

Exponent®
Engineering & Scientific Consulting

Tom Long, Jr., P.E., CFEI

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Professional Profile

Mr. Long is a Corporate Vice President and a Principal Engineer in the Thermal Sciences practice with over two decades of fire protection engineering consulting experience.

Mr. Long specializes in the prevention, engineering and causative analysis, and origin and cause investigation of fires, explosions, and other thermal events.

Mr. Long provides building and fire protection code consultation and engineered performance-based solutions for the installation and operation of: fire protection and life safety systems, including automatic fire sprinkler, foam, and chemical agent systems; automatic fire alarm and detection systems; commercial cooking fire protection systems; fire protection water infrastructure; wet and dry pre-engineered systems; smoke control systems; and occupant egress systems in residential, commercial, industrial, storage, manufacturing, processing, and other occupancies. He evaluates building construction, occupancies, and fire protection systems for compliance with model building and fire codes.

Mr. Long has specific experience in determining the applicable codes and standards and in the evaluation and inspection of buildings, structures, facilities, processes, equipment, and fire protection systems design, installation, and operation, for compliance with nationally and internationally accepted building and fire safety codes, standards, regulations, and guidelines, including model code families published by the National Fire Protection Association (NFPA), the International Code Council (ICC), the Occupational Safety and Health Administration (OSHA), and the American National Standards Institute (ANSI). Mr. Long has developed procedures and protocols for compliance of these systems with applicable codes and standards and has acted as a representative and liaison between clients and Authorities Having Jurisdiction (AHJs). Mr. Long also has special expertise in the third-party engineering review of combustion systems.

Mr. Long has significant experience in evaluating the fire safety performance of consumer products as part of potential fire, burn, overheating, and recall investigations. He has experience reviewing engineering designs and the engineering analysis of failure modes and developing laboratory testing protocols as part of these investigations. Mr. Long has specific experience in analyzing sprinkler and fire protection system failures related to freezing events and inadvertent operations, failure to discharge, and failure to control/extinguish which includes analyzing the design, installation, maintenance, and code compliance of the system(s). Mr. Long conducts fire and explosion origin and cause investigations, as well as fire and explosion hazard analysis, and has investigated and analyzed numerous losses in various occupancies ranging from residential fires and explosions to explosions and fires involving industrial, commercial, high-rise, manufacturing, storage, power generation, petroleum, food processing, chemical processes, energy storage systems, and equipment. He has investigated and analyzed numerous incidents involving: welding and hot work operations; mechanical and HVAC equipment; electrical equipment; firefighter PPE; textiles; garments; scalds, burns, thermal injuries; consumer products; consumer appliances; lithium ion batteries, utilities; candles; self-heating materials; flammable and

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combustible liquids; combustible dusts; residential and commercial cooking equipment; mattresses; upholstered furniture; automotive(ICE, EV, BEV, HEV), aviation, rail, off-road, industrial and marine vehicles; as well as solid fuel, propane and natural gas appliances, equipment, regulators, valves, and fuel gas systems (both portable and fixed). He has investigated a wide range of fire and explosion safety problems and worked to develop solutions to the problems encountered.

Mr. Long has provided testimony as an expert witness in various state and federal courts regarding: fire protection system design and performance; root cause analysis of sprinkler and fire protection system failures; fire origin, cause and spread; welding and hot work operations; structure fires; vehicle and marine fires; building and fire codes and standards compliance; and flammability of consumer products and materials, amongst other topics.

Mr. Long has extensive fire, flammability, and thermal research and testing experience with numerous small, intermediate, and large-scale fire and flammability national and international testing protocols and methods, including those published by the ASTM, NFPA, CBHFTI, FM, UFAC, ISO, UL, and in the CFR. He has extensive experience conducting fire research and testing of Lithium ion cells and batteries used in consumer devices, energy storage systems, and electric drive vehicles. He has provided guidance to governmental, industry, and professional organizations on the hazards associated with and suppression strategies for lithium ion battery fires. He has also provided guidance on other alternative energy sources including hydrogen and hydrogen fuel cells.

Mr. Long actively participates in the development of fire protection standards through his participation, both past and present, on technical committees for the National Fire Protection Association (NFPA). He maintains his expertise by regularly attending conferences, seminars and continuing education training sponsored by professional and technical organizations including the NFPA, SFPE, IAAI, NAFI, AFSA, and NFSA among others.

Mr. Long has experience with battery fire risks and safety and assessing energy storage systems (ESS) for code compliance, having conducted full scale burns of battery and ESS systems. Mr. Long has investigated fires involving ESS and other battery installations and facilities and assisted in the assessment of passive and active fire protection features, systems, and components for protection of various facilities. Mr. Long has conducted numerous test programs to evaluate the effectiveness of suppression strategies on lithium-ion technologies.

Prior to joining Exponent, Mr. Long conducted fire research at the University of Maryland, Department of Fire Protection Engineering and was the lab manager responsible for the remodeling and construction of the fire research laboratories during his tenure. During his graduate research assistantship, he was responsible for the design, construction, and operation of the FIST apparatus to characterize the combustion of solid materials in normal and subsequently in reduced gravity environments. This work was funded by NASA.

Academic Credentials & Professional Honors

M.S., Fire Protection Engineering, University of Maryland, College Park, 1998

B.S., Fire Protection Engineering, University of Maryland, College Park, 1996

Hartford Steam Boiler Professional Loss Control Fellowship 1997–1998

NASA Graduate Research Assistant UMD, 1997–1998

Committee Memberships

Principal Member: Technical Committee on Venting Systems for Cooking Appliances (VEN-AAA) NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, National Fire

Protection Association, 2021 – present

Principal Member: Technical Committee on Hot Work Operations (HWO-AAA), NFPA 51B: Standard for Fire Prevention during Welding, Cutting, and Other Hot Work, National Fire Protection Association, 2008–present; Member of the Smoldering Task Group.

Principal Member: Technical Committee on Dry and Wet Chemical Extinguishing Systems (DRY-AAA), NFPA 17: Standard for Dry Chemical Extinguishing Systems and NFPA 17A: Standard for Wet Chemical Extinguishing Systems, National Fire Protection Association, 2009–present.

