

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Alfonso Ibarreta, Ph.D., P.E., CFEI, is a managing engineer in Exponent's Thermal Sciences practice with over 20 years of experience in fire and explosion investigation, process hazard analysis, and combustion science. He advises law firms, insurers, industrial operators, and energy developers on fire and explosion origin-and-cause investigations, computational fluid dynamics (CFD) flammable release consequence modeling, combustible dust hazards, and battery energy storage system (BESS) fire and explosion risk.

Dr. Ibarreta assesses the compliance of facilities and installations with NFPA standards and local fire codes. He is the mechanical engineering representative at the Massachusetts Board of Fire Prevention Regulations responsible for updating the Massachusetts Fire Code (527 CMR 1.0).

Gas Leak & Explosion Investigation

Dr. Ibarreta investigates the origin and cause of gas-fueled fires and explosions involving natural gas, propane, liquefied petroleum gas (LPG), and hydrogen systems in residential, commercial, and industrial settings. His investigations integrate physical evidence analysis, gas flow modeling, ignition source evaluation, and review of applicable codes and standards — including NFPA 54, NFPA 58, NFPA 68, NFPA 69, and 49 CFR — to establish how a release occurred, how much gas was released, where it accumulated, and what ignited it. He is a Certified Fire and Explosion Investigator (CFEI) and has provided deposition testimony in product liability and personal injury matters involving fuel gas systems. Dr. Ibarreta has served as an expert witness in fire and explosion litigation and arbitration proceedings.

BESS Fire & Explosion Risk

Dr. Ibarreta advises developers, operators, insurers, and regulators on fire and explosion hazards specific to battery energy storage systems (BESS), including lithium-ion battery thermal runaway (battery fire) events, flammable off-gas accumulation, and deflagration risk in battery enclosures. His work encompasses consequence modeling of flammable gas releases from battery failures, evaluation of explosion protection and suppression systems, and review of emerging NFPA and IEC standards governing BESS safety. He has published on the application of explosion prevention, protection, and mitigation to battery energy storage and has presented on BESS explosion prevention to the FDNY and other regulatory audiences.

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Vapor Dispersion & Explosion Modeling

Dr. Ibarreta performs vapor dispersion modeling and vapor cloud explosion (VCE) consequence analysis for LNG terminals, oil and gas facilities, hydrogen systems, and other flammable release scenarios. He uses computational fluid dynamics (CFD) software — including FLACS — to calculate the flammable vapor cloud extent during a flammable release and model confined and unconfined deflagrations, vented explosions, and vapor cloud explosions (VCEs). This modeling allows him to reconstruct blast damage patterns, estimate overpressures, and evaluate the sequence of events leading to an incident. The work also enables facility siting decisions and regulatory exclusion zone determinations.

This modeling capability supports both litigation reconstruction and prospective consequence analysis for facility siting, permitting, and risk management. He has modeled the effectiveness of passive mitigation measures, including vapor fences, pipe shrouds, pipe-in-pipe systems, and liquid spill trenches, and he has published extensively on LNG release consequence analysis and dense gas dispersion. He co-authored the chapter on Explosion Prevention and Protection in the 21st Edition of the NFPA Fire Protection Handbook (2023) and is a principal member of the NFPA Technical Committee on Explosion Protection Systems, responsible for NFPA 67, NFPA 68, and NFPA 69.

Oil and Gas Facility Hazard Analysis

Dr. Ibarreta performs Process Hazard Analyses (PHAs) for oil and gas facilities, including LNG terminals. He has participated in Hazard & Operability (HAZOP) analyses of facilities. Dr. Ibarreta has assessed the compliance of piping, equipment and operations at oil & gas facilities with API, ASME, and NFPA standards. As part of the PHA work, he analyzes Piping and Instrumentation Diagrams (P&IDs), Process Flow Diagrams (PFDs), and operating data to perform failure analyses and identify potentially hazardous conditions.

