation of apparent gas loss at an LNG terminal located in the U.S. Analysis included site examination, process conditions, process instrumentation (PI) data, ship loading certificates, and mass balance calculations.
- Fire and Explosion at Chemical Plant in Southeast Texas – Testified in a matter concerning a fire and explosion that occurred during unloading of propylene from a cargo tank at a chemical plant. Scope of analysis included carrier duty of care, DOT PHMSA hazardous materials regulations, and facility owner duty of care for third-party truck loading operations.
- Floating Storage and Regasification (FSRU) LNG International Arbitration in Asia – Testified in an international arbitration matter concerning the design, operation, maintenance, and performance of a floating storage and regasification (FSRU) LNG carrier in Pakistan. Scope of analysis included the design of the FSRU, installation, commissioning, and performance testing, operating history, maintenance history, and overall plant availability and reliability.
- Water-Hammer in LNG Loading Line – Led a root-cause analysis (RCA) for an incident that caused a water-hammer event and displacement of LNG loading line at a U.S. LNG terminal. Scope of analysis included RCA, evaluation of engineering drawings, Process Hazard Analyses (PHA's), Management of Change (MOC), and inspection/testing of valve actuator.
- Fire at LNG Facility – Led a root-cause analysis (RCA) of a fire that occurred during commissioning activities of a liquefaction train mixed refrigerant compressor at an LNG terminal in the U.S. Scope of analysis included interfacing with PHMSA regulators, leading multi-party inspections, scene processing and preservation, fire origin and cause, and RCA.

Fire and Explosion Investigations

- Houston Warehouse Fire – Investigated the origin and cause of a warehouse fire located in Houston, Texas, allegedly caused by the failure of lithium-ion battery packs during recharge. Analysis included scene inspection, the evaluation of burn patterns, fuel loads, compartment ventilation, and potential ignition sources.
- Home Explosion – Investigated an explosion of a residence located in Central Texas. Analysis included the origin and cause of the explosion, characterization and evaluation of LPG (including odorant loading), regulator testing, and failure of gas piping system.
- Data Center Fire and Explosion – Led a root-cause analysis (RCA) of a fire and explosion that occurred in the battery energy storage system (BESS) at a data center located in Asia. Scope included managing and coordinating large multi-party scene inspections and subsequent laboratory examinations involving hazardous materials. Analysis included RCA, origin-and-cause determination, structure ventilation, explosion damage assessment, off-gas characterization, battery management system data, and building control data.

- Residential Fire in Louisiana – Designated expert in a matter concerning a residential home fire in Louisiana, allegedly caused by a gas log set. Analysis included evaluation of appliance installation, maintenance, and operation as well as fire origin and cause.
- Biodiesel Plant Fire in U.S. – Investigated a hydrogen fire at a biodiesel plant. Scope included scene inspection, documentation, and evidence logging.
- Dryer Fire in San Antonio, Texas – Investigated an alleged dryer fire at a commercial facility. Analysis included scene examination, evaluation of fire patterns, appliance maintenance and operation, and fire origin and cause.
- Residential Fire in Florida – Designated expert in a matter concerning a residential fire allegedly caused by a consumer product mosquito repellant device. Analysis included laboratory burn testing, product design and safety feature evaluation, and fire origin and cause.
- Explosion at Green Hydrogen Plant on Gulf Coast – Investigated an explosion that occurred during commissioning of a green hydrogen (H2) plant. Analysis included field examinations, evaluation of process design, process instrumentation (PI) data, commissioning procedures and performance/acceptance testing, explosion overpressure damage assessment, cell teardowns and inspection of separation membranes, and contractor standard of care.
- Fire at Aircraft Hanger in North Texas – Investigated a fire that occurred in an aircraft hangar allegedly caused by the failure of a battery charging system. Analysis included scene examination, evaluation of fire patterns, and fire origin and cause.
- Residential Fire in Florida – Investigated a residential fire that was allegedly caused by a kitchen appliance (air fryer). Analysis included scene examination, evaluation of fire patterns, and fire origin and cause.
- Crematory Fire in Florida – Investigated a fire at a crematory. Analysis included scene examination, evaluation of fire patterns, evaluation of cremator design, installation and operation, and fire origin and cause.
- Residential Fire in Florida – Investigated a residential fire allegedly caused by a personal oxygen generator appliance. Analysis included scene examination, evaluation of fire patterns, oxygen generator design and operation, and fire origin and cause.
- Apartment Fire in North Texas – Investigated a fire in a multi-unit apartment complex allegedly caused by a kitchen range. Analysis included scene examination, evaluation of fire patterns, stove and oven design and operation, and fire origin and cause.
- Dust Explosion at Animal Feed Processing Plant in Southeast U.S. – Investigated a dust explosion that occurred at an animal feed plant. Analysis included site inspection, process design, explosion venting, explosion damage assessment, and ignition source.
- Fire at Natural Gas Meter Station in Alabama – Investigated a fire that occurred at a natural gas meter station caused by lightning. Analysis included process design, process instrumentation (PI) data, fire origin and cause, and evaluation of lightning damage/ignition.
- Home Fire in Southeast Texas – Investigated a residential home fire allegedly related to a relocatable power tap (RPT) or “power strip.” Analysis included scene inspection, the evaluation of burn patterns, fuel loads, and laboratory inspection of branch circuit wiring, RPT, and debris.
- Residential Explosion in Arkansas – Investigated a residential explosion allegedly caused by the failure of the residential natural gas meter or gas regulator. Analysis included laboratory examination and testing of residential gas meter and gas regulator.