Former IAAI Grant Management Team, Electric and Alternative Fueled Vehicles, Development of two modules to include a general overview of systems operations of the various alternative fueled vehicles and an introduction into investigation and analysis of fires involving alternative fueled vehicles, 2019-2021.

Former Principal Member: Fundamentals (FLC-FUN) NFPA 30, Flammable and Combustible Liquids Code, National Fire Protection Association, 2021 – 2025

Former Alternate Member: Technical Committee on Fundamentals of Combustion System Hazards (BCS-FUN), NFPA 85: Boiler Combustion System Hazards Code, National Fire Protection Association, 2012–2018, Principal Member 2003–2012.

Former Principal Member: (PIP-AAA) NFPA 1620: Recommended Practice for Pre-Incident Planning, National Fire Protection Association, 2008–2016.

Former Principal Member: Technical Committee on Fire Tests (FIZ-AAA), National Fire Protection Association (Representing the Upholstered Furniture Action Council), 2011–2017.

Former Member: Building/Life Safety Code Technical Committee on Residential Occupancies (SAF-RES, BLD-RES), NFPA 101, Life Safety Code; and NFPA 5000, Building Construction and Safety Code, National Fire Protection Association (Representing the Upholstered Furniture Action Council), 2011–2017.

Former Member: Building/Life Safety Code Technical Committee on Furnishings and Contents (SAF-FUR, BLD-FUR), NFPA 101, Life Safety Code; and NFPA 5000, Building Construction and Safety Code, National Fire Protection Association (Representing the Upholstered Furniture Action Council), 2011–2017.

Former Member: NFPA Technical Committee on Hazard and Risk of Contents and Furnishings (HAR-AAA): NFPA 555 Guide on Methods for Evaluating Potential for Room Flashover, NFPA 556 Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles, NFPA 557 Standard Fire Loads for Engineering Design of Structural Fire Resistance in Buildings. (Representing the Upholstered Furniture Action Council), 2009–2017.

Former Alternate Member: NFPA Technical Correlating Committee on Professional Qualifications (PQU-AAC), NFPA 1000, NFPA 1001, NFPA 1002, NFPA 1003, NFPA 1005, NFPA 1006, NFPA 1021, NFPA 1026, NFPA 1031, NFPA 1033, NFPA 1035, NFPA 1037, NFPA 1041, NFPA 1051, NFPA 1061, NFPA 1071, NFPA 1072, NFPA 1081, NFPA 1091, NFPA 1521, National Fire Protection Association, 2015–2016.

Former Alternate Member: Building/Life Safety Code Technical Committee on Fundamentals, NFPA 101, Life Safety Code; and NFPA 5000, Building Construction and Safety Code, National Fire Protection Association, 2010–2016.

Former Principal Member: Technical Committee on Single- and Multiple-Station Alarms and Household Fire Alarm Systems (SIG-HOU): NFPA 72 National Fire Alarm Code, National Fire Protection Association,

2010–2013.

Former Member: International Standards Council (ISC), International Code Council (ICC), 2009–2010.

Awards

National Fire Protection Association (NFPA) 2017 Fire Protection Research Foundation Medal National Fire Protection Association (NFPA), Fire Protection Research Foundation Report “Lithium Ion Batteries Hazard and Use Assessment – Phase 3”. The Fire Protection Research Foundation Medal recognizes a project completed in 2017 that best exemplifies the Foundation’s fire safety mission and the collaborative approach to execution that is the hallmark of all its projects.

National Fire Protection Association (NFPA) 2014 Fire Protection Research Foundation Medal, “Best Practices for Emergency Response to Incidents Involving Electric Vehicles Battery Hazards: A Report on Full-Scale Testing Results.” The Fire Protection Research Foundation Medal recognizes a project completed in 2013 that best exemplifies the Foundation’s fire safety mission and the collaborative approach to execution that is the hallmark of all its projects.

http://conference.blog.nfpa.org/2014/06/best-practices-for-emergency-response-to-incidents-involving-electric-vehicles-battery-hazards-a-rep.html

2013 William M. Carey Award for best suppression paper, NFPA FPRF Suppression, Detection and Signaling Research and Applications (SUPDET) Symposium, “Flammability Characterization Testing of Lithium Ion Batteries.”

http://foundation.blog.nfp.org/2013/07/fire-protection-research-foundation-announces-winners-of-the-2013-william-m-carey-and-ronald-k-menge.html

Former Principal Member: Fundamentals (FLC-FUN) NFPA 30, Flammable and Combustible Liquids Code, National Fire Protection Association, 2021 – 2025

Licenses and Certifications

Professional Engineer Fire , Arizona, #57736

Professional Engineer Fire , California, #1707

Professional Engineer, Colorado, #PE-0042866

Professional Engineer, Connecticut, #PEN.0031625

Professional Engineer Fire , Delaware, #16006

Professional Engineer Fire , Florida, #78333

Professional Engineer, Georgia, #PE047984

Professional Engineer, Illinois, #062061500

Professional Engineer, Indiana, #PE11100127

Professional Engineer, Kansas, #PE25520

Professional Engineer, Kentucky, #39255

Professional Engineer Fire , Louisiana, #PE.0039423

Professional Engineer, Maine, #PE19346

Professional Engineer, Maryland, #31236

Professional Engineer Fire , Massachusetts, #55765

Professional Engineer, Michigan, #6201062948

Professional Engineer, Mississippi, #27690

Professional Engineer, Missouri, #2017037507

Professional Engineer, Nebraska, #E-22062

Professional Engineer, Nevada, #025229

Professional Engineer Fire , New Hampshire, #12760

Professional Engineer, New Jersey, #24GE04845800

Professional Engineer, New Jersey, #24GE04845800

Professional Engineer, New York, #86751

Professional Engineer, North Carolina, #041960

Professional Engineer, Ohio, #PE.77174

Professional Engineer, Oklahoma, #37342

Professional Engineer, Pennsylvania, #PE076022

Professional Engineer, Rhode Island, #PE.0009587

Professional Engineer, South Carolina, #28379

Professional Engineer, Tennessee, #113898

Professional Engineer Fire , Texas, #115012

Professional Engineer, Virginia, #0402045406

Professional Engineer, West Virginia, #22098

Professional Engineer, Wisconsin, #39698-6

Professional Engineer Fire , Wyoming, #PE 17971

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

OSHA Asbestos Awareness Training

Confined Space Entry (29 CFR 1910.146)