Combustible Dust Hazard Analysis

Dr. Ibarreta conducts Dust Hazard Analyses (DHAs) at facilities handling combustible dusts, including metal powders, organic dusts, and plastics, in compliance with NFPA 660, NFPA 652, NFPA 654, NFPA 484, and OSHA combustible dust requirements. He evaluates dust explosion hazards in silos, bucket elevators, conveyors, and other enclosures, and uses the DustEx module in FLACS to model dust explosion consequences. His work helps manufacturers, insurers, and legal teams understand whether a facility met applicable standards, what mitigation measures were required, and how a dust fire or explosion originated and propagated.

Academic Credentials & Professional Honors

Ph.D., Aerospace Engineering, University of Michigan, Ann Arbor, 2002

M.S., Aerospace Engineering, University of Michigan, Ann Arbor, 2000

B.S., Aerospace Engineering, University of Maryland, College Park, 1997

Recipient of Distinguished Paper Award at the 31st Int. Symposium on Combustion, 2006

Recipient of Robert M. Rivello scholarship, 1996

Tau Beta Pi Engineering Honor Society, 2005

Frank Lees Medal, Safety & Loss Prevention Special Interest Group, Institution of Chemical Engineers (IChemE), 2017

Licenses and Certifications

Professional Engineer, Arkansas, #21694

Professional Engineer Mechanical, Louisiana, #PE.0043460

Professional Engineer Mechanical, Massachusetts, #48085

Professional Engineer Mechanical, New Hampshire, #15583

Professional Engineer, Pennsylvania, #PE085818

Professional Engineer Mechanical, Texas, #133850

Blasting Certificate of Competency (MA)

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Senior Research Associate at Case Western Reserve University, 2005

Research Associate at Case Western Reserve University, 2002-2005

Graduate Student Instructor at the University of Michigan, Ann Arbor, 2001-2002

Graduate Student Research Assistant at the University of Michigan, Ann Arbor, 1997-2001

Research Assistant at the University of Maryland, College Park, 1997

Professional Affiliations

National Fire Protection Association:

- Principal member: Technical Committee on Explosion Protection Systems. Responsible for NFPA 67, Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems, NFPA 68 Standard on Explosion Protection by Deflagration Venting and NFPA 69 Standard on Explosion Prevention Systems

National Association of Fire Investigators (member)

Languages

Spanish

Publications

Ibarreta AF, Hashad K, Barry M, Myers TJ. Evaluating Battery Energy Storage System Explosion Prevention and Protection Systems. Proceedings, AIChE Spring Meeting and 22nd Global Congress on Process Safety, Houston, TX, 2026.

Ibarreta A, Wechsung A, Hart R, Morrison DT, Reding N.Blended Natural Gas/Hydrogen Fuel Gas

Systems: An Evaluation of Risk. Process Safety Progress. 2025;44:232–238. doi:10.1002/prs.12677.

Reding N, Hashad K, Ibarreta AF, Hart R, Morrison D. Vapor Cloud Explosions in a Series of Complex Geometries: Application of the BST Method. Mary Kay O'Connor Safety & Risk Conference, College Station, TX, October 21–23, 2025.

Yen M, Ibarreta AF, Hashad K, Myers TJ. Methods for the Analysis of Gas Explosions. Proceedings, International Symposium on Fire Investigation Science and Technology, Orlando, FL, 2024.

Ibarreta AF, Myers TJ. Explosion Prevention and Protection. Chapter 17-8 of the 21st Edition of the Fire Protection Handbook, NFPA, 2023.

Leroy A, Hashad K, Barry M, Ibarreta AF. Explosion Hazard Considerations for HVAC Equipment Serving Lithium-Ion Battery Energy Storage Systems. ASHRAE Transactions. 2023;129(2):549–557.

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, Proceedings, AIChE Spring Meeting and 19th Global Congress on Process Safety, Houston, TX, 2023.

Wechsung A, Yen M, Ibarreta AF, Myers TJ, Kytomaa HK. Venting of Hydrogen Explosions. Proceedings, AIChE Spring Meeting and 19th Global Congress on Process Safety, Houston, TX, 2023.

Ibarreta AF, Hart RJ, Colella F, Morrison DR. Análisis y Mitigación de Fugas de Material Inflamable en Terminales de Gas Natural Licuado. Proceedings, AIChE Spring Meeting and 18th Global Congress on Process Safety, San Antonio, Texas, 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, Proceedings, AIChE Spring Meeting and 18th Global Congress on Process Safety, San Antonio, Texas, 2022.

