Exponent®
Engineering & Scientific Consulting

Todd Hetrick, P.E., CFEI, CFI, CVFI

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Professional Profile

Mr. Hetrick applies his knowledge of fire protection engineering principles and fire science to the study and investigation of fires and explosions. His practice area includes the evaluation of product liability issues, origin and cause investigation for fire and explosion accidents, and analysis of building fire and life safety systems.

Mr. Hetrick specializes in fire science, fluid mechanics, thermodynamics, and heat transfer. He performs investigations of consumer products, appliances, equipment, passenger vehicles, and properties in the residential, commercial, and industrial sectors.

Mr. Hetrick is well-versed in the design, inspection, testing, and maintenance of automatic fire and life safety systems. He has experience with automatic fire sprinkler systems, commercial kitchen fire suppression systems, automatic fire detection and alarm systems, and building code compliance evaluations. Mr. Hetrick is experienced in the design and execution of bench-scale to full-scale fire tests and is skilled in the design, fabrication, and use of thermal and fire test instrumentation. He is also experienced in the validation of theoretical fire, heat transfer, and fluid flow models through experimental studies.

Mr. Hetrick has extensive experience in total flooding clean extinguishing agent technologies and applications. Prior to joining Exponent, Mr. Hetrick supported the National Fire Protection Association and the International Standards Organization in an effort to characterize the transient behavior of clean extinguishing agents in total flooding applications. He has worked with the U.S. Federal Aviation Administration and the U.S. Air Force Research Lab in efforts to evaluate the effectiveness of candidate halon-replacement agents for passenger and cargo aircraft with an emphasis on suppression of engine nacelle fires. Additional research in this area includes the study of clean agent material compatibility, ambient pressures developed during agent discharge/flooding, agent retention times or hold times, effectiveness of clean agents to suppress smoldering, deep-seated fires, and products of thermal and environmental degradation.

Mr. Hetrick also has experience in the natural gas pipeline industry validating the maximum allowable operating pressure (MAOP) for gas transmission lines, development of pipeline features lists (PFLs), quality control methods for ensuring database accuracy, and evaluating methods for resolving unknown pipeline features.

While a student at the Worcester Polytechnic Institute, he served as a teaching assistant and specialized in measurement methods aimed at characterizing the rate of material combustion and heat release with the cone calorimeter, fire propagation apparatus, and large-scale combustion products collector. He is skilled in using PCs to automate routine test methods, standardize calibration procedures, and aid in the evaluation of measurement uncertainty. Mr. Hetrick has experience with prevalent fire modeling software including Fire Dynamics Simulator and CFAST.

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Academic Credentials & Professional Honors

M.S., Fire Protection Engineering, Worcester Polytechnic Institute, 2009

B.S., Mechanical Engineering, Worcester Polytechnic Institute, 2005

Percy Bugbee Scholarship, 2007

William M. Carey Award, 2007

Maatman Fellowship, 2005

Licenses and Certifications

Professional Engineer, Illinois, #62065202

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

Certified Fire and Explosion Investigator (CFEI)

Certified Fire Investigator (CFI)

Certified Vehicle Fire Investigator (CVFI)

Hazardous Material Regulations (HMR) training in accordance with 49 CFR Subchapter C

Professional Affiliations

International Association of Arson Investigators—IAAI

International Association of Arson Investigators, Illinois Chapter

National Association of Fire Investigators—NAFI

National Fire Protection Association—NFPA

- Technical Committee on LP-Gases at Utility Gas Plants (NFPA 59)
- Technical Committee on Transportation of Flammable Liquids (NFPA 385)
- Technical Committee on Industrial Trucks (NFPA 505)

National Fire Protection Association, Illiana Chapter, Industrial Fire Protection Section

Society of Fire Protection Engineers—SFPE

Society of Fire Protection Engineers, Chicago Chapter

Publications

Hetrick TM, Smyth SA, Ogle RA, Ramirez JC. Evaluating the potential for gasoline geysering from small engine fuel tanks. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering, 2017 October; 4(2).

Ogle RA, Ramirez JC, Hetrick TM. Domino effect in a catastrophic solid oxidizer fire. Process Safety Progress 2015; 34; 167-171.

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.

Hetrick TM, Smyth SA, Ogle RA, Ramirez JC. Evaluating the potential for flashing discharge from small engine fuel tanks. ASME 2014 International Mechanical Engineering Conference & Exposition (IMECE 2014), Montreal, QC, November, 2014.