Certified Fire and Explosion Investigator (CFEI)

Certified Vehicle Fire Investigator (CVFI)

National Fire Protection Association (NFPA) Hot Work Safety Certificate Program

Occupational Health and Safety Fire Extinguisher Training, in accordance with OSHA regulation #1910-157

Academic Appointments

Webinar Instructor (with Ditch, B): “Development of Fire Protection Guidance for Energy Storage Systems”, June 27, 2019

Webinar Instructor (with Ditch, B): “Development of Sprinkler Protection for Warehouse Storage of Lithium Ion Batteries”, April 13, 2017.

Instructor: “Scientific Investigation of Fires and Explosions”, Professional Development Seminar, University of Maryland, April 10, 2017.

Webinar Instructor (with Blum, AF): National Fire Protection Association webinar: "Hazard Assessment of Lithium Ion Battery Energy Storage Systems", April 2016.

Webinar Instructor: Fire Protection Research Foundation webinar: "Responding to Electrical Vehicle Battery Fires," 2014.

Guest Lecturer, University of Maryland, Department of Fire Protection Engineering, 2006 - present.

Instructor (with F. Mowrer): SFPE Professional Development Conference and Exposition: The Annual Meeting, "Beyond Cause and Origin: Engineering Analysis of Building Fires," 2009, 2010, 2015, 2021.

Professional Affiliations

American Fire Sprinkler Association – AFSA (member)

International Association of Arson Investigators—IAAI (member)

International Code Council®—ICC (professional member)

Maryland Society of Professional Engineers—MDSPE (former member)

Maryland Fire and Explosion Investigators MFEI-IAAI (member)

National Association of Fire Investigators—NAFI (member)

National Fire Sprinkler Association – NFSA (member)

National Fire Protection Association—NFPA (member)

National Society of Professional Engineers—NSPE (member)

Society of Fire Protection Engineers—SFPE (professional member grade)

Order of the Engineer (member)

Boards

Member, Board of Visitors, The FIRE Center, University of Maryland, Glenn L. Martin Institute of Technology, A. James Clark School of Engineering, Department of Fire Protection Engineering (2010-2019)

Member, Society of Fire Protection Engineers (SFPE) Editorial Advisory Board for Fire Protection Engineering magazine (2008-present)

Publications

Long RT, Faenza N, De Beer J. ISP 3941 Adds Class L for Li-Ion Battery Fire Safety ISO 3941 Unveils Class L for Li-ion Battery Fire Safety | Exponent March 2026

Long RT, Synodis M, Wolf M, Barry M, Dimitrakopoulos G, De Beer J. Mitigating Fires in Recycling Facilities Mitigating Fires in Recycling Facilities | Exponent August 2025

Long RT, De Beer J. FM Approves Its First Oxygen Reduction Fire Suppression System FM Approves Its First Oxygen Reduction Fire Suppression System | Exponent March 2025

Long RT, Faenza N, De Beer J. Thermal Hazards of Using Fire Blankets for EV Fires Thermal Hazards of Using Fire Blankets for EV Fires | Exponent June 2025

Long RT, Wechsung A, Wikramanayake E, Banning M, Stern M, Buehler C, Kytomaa H, Hydrogen Fire Safety – An old acquaintance in new roles, Fire Protection Engineering, Issue #94, 2nd Quarter 2022; https://www.exponent.com/knowledge/publications/2022/08/new-hydrogen-applications-test-limits-of-fire/

Long RT. The Development of Sprinkler Protection Guidance for ESS, SFPE, FPE eXTRA Issue 46, October 2019

Long RT, Misera A, Ditch B, Zeng D. Sprinkler Protection Guidance for Lithium-Ion Based Energy Storage Systems, SFPE Europe, Q2 2019, Issue 14

Long RT, Blum AF. Fire Protection Guidance for Warehouse Storage of Cartoned Li-Ion Batteries, SFPE Europe, 1st Quarter 2017, Issue 5.

Long RT, Blum AF. Fire Testing of a Lithium Ion Battery Energy Storage System, Fire Protection Engineering, Issue #73, 1st Quarter 2017.

Colella F, Biteau H, Ponchaut N, Marr K, Somandepalli V, Long RT. Fire Characterization of Li-ion Batteries in Electric Vehicles, 2016.

Long RT, Blum AF. Fire Hazard Assessment of Lithium Ion Battery Energy Storage Systems, SpringerBriefs in Fire, 2016.

Colella F, Long RT, Biteau H, Ponchaut N, Marr K, Somandepalli V, Horn Q. Electric Vehicle Fires. International Symposium on Tunnel Safety and Security (ISTSS) 2016, March 16-18, 2016.

Colella F, Long RT, Ponchaut N, Marr K, Somandepalli V, Horn Q. Characterization of electric vehicle fires. 16th International symposium on Aerodynamics, Ventilation & Fire in Tunnels", September 14-18, 2015.

Long RT, Blum AF. Full-scale fire tests of electric drive vehicle batteries. SAE International Journal of Passenger Cars - Mechanical Systems, Society of Automotive Engineers, July 2015. http://saepcmech.saejournals.org/

Long RT, Blum AF. Electric vehicle battery hazards: Hands-on fire test data for emergency responders. Fire Protection Engineering, Issue 62, 2nd Quarter 2014.

Long RT, Sutula J. Fire protection storage of Li-ion cells and batteries. Fire Protection Engineering, Emerging Trends, Issue 80, January 2014.

Long RT, Mikolajczak CJ. Lithium-ion batteries hazards: What you need to know. Fire Protection Engineering Q4 2012.