Stern MC, Favero CVB, Ibarreta AF, Colella F, Morrison DR, Myers TJ. Flame Arrestor Failures in Industrial Equipment and Consumer Products. Proceedings, AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Ibarreta AF, Myers TJ. Got Dust?: Performing a Dust Hazard Analysis (DHA). Proceedings, AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Myers TJ, O'Hern SC, Stern MC, Ibarreta AF. Best Practices for Performing a Combustible Dust Hazard Analysis. Leader, VPPPA, 8(1), Winter, 2021.

Myers TJ, Yen M, Mendoza S, Ibarreta A. Mitigating the Hazards of Battery Systems. Chemical Engineering Progress, May 2020.

Myers TJ, Yen M, Mendoza S, Ibarreta A. Using Process Safety Principles to Mitigate the Hazards of Battery Energy Storage Systems. Proceedings, 13th Global Congress on Process Safety, American Institute of Chemical Engineers Spring Meeting, Online Meeting, 2020.

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

Favero C, Vickery J, O'Hern SC, Stern M, Ibarreta AF, Myers TJ. Exposure of Fabrics Used in Personal Protective Equipment to Combustible Dust Flash Fires. Proceedings, Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Ibarreta AF, Colella F, Wolf MI, Yen, M, O'Hern SC, Myers TJ. Modeling of Explosion Venting Fireballs. Proceedings, Mary K O'Connor Process Safety Symposium, College Station, TX, 2019.

Ibarreta AF, Colella F, Wolf MI, O'Hern SC, Myers TJ. Modeling of Explosion Venting Fireballs. Proceedings, 13th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (ISHPMIE), Kansas City, MO, 2018.

O'Hern SC, Stern MC, Vickery J, Anderson DM, Ibarreta AF, Myers TJ. Impact of Dust-Fueled Flash Fires on Personal Protective Equipment Fabrics. Proceedings 13th ISHPMIE, Kansas City, MO, 2018.

Ibarreta AF, Colella F, Wolf M, Vickery J, O'Hern SC, Myers TJ. Measuring Leak Flow Rates in Fire and Explosion Investigations. Proceedings of the International Symposium on Fire Investigation, Itasca, IL, 2018.

Stern MC, Bishop J, Ibarreta AF, Ogle RA, Myers TJ. Electrostatic Hazards During Pneumatic Conveying of Combustible Dusts in Flexible Hoses. Proceedings, 14th Global Congress on Process Safety, American Institute of Chemical Engineers Spring Meeting, Orlando, FL, 2018.

Ibarreta AF, Morse TL, Gilman L, Wolf MI, Myers TJ. The Winter Hazard of Carbon Monoxide. Article published in the Defense Counsel of RI Newsletter, 2018.

Stern MC, O'Hern SC, Ibarreta AF, Ogle RA, Myers TJ. Ignitability of Combustible Dust Fueled Flash Fires With Industrial Ignition Sources. Proceedings, 13th Global Congress on Process Safety, American Institute of Chemical Engineers Spring Meeting, San Antonio, TX, 2017.

O'Hern SC, Stern MC, Ibarreta, AF, Myers TJ. Analysis of Combustible Dust Flash Fires on Personal Protective Equipment Fabrics. Proceedings of the IChemE Hazards27 Conference, Birmingham, UK, 2017.

Ibarreta AF, Myers TJ, Stern MC, O'Hern SC. Portable Vacuums for AM/PM Operations: The Good, the Bad and the Ugly, Proceedings POWDERMET 2017, International Conference on Powder Metallurgy & Particulate Materials, Las Vegas, NV 2017.

Ibarreta AF, Myers TJ. Mitigating Fire and Explosion Hazards of Powdered Metals. Metal Powder Report 2016; doi:10.1016/j.mprp.2016.01.073.

Myers TJ, Ibarreta AF, O'Hern SC. Mitigating Fire and explosion hazards of metal Powders: Update on Changing Consensus Standards, Proceedings POWDERMET 2016, International Conference on Powder Metallurgy & Particulate Materials, Boston, MA 2016.

