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Engineering & Scientific Consulting

Nicholas Traina, Ph.D., P.E.

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Professional Profile

Dr. Traina specializes in investigating and analyzing fires, evaluating the fire performance of materials and products, performing building and fire code assessments, performing safety evaluations of consumer products, and providing technical consulting services for natural gas facilities and pipelines.

Dr. Traina performs origin and cause investigation of fires and explosions and has performed these investigations in residential, industrial, and commercial structures. He also has experience with vehicle fire investigations including consumer vehicles, agricultural equipment, and other heavy equipment. While at Exponent, Dr. Traina also has evaluated the safety of consumer products in regards to thermal and fire safety performance. Some of the evaluated products include electric and fuel-based indoor fireplaces, refrigeration equipment, clothing and apparel, and cooking appliances. He also provides technical consulting services for natural gas facilities and pipelines. Some examples of his experience include risk analyses of unintentional and intentional releases of flammable gases and root cause analyses of incidents involving natural gas pipelines, which have involved overpressure incidents, equipment failure incidents, and accidental ignition incidents during intentional releases of flammable gas. He also has been involved in numerous investigations of residential structure explosions from flammable gas leaks.

Dr. Traina's background is in mechanical engineering with a focus on fluid mechanics, heat transfer, laser diagnostics, combustion, and fire dynamics. He has extensive experience with fire dynamics in residential environments and has studied the effectiveness of different fire-service tactics, including ventilation and water application, on controlling fires containing modern fuel loads. He has also examined the threat of radiant and convective heat, carbon monoxide, and hydrogen cyanide to potentially trapped occupants and quantified the typical timelines available for occupants to escape residential structures for kitchen, living room, and bedroom fires in one-story and two-story structures.

Prior to joining Exponent, he completed his Ph.D. in Mechanical Engineering at the University of Illinois at Urbana-Champaign. His thesis focused on tenability and laser diagnostics in the fire environment. Using laser absorption spectroscopy, he was able to successfully implement a tunable diode laser technique for measuring water vapor and a mid-infrared laser technique for measuring hydrogen cyanide in the highly corrosive environment created during large-scale fires. He was also able to successfully implement a porcine skin surrogate model to quantify the risk of fire-service water application steaming potentially trapped occupants.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Illinois, Urbana-Champaign, 2017

M.S., Mechanical Engineering, University of Illinois, Urbana-Champaign, 2012

B.S., Mechanical Engineering, University of Illinois, Urbana-Champaign, 2012

SFPE Educational and Scientific Foundation Student Scholar Award, 2017

SFPE Chicago Chapter Scholarship, 2016-2017

Licenses and Certifications

Licensed Professional Engineer, Illinois, #062073611

Certified Fire and Explosion Investigator, NAFI No. 23195-13378

Certified Vehicle Fire Investigator, NAFI No. 23195-13378v

Prior Experience

Research Assistant, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, 2013-2017

Teaching Assistant, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, 2014-2016

Publications

Ghanekar S, Rajasegar R, Traina N, et al. In-situ measurement of water-vapor in fire environments using a real-time tunable diode laser based system. Fire Safety Journal 2021; 120:103114.

Halloran M, Traina N, Choi J, Lee T, Yoo J. Simultaneous Measurements of Light Hydrocarbons Using Supercontinuum Laser Absorption Spectroscopy. Energy Fuels 2020; 3:3671-3678.

Traina N, Kerber S, Kyritsis DC, Horn GP. Occupant tenability in single family homes part I-Impact of structure type, fire location and interior doors prior to fire department arrival. Fire Technology 2017; 53:1589-1610.

Traina N, Kerber S, Kyritsis DC, Horn GP. Occupant tenability in single family homes part II-Impact of door control, vertical ventilation and water application. Fire Technology 2017; 53:1611-1640.

Yoo J, Traina N, Halloran M, and Lee T. Minute concentration measurements of simple hydrocarbon species using supercontinuum laser absorption spectroscopy. Applied Spectroscopy 2016; 70:1063-1071.

Conference Proceedings and Presentations

Nasir E, Dee SJ, Smyth S, Traina N. Understanding Fire Hazards in Inert Cryogenic Systems. AIChE Midwest Regional Conference, Chicago, IL, March 17-18, 2021.

Cloninger C, Smyth S, Traina N. Perception & Expert Biases: Analyzing Testimony and Critiquing Opinions, OCAAFII Quarterly Training, March 16, 2021.

Traina N, Morrison DR. Applying toxic gas exposure models for fire victim exposure. International Symposium on Fire Investigation, Itasca, IL, September 24-26, 2018.

Cox BC, Bishop J, Ogle RA, Traina N, Prigmore J. Bonded, grounded, and burned to a crisp: electrostatic ignition of flammable gases. 14th Global Congress on Process Safety, Orlando, FL, April 22-25, 2018.

Traina N, Cox BC, Dee SJ. The sweet smell of ammonia hazards. AIChE Midwest Regional Conference, Chicago, IL, March 13-14, 2018.

Traina N, Kerber S, Kyritsis DC, Horn GP. Occupant tenability in residential fires. SFPE Conference and Expo, Montreal, QC, October 9-11, 2017.

Traina N, Kerber S, Horn GP. Effect of firefighter water application on occupant burn risk and tenability. Poster presentation, NFPA Conference and Expo, Boston, MA, 2017.

Traina N, Kerber S, Kyritsis DC, Horn GP. Effect of different ventilation configurations on the fire environment in residential structures. Presentation, 2013 SFPE Annual Meeting: Professional Development Conference and Exposition, Austin, TX, 2013.

Traina N, Kerber S, Kyritsis DC, Horn GP. Effect of external water application on tenability and the fire environment. Poster presentation, NFPA Conference and Expo, Chicago, IL, 2013.

Traina N, Kerber S, Kyritsis DC, Horn GP. Analysis of water application in large-scale residential structures. Presentation, The 8th U.S. National Meeting of the Combustion Institute, Park City, UT, 2013.