Long RT, Wu NP. Professional practice. Fire Protection Engineering, 3rd Quarter 2011.

Blum AF, Long RT. Investigation of inadvertent automatic fire sprinkler system discharges. Subrogator Magazine, National Association of Subrogation Professionals, Winter 2011.

Long RT, Wu NP, Blum AF. Unsatisfactory sprinkler performance: An update on trends and a root cause discussion from the investigating engineer's perspective. Fire Protection Engineering, 4th Quarter 2010.

Myers T, Long RT, Gavelli F, Kytömaa HK. The use of smoke detector sequence of activation in determining the area of origin of a fire: investigation of the FedEx DC-10 fire. Proceedings, International Symposium on Fire Investigation Science and Technology, Cincinnati, OH, May 2008.

Garrett JL, Smith SJ, Long RT. Blast indicators and damage assessment associated with a boiler explosion. Mechanics and Materials Conference, 2001.

Long RT, Quintiere JG, Torero JL, Fernandez-Pello AC. Scale and transport considerations on piloted ignition of PMMA. 6th International Symposium on Fire Safety Science, 1999.

Cordova JL, Zhou Y, Pfaff CC, Long RT, Fernandez-Pello AC, Torero JL. Effects of oxidizer flow characteristics on the flammability diagrams of solid combustible materials. 5th ASME/JSME Thermal Engineering Joint Conference, AJTE99-6244, 1999

Steinhaus T, Olenick SM, Long RT, Sifuentes A, Torero JL. A method for assessing material flammability for micro-gravity environments. Joint Meeting of the United States Sections, The Combustion Institute, Washington, D.C., 1999.

Dillon SE, Wu NP, Long RT, Heater D. Material fire properties. FAA Fire Conference, Atlantic City, NJ, November 1998.

Long RT. An evaluation of the lateral ignition and flame spread test for material flammability assessment for micro-gravity environments. Thesis Publication 1998, University of Maryland at College Park, Department of Fire Protection Engineering.

Cordova JL, Ceamones J, Long RT, Fernandez-Pello AC, Quintiere JG, Torero JL. Flow effects on the flammability diagrams of solid fuels. 4th International Micro Gravity Combustion Symposium Workshop, Cleveland, OH, May 1997.

Book Chapters

Long RT, Colwell J, Grossman H, Ray R, Thomas B, Strassburger R. Passenger vehicle fires. Chapter 1, Section 21. In: Fire Protection Handbook, 20th Edition. National Fire Protection Association (NFPA), pp. 21-3-21-14 Quincy, MA, 2008.

Reports

Long RT, Sprinkler Protection Guidance for Lithium-Ion Based Energy Storage Systems, Fire Protection Research Foundation, May 2019.

Long RT, Lithium Ion Batteries Hazard and Use Assessment Phase III: Sprinkler Protection Criteria for Lithium Ion Batteries Stored in Cartons, Fire Protection Research Foundation, November 2016. http://www.nfpa.org/news-and-research/fire-statistics-and-reports/research-reports/hazardous-materials/other-hazards/lithium-ion-batteries-hazard-and-use-assessment

Long RT, Blum AF. Hazard Assessment of Lithium Ion Battery Energy Storage Systems. National Fire Protection Association, Fire Protection Research Foundation, February 2016. http://www.nfpa.org/research/fire-protection-research-foundation/projects-reports-and-proceedings/other-research-topics/hazard-assessment-of-lithium-ion-battery-energy-storage-systems

Long RT, Sutula J, Kahn M. Flammability of cartoned Lithium ion batteries. Springer Briefs in Fire. May 2014. http://link.springer.com/chapter/10.1007/978-1-4939-1077-9_1

Long RT, Blum AF, Bress TJ, Cotts BRT. Emergency response to incidents involving electric vehicle battery hazards. Fire Protection Research Foundation Report, July 2013. http://www.nfpa.org/research/fire-protection-research-foundation/reports-and-proceedings/electrical-safety/new-technologies-and-electrical-safety/emergency-response-to-incident-involving-electric-vehicle-battery-hazards

Long RT, Kahn M, Sutula, J. Lithium-ion batteries hazard and use assessment Phase IIb. Fire Protection Research Foundation Report, 2013. http://www.nfpa.org/research/fire-protection-research-foundation/reports-and-proceedings/hazardous-materials/other-hazards/lithium-ion-batteries-hazard-and-use-assessment-ph-iib Long RT, Utiskul Y, Wu NP. Franklin Electrical Substation: Fire safety study, May 4, 2012.

12Long RT, Mikolajczak C, White K, Kahn M. Lithium-ion batteries hazard and use assessment Phase IIa. Fire Protection Research Foundation Report, April 2012. http://www.nfpa.org/research/fire-protection-research-foundation/reports-and-proceedings/hazardous-materials/other-hazards/lithium-ion-batteries-hazard-and-use-assessment

11Long RT, Mikolajczak C, White K, Kahn M. Lithium-ion batteries hazard and use assessment. Springer Briefs, April 2012. http://dx.doi.org/10.1007/978-1-4614-3486-3 http://www.springer.com/engineering/energy+technology/book/978-1-4614-3485-6

10Long RT, Mikolajczak C, White K, Kahn M. Lithium-Ion Batteries Hazard and Use Assessment. Fire Protection Research Foundation Report, July 2011. http://www.nfpa.org/assets/files//PDF/Research/RFLithiumIonBatteriesHazard.pdf

Anderson L, Mikolajczak C, Long RT, Paustenbach D. A review of CBHF proposed Technical Bulletin 603. Exponent Report, April 2003

8Long RT, Reza A, Mongia R. Damage to the WTC Complex due to the collapse of a single tower, mechanical subsystems, fire, smoke and dust contamination. Chapter 2: World Trade Center Fire Protection System Performance and Expected Actions of the Fire Department City of New York if Only One Plane Strike had Occurred on September 11, 2001, 2002.

Smith T, Reza A, Long RT. Investigation of the October 13, 1998 explosion at Condea Vista Chemicals, Baltimore, Maryland. Exponent FaAA Report, March 1999.