Myers TJ, Ibarreta AF, Stern MC, O'Hern SC, Page CD. Combustible Dust Hazards in Additive Manufacturing Operations, Proceedings POWDERMET 2016, International Conference on Powder Metallurgy & Particulate Materials, Boston, MA 2016.

Ibarreta AF, Stern MC, Myers TJ. Fire and Explosion Hazards in Enclosed Powder Conveyors. Powder & Bulk Solids 2016, 34(6):26-30.

Ibarreta AF, Biteau H, Sutula J. BLEVEs and Fireballs. Chapter of the 5th Edition of the SFPE Handbook, of Fire Protection Engineering, SFPE, 2016.

Ibarreta AF, Hart RJ, Ponchaut NF, Morrison DR, Kytömaa HK. 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.

Stern MC, Rosen JS, Ibarreta, AF, Myers TJ, Ogle RA. Quantification of the Thermal Hazard of Metallic and Organic Dust Flash Fires. Proceedings Mary K O'Connor Process Safety Symposium, College Station, TX, 2015.

Ibarreta AF, Myers TJ. Fire and Explosion Mitigation Strategies for Metal Powders. Proceedings, POWDERMET 2015, International Conference on Powder Metallurgy & Particulate Materials, San Diego, CA, 2015.

Ibarreta AF, Myers TJ, Marr KC, Garner SW. On the Use of Laminar Burning Velocities in Process Safety. Proceedings, 49th Loss Prevention Symposium, American Institute of Chemical Engineers Spring Meeting, Austin, TX, 2015.

Stern MC, Rosen JS, Ibarreta AF, Myers TJ, Ogle RA. Unconfined Deflagration Testing for the Assessment of Combustible Dust Flash Fire Hazards. Proceedings, 49th Loss Prevention Symposium, American Institute of Chemical Engineers Spring Meeting, Austin, TX, 2015.

Ibarreta AF, Morrison DR, Kytömaa HK. Small Scale and Transportation: Navigating the Risk. LNG Industry Magazine 2014 Oct; 17-24.

Stern MC, Ibarreta AF, Myers TJ. Assessment and Mitigation of Combustible Dust Hazards in the Plastics Industry. Proceedings, 30th International Conference of the Polymer Processing Society, Cleveland, OH, 2014 and AIP Conference Proceedings 1664, 180003, 2015.

Myers TJ, Ibarreta AF, Marr KC. Prescriptive Versus Performance-Based Mitigation of Combustible Dust Hazards. Proceedings, 48th Loss Prevention Symposium, American Institute of Chemical Engineers Spring Meeting, New Orleans, LA, 2014.

Colella F, Ibarreta A, Ponchaut NF, Kytömaa H. Effectiveness of Vapor Fences in Mitigating LNG Jetting & Flashing Releases. 10th Global Congress on Process Safety, American Institute of Chemical Engineers Spring Meeting, New Orleans, LA, 2014.

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.

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.

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Colella F, Ibarreta A, Ponchaut NF, Kytömaa H. Numerical Analysis of Dense Gas Dispersion: Effect of Staggered Fences. Mary Kay O'Connor Process Safety Center. 2013 International Symposium, College Station, TX, October 2013.

Myers TJ, Ibarreta AF. Tutorial on Combustible Dust. Process Safety Progress 2013; 32(3):298-306.

Myers TJ, Ibarreta AF, Bucher JM, Marr KC. Assessing the Hazard of Marginally Explosible Dusts. Proceedings, 47th Loss Prevention Symposium, American Institute of Chemical Engineers Spring Meeting, San Antonio, TX, 2013.

Ashcraft R, Ibarreta A, Myers T. Preferential Gas Flow Around a Snow-Covered Pipe: Empirical Evidence and Modeling. The National Investigator, National Association of Fire Investigators, Sarasota, FL,

Fall/Winter Issue 2012.

Bucher JM, Ford WP, Ibarreta AF, Marr KC, Myers TJ. Testing of Marginally Explosible Dusts: Evaluation of Overdriving and Realistic Ignition Sources in Process Facilities. Proceedings, Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2012.