- Explosion at Coal-fired Power Plant in Rocky Mountain Region – Investigated an explosion at a coal-fired power plant that was undergoing restart following extended downtime. Analysis included RCA, analysis of process and storage design, process instrumentation (PI) data, plant maintenance and operating procedures, and coal self-heating.
- Residential Fire near Austin, Texas – Investigated a residential fire allegedly caused by the failure of lithium-ion batteries or consumer electronic devices. Analysis included scene examination, evaluation of fire patterns, laboratory examination and testing of multiple consumer products, and fire origin and cause.
- Residential Fire in Houston, Texas – Investigated a residential fire allegedly caused by the failure of pool equipment including pool pump(s) and/or pool heater. Analysis included scene examination, evaluation of fire patterns, laboratory examination and testing of multiple consumer products, and fire origin and cause.
- Industrial Production Facility Explosion in Harris County, Texas – Testified in a matter concerning a release of propylene within a valve and machining facility, followed by ignition and subsequent explosion. Scope of analysis included scene investigation, testing of tank level and monitoring system, evaluation of propylene composition, modeling of release and dispersion, explosion overpressure damage assessment, and fire origin and cause.
- Creosote Facility Fire in East Texas – Investigated a creosote fire that occurred at a manufacturing facility. Analysis included process design, process instrumentation (PI) data, and fire origin and cause.
- Rail Car Derailment and Fire – Investigated a rail car derailment and fire caused by hot work done near leaking butadiene tank car. Scope of analysis included hot work permit, gas detector performance and operation, and flammable vapor dispersion.
- Crematory Fire in Canada – Investigated a fire at a crematory and mortuary in Canada. Analysis included scene examination, evaluation of fire patterns, evaluation of cremator design, installation and operation, and fire origin and cause.
- Explosion at Coal-Fired Power Plant in Midwest U.S. – Led a root-cause analysis (RCA) for an explosion at a coal-fired power plant that was undergoing restart following extended downtime. Analysis included RCA, analysis of process and storage design, process instrumentation (PI) data, plant maintenance and operating procedures, and coal self-heating.
- Fire at Ethanol Plant in Midwest U.S. – Investigated a fire at an ethanol production plant caused by hot work activities and simultaneous maintenance that resulted in an intentional release of flammable liquids in the spill collection system. Scope of analysis included scene inspection, evaluation of facility and process design, code review, modeling of spill collection system, and hot work permit procedures.
- Oxygen System Fire at Chemical Plant in Middle East – Investigated a fire that occurred in a pure oxygen process system at a chemical plant. Analysis included code review and analysis, process design and operating conditions, and combustion modeling.

Hazardous Materials

- Explosive Manufacturing Plant Chemical Incident – Investigated the potential emissions resulting from an alleged contaminant causing rapid decomposition of nitric acid. Analysis included the process instrumentation (PI) data, reaction mechanism, and chemical and physical properties of nitric acid and decomposition products.