Torero JL, Quintiere JG, Long RT. Scaling effects on the lateral ignition and flame spread test apparatus. NASA-LeRC Report, 1997.

Ghandi S, Quintiere JG, Long RT. Fire tests of passenger rail car materials. NTSB 12-96-SP-034, November 1996.

Selected Invited Presentations

Long RT, Sefton WJ, Nava N. Fire Scene Investigations for the 21st Century: Techniques and Technologies DRI 2022 Product Liability Conference, February 2, 2022.

2Long RT, Ditch B. Coupled Sprinkler Protection and Installation Guidance for Li-Ion Battery Based Energy Storage Systems. Suppression, Detection and Signaling Research and Applications Conference (SUPDET 2019), September 19, 2019

1Long RT. Sprinkler Protection Guidance for Lithium-Ion Based Energy Storage Systems. NFPA Conference & Expo, June 18, 2019.

Long RT. Managing Your Risk and Risk Avoidance. AFSA's 37th Annual Convention, Exhibition & Apprentice Competition, September 30, 2018.

Long RT, Ditch B. Development of Protection Recommendations for Li-ion Battery Bulk Storage: Sprinklered Fire Test. SUPDET 2017, AUBE'17, September 12, 2017.

Long RT, Ditch B. Lithium Ion Batteries Stored in Cartons - Sprinkler Protection Criteria. 2017 NFPA Conference and Expo, June 6, 2017.

Long RT, Collier, K, Vesta, R, O'Rorke, A, Rauchwerger, D. Why Small Fires Become Big Fires? Effective Strategies for Developing Fire Spread Recoveries. CLM 2017 Annual Conference, March 30, 2017.

Long RT, Blum AF. Lithium Ion Batteries in Energy Storage Systems -- Assessing the Hazard, National Fire Protection Association's (NFPA) Conference & Exposition, June 2016. Long RT, Ditch B. Cartoned Lithium Ion Battery Storage Sprinkler Protection. National Fire Protection Association's (NFPA) Conference & Exposition, June 2016.

Long RT, Blum AF. Lithium-ion Energy Storage System Fires. Society of Fire Protection Engineers (SFPE), Suppression, Detection and Signaling Research and Applications Conference (SUPDET), March 2016.

Long RT, Ditch B. Cartoned Lithium Ion Battery Storage Sprinkler Protection. National Fire Protection Association SUPDET 2016, March 2016.

Blum AF, Long RT. Full-scale fire tests of electric drive vehicle batteries. SAE 2015 World Congress & Exhibition, Detroit, MI, April 21-23, 2015. SS200 - Fire Safety. Paper number 2015-01-1383.

Long RT, Blum AF. Suppressing lithium-ion electric drive vehicle battery fires with water. Fire Protection Research Foundation Suppression, Detection and Signaling Research and Applications Conference, Orlando, FL, March 6, 2015.

Long RT, Blum AF. Emergency response to incidents involving electric vehicle battery hazards: Full-scale testing results. International Symposium on Fire Investigation Science and Technology, Marriott Conference Center, UMUC Campus, College Park, MD, September 22, 2014.

Somandepalli, V, Long RT. Lithium ion battery fire hazards and protection solutions: Where we are and where we need to go. National Fire Protection Association's Conference & Exposition, June 11, 2014.

Long RT, Blum AF. Best practices for emergency response to incidents involving electric vehicle battery hazards. National Fire Protection Association's Conference & Exposition, June 11, 2013.

Long RT, Ditch B. Flammability characterization of lithium ion batteries for storage protection. National Fire Protection Association's Conference & Exposition, June 10, 2013.

Long RT, Blum AF, Keller EC. Large loss fires and their connection with fire sprinkler performance. National Fire Protection Association's Conference & Exposition, June 10, 2013.

Long RT, Wieczorek C, Ditch B. Flammability characterization testing of lithium ion batteries. Fire Protection Research Foundation Suppression, Detection and Signaling Research and Applications Conference, Orlando, FL, February 27, 2013.

Blum AF, Long RT, Dillon SE. Investigating inadvertent automatic fire sprinkler system discharges. American Society of Civil Engineers (ASCE) 6th Forensic Engineering Congress, October 2012.

Blum AF, Long RT, Wu NP, Dillon SE. Analyzing unsatisfactory fire sprinkler performance. American Society of Civil Engineers (ASCE) 6th Forensic Engineering Congress, October 2012.

Long RT, Mikolajczak C. Lithium ion battery hazard assessment. NFPA Conference & Expo, Las Vegas, NV, June 12, 2012.

Long RT, Mikolajczak C, Kahn M. Lithium ion fire protection considerations. The 29th International Battery Seminar & Exhibit: Primary & Secondary Batteries - Other Technologies; Broward County Convention Center Ft. Lauderdale, Florida, March 12-15, 2012.

Long RT, Mikolajczak C. Lithium ion battery hazard assessment. Fire Protection Research Foundation Suppression, Detection and Signaling Research and Applications - A Technical Working Conference (SUPDET 2012), Phoenix, AZ, March 5-8, 2012.

Long RT, Mikolajczak C, Kahn M, Lithium-Ion Failure Rates & Fire Protection Considerations, Proceedings, BATTERY SAFETY 2011 - Advancements in System Design, Integration & Testing for Safety & Reliability, Las Vegas, NV, November 9-10, 2011.

Long RT, Ogle R, Morrison III DR, Dillon SE, Blum AF. Performing a high-rise life safety analysis: Lessons learned from the Cook County administration building fire. 2009 NFPA America's Fire and Security Exposition, Miami Beach, FL, July 30, 2009.

Myers T, Wu N, Long RT. Material flammability and its contribution to fire growth. The Hartford Financial Services Group, Hartford, CT, 2007.

Ramirez J, Myers T, Long RT. Identificación de los Peligros de Explosiones de Polvo Usando las Normas de la NFPA. XXII Exsposición, SegurShow 07, Caracas, Venezuela, 2007.