Ibarreta AF, Myers TJ, Bucher JM, Marr K. Explosion Severity: Propane Versus Natural Gas. Proceedings, International Symposium on Fire Investigation Science and Technology, Hyattsville, MD, 2012.

Ibarreta AF. Explosion Hazards of Gas and Vapor Mixtures. Proceedings, American Institute of Chemical Engineers Spring National Meeting, Houston, TX, 2012.

Ibarreta AF, Myers TJ. Tutorial on Combustible Dust. Proceedings, American Institute of Chemical Engineers Spring National Meeting, Houston, TX, 2012.

Ponchaut NF, Ibarreta AF, Kytömaa HK. Modeling of LNG Spills Into Trenches and Troughs. AIChE Spring Meeting, 12th Topical Conference on Gas Utilization, Houston, TX, April 2012.

Ponchaut NF, Kytömaa HK, Ibarreta AF. Modeling the Vapor Source Associated With Spills of LNG Into Troughs and Trenches. AIChE Spring National Meeting, 11th Topical Conference on Gas Utilization, Chicago, IL, March 2011.

Ashcraft RW, Ibarreta AF, Myers, TJ. Leaking Gas From a Snow-Covered Pipe: Empirical Evidence and Modeling of Preferential Flow Paths. Journal of Fire Protection Engineering 2011; 21:57-79.

Kytömaa H, Ibarreta A, Loud J. Char Depth Mapping of Floor Structure to Determine Fire Origin. Proceedings, International Symposium on Fire Investigation Science and Technology, Hyattsville, MD, 2010.

Ashcraft R, Ibarreta A, Myers T. Preferential Gas Flow Around a Snow-Covered Pipe: Empirical Evidence and Modeling. Proceedings, International Symposium on Fire Investigation Science and Technology, Hyattsville, MD, 2010.

Kytömaa H, Myers T, Ibarreta A, Ponchaut N. Using Real Time Process Models to Detect Loss of Containment and Mitigate Hazards. Proceedings, 12th Process Plant Safety Symposium, American Institute of Chemical Engineers Spring National Meeting, San Antonio, TX, 2010.

Myers T, Kytömaa H, Ibarreta A, Ponchaut N. Analyzing Historic Process Data to Identify Near Misses and Warning Signs: Examples From the Buncefield Incident. Proceedings, 6th Global Congress on Process Safety, American Institute of Chemical Engineers Spring National Meeting, San Antonio, TX, 2010.

Myers T, Ibarreta A. Investigation of the Jahn Foundry and CTA Acoustics Dust Explosions: Similarities and Differences. J Loss Prev Process Indust 2009; 22:740-745.

Ibarreta A, Clevenger J, Ellison A. Changes in Flammability of Nylon Used as Insulation in Electrical Connectors. American Bar Association Tort Trial & Insurance Practice Journal, Summer 2009.

Myers T, Ibarreta A. Case Study of a Hydrogen Explosion in an Electrical Panel. Fire Saf Mag 2009; Spring:12-19.

Myers T, Ibarreta A, Ashcraft R. Dust Explosion Prevention: Regulations, Standards, and Mitigation Techniques. Proceedings, 43rd AIChE Loss Prevention Symposium, Tampa Bay, FL, April 2009.

Davis S, Ibarreta A, Kessel A, Ellison A. Flammability of Nylon Used as Insulation in Electrical

Connectors. Proceedings, International Symposium on Fire Investigation Science and Technology, Cincinnati, OH, 2008.

Myers T, Ibarreta A. Case Study of a Hydrogen Explosion in an Electrical Panel. Proceedings, 42nd Annual Loss Prevention Symposium, American Institute of Chemical Engineers Spring National Meeting, New Orleans, LA, 2008.

Myers T, Ibarreta A. Investigation of the Jahn Foundry and CTA Acoustics Dust Explosions: Similarities and Differences. Mary Kay O'Connor Process Safety Center Symposium, 2007.

Rangwala A, Myers T, Ibarreta A. Measurements of the Non-Dimensional Frank-Kamenetskii Number Using a Standard Dust Layer Ignition Testing Apparatus. 5th International Seminar on Fire and Explosion Hazards, Edinburgh, UK, 2007.