- LPG Odorization – Investigated allegations of inadequate odorization of LPG at a midstream facility in Texas. Scope included determining source of inadequate odorization including scene inspection, dosing system performance, maintenance, and quality assurance, potential degradation or contamination of mercaptan, maintenance and operating procedures, and sampling and chromatography best practices.
- Sulfur Dioxide Truck Accident – Investigated a truck accident and subsequent material release. Analysis included duty of care for cargo tank maintenance and operations (DOT regulations) and inspection of the damaged cargo tank.
- Acid Spill in West Texas – Designated Expert in a matter concerning a spill of hydrochloric acid at a multi-well site in West Texas. Analysis included modeling of spill vaporization and atmospheric dispersion.
- Soapstock Contamination – Investigated a fire that occurred at a rail tank car containing biodiesel byproduct soapstock during tank car unloading. Analysis included sampling and characterization of soapstock and fire origin and cause.
- Asphyxiation at Chemical Plant in Louisiana – Designated expert in a matter concerning maintenance turnaround activities on and within a process vessel where a worker in the confined space asphyxiated due to argon. Scope of analysis included process design, confined space entry permit process, confined space testing and ventilation requirements, owner duty of care and contractor standard of care related to hazard communication, hazard identification, and hazard mitigation.
- Process Vessel Implosion at Acid Plant – Led a root-cause analysis (RCA) of a process vessel implosion at an acid plant. Scope of analysis included Process Safety Management (PSM) program gap analysis, process design, process instrumentation (PI) data, and process controls.
- Fertilizer Plant Explosion in South Dakota – Investigated an explosion at a fertilizer manufacturing plant. Analysis included scene examination, evaluation of process design, process instrumentation (PI) data, and operator actions.
- Failure of Consumer Pool Tab Container – Testified in a matter concerning allegations of an exploding bucket of consumer pool tabs in Houston, Texas. Scope of analysis including site inspection, testing of subject and exemplar containers, and evaluation of trichlor decomposition.
- Explosion at Industrial Facility in South Texas – Investigated an explosion of a storage tank at an industrial plant that produces paper and carboard products. Analysis included site inspection, vessel design, operation and maintenance, explosion damage assessment, and ignition source.
- Fertilizer Warehouse Incident in Brazil – Investigated a fertilizer warehouse decomposition event. Scope of analysis included Accelerated Rate Calorimetry (ARC) testing of fertilizers and various organics, modeling of fertilizer decomposition, and decomposition byproduct characterization.
- Self-Heating at Hazardous Waste Facility – Investigated a fire at a hazardous waste handling facility allegedly caused by the self-heating (spontaneous combustion) of combustor tram. Analysis included facility design and operations, codes and standards, emergency response, evaluation of fire patterns, combustor tram characterization and self-heating.
- Contamination at Food Production Facilities – Led an RCA of contamination at multiple food production facilities. Scope of analysis included site inspection, sampling and testing of product quality, and degradation studies.

Process Safety and Risk Consulting

- Retort Kiln Safety Analysis – Provided engineering support for the development of a novel retort kiln for the low-oxygen production of syngas and bio-char. Analysis included code and standard review, gap analysis, and Process Hazard Analysis (PHA) including What-If Study.
- Facility Siting and Building Siting Analysis at LNG Terminal in U.S. Gulf Coast – Performed both Facility Siting (per DOT PHMSA and FERC Federal Regulations) and Building Siting (per API RP 752 and API RP 753) to support a new LNG terminal located in Louisiana. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires. Hazard mitigation evaluated, including process barriers, natural barriers, and SIL-rated detection and shutdown systems. Served as an LNG safety and risk Subject Matter Expert (SME) in conversations with PHMSA and FERC regulators.
- Warehouse Site Risk Assessment in Mexico – Performed independent third-party review of risk assessment and performed independent risk and hazard analysis of a neighboring LPG storage and loading facility. Evaluated and modeled mitigation strategies.
- Control Room Risk Mitigation at LNG Terminal in North America – Provided engineering consulting support for the identification and mitigation of risks and hazards at a control room for an LNG terminal. Analysis included risk assessment, explosion modeling, flammable vapor dispersion modeling, jet fire modeling, and hazard mitigation through thermal barriers.
- Insurance Risk Assessment at LNG Plant in Southwest U.S. – Provided engineering consulting support for the insurance risk assessment of an LNG plant in the southwest U.S. Analysis included evaluation of facility design, installation and construction management, and operation and maintenance policies and procedures.
- Facility Siting and Building Siting Analysis at LNG Terminal in U.S. Gulf Coast – Performed both Facility Siting (per DOT PHMSA and FERC federal regulations) and Building Siting (per API RP 752 and API RP 753) to support a new LNG terminal located in Texas. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires. Hazard mitigation evaluated, including process barriers, natural barriers, and SIL-rated detection and shutdown systems. Served as an LNG safety and risk Subject Matter Expert (SME) in conversations with PHMSA and FERC regulators.
- Risk Analysis for Hazardous Material Truck Transport in Midwest – Provided engineering consulting support for a permit application to authorize hazardous material transportation across an international bridge. Scope of analysis included third-party review of QRA for trucking of hazardous materials and serving as an LNG safety and risk Subject Matter Expert (SME) in conversations with MDOT regulators.
- Facility Siting and Building Siting Analysis at LNG Terminal in North America – Performed both Facility Siting (per Mexico Federal Regulations) and Building Siting (per API RP 752 and API RP 753) to support a new LNG terminal. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires. Hazard mitigation evaluated, including process barriers, natural barriers, and SIL-rated detection and shutdown systems.
- LNG in Rail Transport Special Permit – Provided engineering consulting services for multiple clients who sought Special Permit authorization from the Federal Railroad Administration (FRA) for the rail transport of LNG. Scope of analysis included Process Hazard Analysis (PHA), facility siting studies, evaluation of Standard Operating Procedures (SOPs), risk management and mitigation, and serving as an LNG safety and risk Subject Matter Expert (SME) in conversations with FRA regulators.