Myers T, Long RT. Identification of dust explosion hazards and mitigation using NFPA Standards. 2007 NFPA World Safety Conference & Exposition, Boston, MA, June 5, 2007.

Long RT. Ford Rouge explosion and fire, February 1, 1999. 5th International Seminar on Fire and Explosion Hazards, Plenary Lecture, Edinburgh, Scotland, UK, April 27, 2007.

Clarke C, Long RT, Tsuji J, Gavelli F. Fire and toxicity aspects of polyurethane foams. Proceedings, 2005 Polyurethane Foam Association Spring Meeting and Technical Program, Washington, DC, May 2005.

Conferences, Seminars, Workshops, and Specialized Training

“Florida Laws and Rules (2025)”, PDH Library, webinar, 1 PDH, February 27, 2025

“Research in Fire Engineering: Understanding Fire Growth and Flame Spread in Developing a Design Fire”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, November 6, 2024

“AFireTest – Fire Testing Made Cheaper, Faster, and More Informative”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, November 5, 2024

“Window Sprinklers Versus Fire Rated Windows – Where & When Window Sprinklers are a Viable Alternative”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, November 5, 2024

“Next-Generation Radiant Energy Detectors – Integration with IoT and AI”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, October 25, 2024

“Fires During Construction and Changes to NFPA 241”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, Sept. 4, 2024

“Wagner Fire provides an Introduction to Active Fire Prevention Solutions”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, August 28, 2024

“Indiana Rules & Statues 2022-2024 Test”, American Council of Engineering Companies of Indiana (ACEC Indiana), webinar, 1 PDH, July 30, 2024

“Fire Protection Engineering 101 -Back to Basics”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, July 24, 2024

“How Should Lithium-ion Batteries that are NOT an Energy Storage System be Stored and Handled?”, Society of Fire Protection Engineers (SFPE), webinar, 1 PDH, July 24, 2024

“Application Based Design using Hybrid Air Sampling Detection and Linear Heat Detection”, Society of Fire Protection Engineers, webinar, 1 PDH, July 24, 2024

“Maryland Professional Engineers Ethics and Law Exam”, Maryland Department of Labor, webinar, 1 PDH, July 19, 2024

“Professional Engineering & Surveying Practice Update/Ethics”, Texas Board of Professional Engineers and Land Surveyors (TBPELS), webinar, 1 PDH, June 13, 2024

“Digital Forensics”, International Association of Arson Investigators, Inc., webinar, 2 PDH, June 13, 2024

“Spring/Summer 2024 Edition of the Missouri Board of Architects, Professional Engineers, Professional Land Surveyors and Professional Landscape Architects’ Newsletter: Dimensions”, newsletter, 0.5 PDH, June 3, 2024

“Professional Ethics Webinar”, webinar, Louisiana Professional Engineering and Land Surveying Board (LAPELS), 1 PDH, May 23, 2024

“AquaMist ULF – Low Pressure Water Mist Systems for Building Protection in Accordance with EN 14972”, webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, April 25, 2024

“Using Nitrogen Gas to Avoid Corrosion in Fire Sprinkler Systems” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, February 28, 2024

“Commercial Kitchen Fires 1: Fundamentals”, online seminar, International Association of Arson Investigators, Inc., 3 PDH, February 28, 2024

“Standard for Safeguarding Construction , Alteration, and Demolition Operations, 2022 Updates” [webinar?], The National Fire Sprinkler Association (NFSA), 1 PDH, February 7 2024

“Professional Engineering Ethics 101”, online seminar, New Jersey Society of Professional Engineers (NSPE-NJ), 2 PDH, February 8, 2024

“Research in Fire Engineering: Integrating WUI Fire Risk Management into the Fire Safety Engineering

Practice: Challenges and Opportunities” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 3, 2026

“Research in Fire Engineering: The Interface between Digital Buildings and Fire Service Operations” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, February 17, 2026

“A Review of Case Studies, presented as SFPE Performance-based Conference, from 1996 – 2018” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, January 20, 2026

“2025 Florida Laws and Rules” webinar, PDH Library, 1 PDH, February 27, 2025

“DSPS-DIS Spring Webinar” webinar, Wisconsin Department of Safety and Professional Services, 1 PDH, March 26, 2025

“Modern Fires…Modern Fire Protection…Are We Ready?” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“Response to Alert Tones under Unintended Situations” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“Introduction to Artificial Intelligence Methods” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“Modern Fires…Modern Fire Protection…Are We Ready?” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“Research in Fire Engineering: Ethics in AI for Fire Engineering - A Panel Discussion” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“The Global Language of Firestopping” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, March 27, 2025

“Research in Fire Engineering: Health and Environmental Impacts of Thermal Runaway Events in Outdoor Li-Ion BESS Installations” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, April 4, 2025

“Professional Ethics Webinar hosted by Mr. Byron Trust P.E.” webinar, Louisiana Professional Engineering and Land Surveying Board (LAPELS), 1 PDH, April 15, 2025

“Professional Engineering & Surveying Practice Update/Ethics” webinar, Texas Board of Professional Engineers and Land Surveyors (TBPELS) 1 PDH, June 4, 2025

“Maryland Professional Engineers Ethics and Law Exam” Maryland Department of Labor, (MDOL), 1 PDH, July 15, 2025

“Design Fire Scenarios for Hazard Assessment of Modern Passenger Vehicles” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, July 39, 2025

“Battery Energy Storage Systems: Lessons from the FDNY and Beyond” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH September 5, 2025

“Vapor Phase Corrosion Inhibitors In Fire Protection, webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 5, 2025

“Modern Solutions in Early Warning Air Sampling Fire Detection” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 3, 2025

“Research in Fire Engineering: When Fire Meets Water – Understanding VOC Intrusion in Water Distribution Networks within Wildfire Perimeters” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 6, 2025

“Foam Fire Suppression Issues and Solutions for Firefighters and Fire Systems” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 6, 2025

“Commodity Classification: A Critical Consideration in Automatic Fire Sprinkler System Design” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 30, 2025