Davis S, Ibarreta A, Clevenger J. Flammability of Electrical Crimp Connectors Subjected to Heating. Proceedings, Fire and Materials 10th International Conference, 2007.

Han B, Ibarreta A, Sung CJ, T'ien JS. Structure of low-stretch methane nonpremixed flames. Combust Flame 2007; 149:173-190.

Ibarreta A, Sung CJ, Wang H. Experimental Characterization of Premixed Spherical Ethylene/Air Flames Under Sooting Conditions. Proceedings, Combustion Institute 2006; 31:1047-1054.

Ibarreta A, Sung CJ. Optimization of Jet-A Fuel Reforming for Aerospace Applications. Int J Hydrogen Energy 2006; 31:1066-1078.

Mento C, Sung CJ, Ibarreta A, Schneider S. Catalytic Ignition of Methane/Hydrogen/Oxygen Mixtures for Microthruster Applications. 42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference, AIAA Paper No. 2006-4871, 2006.

Mento C, Sung CJ, Ibarreta A, Schneider S. Effects of Hydrogen Addition on Catalytic Ignition of Rich Methane/Oxygen Mixtures in a Platinum Microtube. Technical Meeting of the Central States Section of The Combustion Institute, Case Western Reserve University, NASA Glenn Research Center, Cleveland, OH, 2006.

Ibarreta A, Sung CJ. Flame Temperature and Location Measurements of Sooting Premixed Bunsen Flames Using Rainbow Schlieren Deflectometry. Appl Opt 2005; 44, No. 14:3565-3575.

Ibarreta A, Sung CJ, Wang H. Burning Velocities of Sooting Premixed Ethylene/Air Flames In Microgravity. 4th Joint Meeting US Sections of the Combustion Institute, Paper No. F08, Philadelphia, PA, March 2005.

Han B, Ibarreta A, Sung CJ, T'ien JS. Structure of Low Stretch Methane Diffusion Flames. 4th Joint Meeting US Sections of the Combustion Institute, Paper No. F21, Philadelphia, PA, March 2005.

Ibarreta A, Sung CJ, Hirasawa T, Wang H. Burning Velocity Measurements of Sooting Premixed Flames. 42nd AIAA Aerospace Sciences Conference, Reno, NV, January 2004.

Ibarreta A, Sung CJ, Wang H, Hirasawa T. Burning Velocity Measurements of Microgravity Spherical Sooting Premixed Flames Using Rainbow Schlieren Deflectometry. Combust Flame 2005; 140:93-102.

Han B, Ibarreta A, Sung CJ, T'ien JS. Experimental Low Stretch Gaseous Diffusion Flames in Buoyancy-Induced Flowfields. Proceedings, Combustion Institute 2004; 30:527-535.

Ibarreta A, Sung CJ. Temperature Measurements in Sooting Premixed Flames Using Rainbow Schlieren Deflectometry. 42nd AIAA Aerospace Sciences Conference, Reno, NV, January 2004.

Han B, Ibarreta A, Sung CJ, T'ien J. A Study on Buoyancy-Induced Low Stretch Gaseous Diffusion Flames. 42nd AIAA Aerospace Sciences Conference, Reno, NV, January 2004.

Han B, Ibarreta A, Sung CJ, T'ien J. Experimental Diagnostics on Buoyancy-Induced Low Stretch Gaseous Diffusion Flames. Technical Meeting of Eastern States Sections of the Combustion Institute, University Park, PA, p. 157, October 2003.

Ibarreta A, Sung CJ. Determination of Flame Location Using Rainbow Schlieren Deflectometry. 3rd Joint Meeting of U.S. Sections of the Combustion Institute, Paper No. PI03, Chicago, IL, March 2003.

Han B, Ibarreta A, Sung CJ, T'ien J. On Burner-Generated Low-Stretch Diffusion Flames in Natural-Convective Flows. 3rd Joint Meeting of U.S. Sections of the Combustion Institute, Paper No. PC03, Chicago, IL, March 2003.