- Insurance Risk Assessment at Multiple LNG Terminals in U.S. Gulf Coast – Performed an independent third-party insurance risk assessment for an LNG terminal. Analysis included evaluation of facility design, installation and construction management, commissioning, operation and maintenance policies and procedures, and hazard and risk assessment.
- Quantitative Risk Assessment (QRA) for Commercial Propane Heat Pump Project – Performed QRA for a propane heat pump project in California. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires. Hazard mitigation evaluated, including process barriers, natural barriers, and SIL-rated detection and shutdown systems.
- Facility Siting at Multiple LNG Peakshaver Facilities in Northeast U.S. – Performed Facility Siting (per DOT PHMSA federal regulations) to support new LNG peakshaver plants and facility modification projects located in the northeast U.S. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires. Hazard mitigation evaluated, including process barriers, natural barriers, and SIL-rated detection and shutdown systems. Served as an LNG safety and risk Subject Matter Expert (SME) in conversations with PHMSA regulators.
- Quantitative Risk Assessment (QRA) for Commercial Heat Pump Project – Performed QRA for a commercial multi-building campus in California. Scope included technology review for heat pump systems including ammonia, propane, carbon dioxide, and synthetic refrigerants. Analysis included flammable vapor dispersion, toxic vapor dispersion, asphyxiation analysis, vapor cloud explosion (VCE), jet fire, and pool fires; additionally, event trees utilizing failure frequencies were developed to support a risk model.
- LNG Regasification Terminal International Arbitration (IA) in Middle East – Provided engineering consulting support in an IA matter concerning the construction and commissioning of an LNG regasification terminal. Analysis included site inspections, commissioning procedures, performance, and acceptance testing.
- Pre-Startup Safety Review (PSSR) of LNG Plant in Southeast U.S. – Performed a PSSR of an LNG plant. Scope of analysis included audits and technical reviews of Mechanical Integrity Program, Commissioning Procedures, Acceptance Testing, Standard Operating Procedures (SOPs), Management of Change (MOC), Process Hazard Analysis (PHA), Emergency Response Planning (ERP), and Employee/Contractor Training.
- Audit of LNG Plant in Northeast U.S. – Performed a third-party audit of the safety program elements of an LNG plant. Scope of analysis included audits and technical reviews of Mechanical Integrity Program, Standard Operating Procedures (SOPs), Management of Change (MOC), Process Hazard Analysis (PHA), Emergency Response Planning (ERP), and Employee/Contractor Training.

Deposition & Trial Testimony

Depositions

Omar Pena, et al. v Brazos Midstream Operating, LLC, et al., Cause No. 017-367791-25, in the District Court of Tarrant County, Texas, 17th Judicial District, 2026.

Dayami Garcia, et al. v Baytex Energy USA, Inc., et al. v ChampionX LLC, Cause No. DC-24-02, in the District Court of Duval County, Texas, 229th Judicial District, 2026.

Arturo Jimenez v INEOS Americas LLC and INEOS USA I Inc., Cause No. 2023-21180, in the District

Court of Harris County, Texas, 113th Judicial District, 2024.

In Re: January 24th Explosion Litigation; All Cases, Master Docket No. 2021-15294, in the United States District Court of Harris County, Texas, 11th Judicial District, 2022.

Rashaun Nicole Stagg-Shehadeh v LPM Manufacturing, Inc., Leslie's Poolmart, Inc., and M&M Industries, Inc., Case 4:18-cv-04775, in the United States District Court for the Southern District of Texas, Houston Division, 2020.

Arbitrations

Representation of a Pakistani client in an arbitration worth several hundred million dollars in the oil and gas industry. ICC Rules, 2025.