“Investigating Fires in Sprinklered Buildings” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 10, 2025

“Review of Chapters 625 of Nevada Revised Statutes (NRS) and Nevada Administrative Code (NAC)” webinar, Nevada Board of Professional Engineers and Land Surveyors, (NVBPELS), 1 PDH, November 12, 2025

“Research in Fire Engineering: Understanding Fire Growth and Flame Spread in Developing a Design Fire” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, November 6, 2024

“Fire Testing Made Cheaper, Faster, and More Informative” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, November 5, 2024

“In case of fire – Don’t panic, use the lift” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, November 5, 2024

“Window Sprinklers Versus Fire Rated Windows – Where & When Window Sprinklers are a Viable Alternative” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, November 5, 2024

“Next-Generation Radiant Energy Detectors – Integration with IoT and AI” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 25, 2024

“Fires During Construction and Changes to NFPA 241” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 4, 2024

“Wagner Fire provides an introduction to Active Fire Prevention Solutions” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, August 28, 2024

“Indiana Rules & Statutes 2022-24 Test” American Council of Engineering Companies, (ACEC), 1 PDH, July 30, 2024

“How should Lithium-ion Batteries that are NOT an Energy Storage System be Stored and Handled?” Webinar, The Society of Fire Protection Engineers, (SFPE), 1PDH, July 24, 2024

“Fire Protection Engineering 101 – “Back to Basics”” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, July 24, 2024

“Application Based Design using Hybrid Air Sampling Detection and Linear Heat Detection” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, July 24, 2024

“Maryland Professional Engineers Ethics and Law Exam” Maryland Department of Labor, (MDOL) 1 PDH, July 19, 2024

“Live Event - Digital Forensics” [webinar?], International Association of Arson Investigators, Inc. (IAAI), 2 PDH, June 13, 2024

“Professional Engineering & Surveying Practice Update/Ethics” webinar, Texas Board of Professional Engineers and Land Surveyors, (TBPELS), 1 PBH, June 13, 2024

“Spring/Summer 2024 Edition of the Missouri Board for Architects, Professional Engineers, Professional Land Surveyors and Professional Landscape Architects’ Newsletter Entitled, “Dimensions.”” Newsletter, State of Missouri, 0.5 PDH, June 3, 2024

“LAPELS – Professional Ethics Webinar” webinar, Louisiana Engineering and Land Surveying Board, (LAPELS), 1 PDH, May 23, 2024

“AquaMist ULF – Low Pressure Water Mist Systems for Building Protection in Accordance with EN 14972 (VdS, FM)” The Society of Fire Protection Engineers, (SFPE), 1 PDH, April 25, 2024

“Using Nitrogen Gas to Avoid Corrosion in Fire Sprinkler Systems” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, February 28, 2024

“Commercial Kitchen Fires 1: Fundamentals” [webinar?], International Association of Arson Investigators, Inc. (IAAI), 3 PDH, February 26, 2024

“Professional Engineering Ethics 101”, online seminar, New Jersey Society of Professional Engineers (NSPE-NJ), 2 PDH, February 8, 2024

“Standard for Safeguarding Construction , Alteration, and Demolition Operations, 2022 Updates” [webinar?], The National Fire Sprinkler Association (NFSA), 1 PDH, February 7, 2024

“A Large-Scale Sprinklered Fire Test of Lithium-ion Cells in Plastic Trays Within a Rack Storage Test Configuration” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, December 14, 2023

“AquaMist ULF – Low Pressure Water Mist Systems for Building Protection in Accordance with NFPA 750 (VdS, FM)” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, December 14, 2023

“Sustainability and Fire Resilience: Webinar I – Setting the Scene” webinar, The Society of Fire Protection Engineers, (SFPE), 1.5 PDH, December 14, 2023

“Construction Fire Safety Best Practices” webinar, The Society of Fire Protection Engineers, (SFPE), 1.5 PDH, December 13, 2023

“Professional Ethics” webinar, Nevada Board of Engineers and Land Surveyors (NVBPELS), 2 PDH, October 26, 2023

“Review of Chapter 625 of Nevada Revised Statutes (NRS) and Nevada Administrative Code (NAC)” webinar, Nevada Board of Engineers and Land Surveyors (NVBPELS), 1 PDH, October 25, 2023

“Fiber Optic Linear Heat Detection" webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, October 19, 2023

“Fire Safe Use of Wood in Buildings – Global Design Guide” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, May 9, 2023

“Quell™ Methodology Overview – Challenges and Solutions for Cold Storage” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, April 28, 2023

“Fire Fighter Air Replenishment Systems and Design Criteria” webinar, The Society of Fire Protection Engineers, (SFPE), 1.5 PDH, April 28, 2023

“Florida Laws and Rules” webinar, PDH Library, 1 PDH, February 27, 2023

“Fire Service Webinar: SFFD requirements for Fire Service Access Elevators per 2021 I BC, 2022 N FPA 72 and 2022 SFFD AB # 5.08” webinar, The Society of Fire Protection Engineers, (SFPE), 1.5 PDH, January 27, 2023

“Professional Ethics” webinar, Louisiana Professional Engineering and Land Surveying Board (LAPELS), 1 PDH, December 14, 2022

“In Building Public Communication Enhancement Systems – When/How/Which to Specify” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 20, 2022

“Overview of the 2nd Edition SFPE Guide to Fire Risk Assessment” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 19, 2022

“Research in Fire Engineering: Development of Fire Protection Engineering Practitioner Tools” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 19, 2022

“Forum on Fire Protection Engineering: Challenges in Storage” 2- day conference, The Society of Fire Protection Engineers, (SFPE), 11.5 PDH, September 8 - 9, 2022

“Fundamentals of Fire Investigation – The Relationship Between Compartment Fire Dynamics and Resulting Post-Incident Damage Patterns” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, September 1, 2022

“Indiana Rules & Statutes Course 2020-22” webinar, American Council of Engineering Companies (ACEC) of Indiana, 1 PDH, July 25, 2022

“Car Stackers - Hazards and Best Practices” webinar, The Society of Fire Protection Engineers, (SFPE), 1.5 PDH, July 20, 2022