Ibarreta A, Driscoll, J. Effects of negative curvature on the flame structure and burning velocities of laminar premixed flames. 2nd Joint Meeting of US Sections of the Combustion Institute, Oakland, CA, March 2001.

Ibarreta A.An Experimental and Numerical Study of the Inwardly-Propagating Premixed Flame. Ph.D. thesis, University of Michigan, Ann Arbor, Michigan, June 2002.

Ibarreta A, Driscoll JF, Feikema DA. Markstein Numbers of Negatively-Stretched Flames — Microgravity Measurements and Computations. Proceedings, Combustion Institute 2002; 29:1435-1443.

Ibarreta A, Driscoll JF. Measured Burning Velocities of Stretched Inwardly Propagating Premixed Flames. Proceedings, Combustion Institute 2000; 28:1783-1791.

Presentations and Posters

Ibarreta AF. Combustible Dust Hazards – Analysis and Mitigation. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2025.

Ibarreta, AF, Rangwala, A. Workshop Presentation: Explosion Dynamics. 2023 Mary Kay O'Connor Process Safety Conference, College Station, Texas, October 13, 2023.

Ibarreta AF. Deflagration Explosion Consequence Analysis. Purdue Process Safety and Assurance Center (P2SAC) Spring Conference, Virtual, 2022.

Ibarreta AF, Myers TJ. Analysis of Industrial Explosions. Oakland County Association of Arson and Fire Investigators Inc. (QCAAFII) Quarterly Training, Virtual, 2021.

Ibarreta AF, Myers TJ. Vapor Cloud Explosion (VCE) Basics. Tutorial presentation at AIChE Spring Meeting and 17th Global Congress on Process Safety, Virtual, 2021.

Ibarreta AF. Explosion Prevention Systems - NFPA. Engineering for Safety - Battery Energy Storage Systems, FDNY, Brooklyn, October 2019.

Ibarreta AF, Colella F. Hazards and consequence analysis of flammable releases. New England Chapter of the Society of Fire Protection Engineers, November 2018.

Ibarreta AF, Myers TJ. Explosion Protection in Industrial Settings. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, April 2018

Ibarreta AF, O'Hern SC. Explosion Protection in Industrial Settings. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2016

Ibarreta AF. Flammability, Fires and Explosions. University of Michigan, Department of Chemical Engineering, Ann Arbor, MI, 2015.

Ibarreta AF, Hart RJ, Sipe J, Morrison DR, Kytömaa HK. Gas Fueled Vehicles - Changing Regulations NFPA Conference and Expo, Chicago, IL, 2015.

Ibarreta AF, Myers TJ. Over-Reliance on Automated Controls and Alarms: A Case Study. New England Area Chapters of American Society of Safety Engineers (ASSE), Warwick, RI, December 2014.

Ibarreta A, Ellison A. Investigation of Explosion Incidents. New England Chapter of the Society of Fire Protection Engineers, February 2013.

Myers TJ, Ibarreta AF. The Role of Engineering Analysis in Explosion Investigations. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2012.

Ellison A, Ibarreta A. Investigation of Explosions Using Engineering Analysis. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, April 2011.

Bucher JM, Ibarreta AF, Myers, TJ. Combustible Dusts: Hazard Recognition and Abatement. Greater Boston Chapter American Society of Safety Engineers (ASSE), Hopkinton, MA, 2011.

Ibarreta A, Myers T. Fires and Explosions Involving Fuel Gas Systems. First Party Claims Conference (FPCC), Providence-Warwick, RI, 2010.

Myers T, Ibarreta A. Investigation of Explosions Using Engineering Analysis. Worcester Polytechnic Institute (WPI), Department of Fire Protection Engineering, Worcester, MA, 2010.

Myers T, Ibarreta A. Water Leaks, Oil Spills and Gas Explosions - When Good Pipes Go Bad. Cozen O'Connor, Philadelphia, PA, 2010.

Kytömaa H, Myers T, Ibarreta A, Ponchaut NF. Anatomy of the Failures That Led to the Buncefield Explosion and Fire. Mary Kay O'Connor Process Safety Center Symposium, College Station, TX, 2009.