Hetrick TM, Morrison DR, Ramirez JC, Ott BA, Karnesky J. Analysis of flammable liquid ejection from a container following headspace vapor ignition. Proceedings, International Symposium on Fire Investigation Science and Technology, College Park, MD, National Association of Fire Investigators, Sarasota, FL, September 22-24, 2014.

Smyth S, Hetrick T. Designing for fire prevention. Association of Equipment Manufacturers, Product Safety and Compliance Seminar, Schaumburg, IL, April 28-30, 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.

Ogle RA, Ramirez JC, Hetrick TM. Domino effect in a catastrophic solid oxidizer fire. American Institute of Chemical Engineers, 2014 Spring National Meeting, 10th Global Congress on Process Safety, New Orleans, LA, March 30-April 2, 2014.

Hetrick TH. Fire investigation. Invited lecture, Northwestern University, CIV_ENV 395-0 Sec. 20, Engineering Forensics, November 12, 2013.

Hetrick T, Ramirez JC, and Morrison D. Ejection of flammable liquids during loading and unloading: A preliminary experimental investigation. ASME 2013 International Mechanical Engineering Conference & Exposition (IMECE 2013), San Diego, CA, November, 2013.

Dee SJ, Hart RJ, Hetrick TM, Morrison DR. Hot surface ignition of bearing grease in horizontal and vertical orientations. Proceedings, International Symposium on Fire Investigation Science and Technology, College Park, MD, National Association of Fire Investigators, Sarasota, FL, October 15-18, 2012.

Bailey WH, Su S, Johnson GB, Bishop J, Hetrick T. Measurements of charged aerosols near 500-kV DC transmission lines and in other environments. IEEE Transactions on Power Delivery, 2012 January; 27(1): 371-379.

Hetrick TM. Introduction to process safety management and process hazard analysis. Invited lecture, Worcester Polytechnic Institute, FPE 573 Industrial Fire Protection, Fire Protection Engineering Department, December 5, 2011.

Morrison DR, Dillon SE, Hetrick TM. A review of the hypotheses of low-temperature self-ignition of wood. Conference Proceedings, 2011 Fire and Materials Conference, San Francisco, CA, Interscience Communications Limited, London, January 2011.

Hetrick TM, Rangwala AS. A modified hold time model for total flooding fire suppression. Fire Safety Journal, 2010 January; 45(1):12-20.

Gollner MJ, Hetrick TM, Rangwala AS, Perricone J, Williams FA. Controlling parameters involved in the burning of standard storage commodities: A fundamental approach towards fire hazard classification.

Conference Proceedings, 6th U.S. National Combustion Meeting, Ann Arbor, MI, May 17-20, 2009.

Hetrick TM, Rangwala AS, Rivers PE. Development and validation of a modified hold time model for total flooding fire suppression. Conference Proceedings, Suppression and Detection Research and Applications - A Technical Working Conference (SUPDET 2009), Orlando, FL, February 24-27, 2009.

Hetrick TM. Development and validation of a modified clean agent draining model for total flooding fire suppression systems. Master's Thesis, Worcester Polytechnic Institute, Department of Fire Protection Engineering, 2009.

Hetrick TM, Rangwala AS. Validation study on hold time models for total flooding clean extinguishing agents. Poster presentation, 32nd International Symposium on Combustion, Montreal, Canada, August 3-8, 2008.

Hetrick TM. Analysis of hold time models for total flooding clean extinguishing agents. Fire Technology, 2008 September; 44(3):239-261, September.

Hetrick TM, Rangwala AS. Validation study on clean extinguishing agent hold time calculation methodologies. Proceedings, 2008 Spring Technical Meeting of the Central States Section of the Combustion Institute, Tuscaloosa, AL, April 20-22, 2008.

Hetrick TM, Rangwala AS. Analysis of hold time models for total flooding clean extinguishing agents. Conference Proceedings, Suppression and Detection Research and Applications - A Technical Working Conference (SUPDET 2008), Orlando, FL, March 11-13, 2008.

Hetrick T, Rivers PE. Investigation of hold time calculation methodologies for total flooding clean extinguishing agents. Conference Proceedings, Suppression and Detection Research and Applications - A Technical Working Conference (SUPDET 2007), Orlando, FL, March 5-8, 2007.

Hetrick T, Barden T. Train fire modeling in fire dynamics simulator (FDS). National Fire Protection Association World Safety Conference & Exposition, June 4-8, 2006.

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