Myers T, Ibarreta A. Using Fire Protection Engineering to Investigate Explosions. Guest speaker presentation at Worcester Polytechnic Institute, MA, April 2009.

Myers T, Ibarreta A. Case Study of a Hydrogen Explosion in an Electrical Panel. Poster presented at the AIChE Loss Prevention Symposium, Spring 2008.

Myers T, Ibarreta A. Explosion Investigation: Reverse-Engineering a Blast Scene. Guest speaker presentation at Worcester Polytechnic Institute, MA, November 2007.

Ibarreta A, Sung CJ, Hirasawa T, Wang H. Burning Velocity Measurements of Microgravity Spherical Sooting Premixed Flames Using Rainbow Schlieren Deflectometry. Poster presented at the 30th International Symposium on Combustion, Chicago, IL, July 2004.

Project Experience

Gas Leak & Explosion Investigation

- Restaurant Gas Explosion: Applied CFD modeling and building ventilation fundamentals to investigate a natural gas leak at a commercial kitchen; calculation of gas concentrations over time allowed identification of probable ignition mechanism.

- Home Propane Explosion: Tested and analyzed gas piping components in home propane distribution system; identified most probable leak source and gas migration pathway which was key to resolving the litigation via settlement.
- Gas Migration Study: Investigated potential underground sources of natural gas, potential pathways and minimum amount of gas required to produce the observed overpressure; analysis allowed fuel gas source to be identified.

BESS Fire & Explosion Risk

- BESS Permit Application: Performed gap analysis to evaluate compliance of BESS system with local codes and NFPA standards, facilitating the filing of the facility permit with the Authority Having Jurisdiction (AHJ).
- BESS Explosion Protection Assessment: Analyzed the effectiveness of explosion vents (deflagration vents) to protect a BESS installation and assessed system compliance with NFPA 855 and NFPA 68 requirements.

Vapor Dispersion & Explosion Modeling

- Liquefied Natural Gas (LNG) Facility Permitting: Applied CFD modeling, including FLACS, to perform vapor dispersion calculations and explosion consequence analyses for flammable release scenarios at multiple LNG facilities; the analyses led to the approval of multiple facility permits by US and Mexican regulatory agencies.
- LNG Facility Hazard Mitigation: Determined the hazardous area associated with the flammable vapor cloud associated with a leak of LNG; developed potential mitigation strategies, including the use of vapor fences surrounding the facility.
- Hydrogen Release Consequence Analysis: Employed FLACS CFD modeling to determine worst-case overpressure resulting from a vented hydrogen explosion; results were used to develop hazard mitigation strategies.

Oil and Gas Facility Hazard Analysis

- LNG Facility Process Hazard Analysis (PHA): Assisted facility in assessing outcomes of worst-case failure scenarios in order to (a) meet permitting requirements and (b) complete building siting analyses.
- Refinery Fire Incident Investigation: Performed root-cause analysis of flammable release and fire incident as part of litigation; assessed whether non-compliance with safety standards contributed to the incident.
- Propane Storage Facility Piping Assessment: Served as expert testifier for international arbitration in South America involving pipe system construction contract disputes; identified piping systems that were not in compliance with ASME codes and did not meet contractual requirements.

Combustible Dust Hazard Analysis

- Manufacturer Dust Hazard Analysis (DHA) Program: Assisted more than 50 facilities owned by manufacturer in assessing combustible dust properties at locations and developed DHA program;

helped train dozens of facility workers on combustible dust hazards and applicable NFPA standard requirements.

- Combustible Dust Hazard Identification: Implemented dust sampling and testing program to identify combustible dust hazards and quantify combustible dust properties; used dust testing results to propose potential fire and explosion mitigation strategies at facility.
- Modeling of Bucket Elevator Combustible Dust Explosions: Modeled combustible dust deflagration (explosion) overpressures in several bucket elevator designs using FLACS-DustEx CFD; analysis allowed the assessment of proposed explosion venting design for multiple clients.

Advisory Appointments

Massachusetts Board of Fire Prevention Regulations (BFPR): Mechanical engineering representative. Responsible for amending and promulgating the comprehensive fire safety code (527 CMR) for the Commonwealth of Massachusetts