“Professional Engineering and Surveying Practice Update and Ethics” webinar, Texas Board of Professional Engineers and Land Surveyors (TBPELS), 1 PDH, June 9, 2022

“Professional Engineering Ethics 101”, online seminar, New Jersey Society of Professional Engineers (NSPE-NJ), 2 PDH, March 11, 2022

“Suppression Fire Protection Systems for Storage Occupancies” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, February 7, 2022

“Laws and Rules for Nevada Engineers (Revised for 2021)”, PDHengineer.com, 1 PDH, December 6, 2021

“Ethics for Professional Engineers”, EZ-pdh.com, 1 PDH, December 6, 2021

“What We’ve Learned Since the Introduction of Listed Antifreezes” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, November 17, 2021

“The Role of Emergency Responder Communication Enhancement Systems (ERCES) in Fire & Life Safety Solutions” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, August 10, 2021

“Linear Heath Detection Design and Use in Modern Applications” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, July 29, 2021

“Live Member Webinar: Understanding and Reducing the Fire Risk of Residential Upholstered Furniture Fires” webinar, The Society of Fire Protection Engineers, (SFPE), 1 PDH, May 24, 2021

“NFPA 14 – Standpipes for Fire Protection” webinar, The National Fire Sprinkler Association (NFSA), 2.5 PDH, April 14, 2021

“Design and Inspection Criteria for Freeze Protected Sprinkler Systems” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 8, 2021

“Electric & Hybrid Vehicle Fires” webinar, The International Association of Arson Investigators (IAAI), 3 PDH, April 1, 2021“SFPE Perspective Webinar: Using Nitrogen to Manage Corrosion in Dry Pipe and Preaction Fire Sprinkler Systems” webinar, The Society of Fire Protection Engineers (SFPE), March 2, 2021

“SFPE Member Monday Webinar: The New NIST Fire Calorimetry Database: A Resource for Fire Protection Engineers" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, February 8, 2021

“SFPE Member Monday Webinar: Sprinkler Hydraulics – The 3rd Edition” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 25, 2021

“Electric & Hybrid Vehicle Design Basics” webinar, International Association of Arson Investigators (IAAI), 3 PDH, January 26, 2021

“Florida Laws and Rules for Professional Engineers” webinar, EZ-pdh.com, 1 PDH, January 11, 2021

"Impact of Ventilation of Fire Patterns in Full-Scale Structure" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, December 7, 2020

“Robot Rebellion Key Fire Safety Issues in Autonomous Vehicle Parking Systems” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 5, 2020

“SFPE Perspective Power Hour: Freeze Protection and Corrosion Mitigation in Fire Sprinkler System” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 30, 2020

“External Fire Spread – A Risk Based Approach” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 24, 2020

“Using the Quantitative Risk-Based Approach for Fire Safety in Practice” webinar, The Society of Professional Engineers, 1 PDH, September 14, 2020

“Delivering Value to the Fire Safety Engineer” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 9, 2020

“Different Exit Signages Impact on Evacuees Choice” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, August 31, 2020

“NFPA 909 – Protecting Cultural Properties – It’s Essential to Our Heritage” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, August 24, 2020

“Guidelines for Peer Review in the Fire Protection Design Process”, The Society of Fire Protection Engineers (SFPE), 1 PDH, July 27, 2020

“Ethics for Professional Engineers” webinar, EZ-pdh.com, 1 PDH, July 14, 2020

“Indiana Rules & Statutes Course 2019-20" webinar, ACEC Indiana, 1 PDH, July 14, 2020

“Evacuation Strategies in an Office Building: How a PBD Approach Guarantees an Acceptable Safety

Level” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, June 8, 2020

“First in USA Automated High Rise Bag Storage Building Built on a Podium, Straddling the Main Road” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, June 1, 2020

“Vent to Prevent Corrosion: NFPA 13 Guidelines for Air Venting in Wet Fire Sprinkler Systems” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, May 6, 2020

“PE Licensure – How and Why?” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, May 4, 2020

“PoE, A Digital Extension Of Architectural And Engineering Evolution: An Overview Of Tentative Applications on Fire” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 27, 2020

“Specific Application Windows Sprinkler" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 23, 2020

“Solving for “Why” Grenfell Tower 3 Years On” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 20, 2020

“How to Prevent Thermal Runaway in Lithium-Ion Batteries” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 15, 2020

“Fires and Urban Growth – A South African Case Study” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 6, 2020

“Resiliency – Consideration Beyond Code Requirements” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, March 31, 2020

“Probabilistic Fire Rick Analysis in an Automated Intensive Warehouse: A Different Approach to Fire Safety” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, February 10, 2020

“Oxygen Reduction System for Automated Deep Freeze Warehouse – A Case Study” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 13, 2020

“Performance-Based Design of Fire Safety in High rise Timber Building” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, December 9, 2019

“Single Point Density” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, December 2, 2019

“Design and Future Trends of High-Rise Residential Towers – A Comparison Between UK and German Regulations” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, November 25, 2019

“Structural Performance and Particularities of Multi-Story Intermodal Steel Container Structures at Elevated Temperatures” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 21, 2019

“Competency Webinar”, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 8, 2019

"Intelligent Egress in a Historical Building" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 7, 2019

“Façade Fires – Recent Developments in Europe” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 16, 2019

“UL 268 7th Edition – How Did We Get There?” webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, June 27, 2019

"Important Tips and Critical Issues Involved in Investigating and Handling Condominium and Townhome Losses", The National Association of Subrogation Professionals (NASP), June 11, 2019

"California's October 2017 Wildfires: What Happened, and Can We Map Areas Where It Could Happen Again" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, May 13, 2019

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, May 9, 2019

"Construction Fire Protection" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, March 25, 2019

"Basics: Fire Safety for Restaurants" webinar, Cognistar, 1 PDH, January 3, 2019

"Florida Laws & Rules for Professional Engineers" webinar, EZ-pdh.com, 1 PDH, December 31, 2018

"The Changing Face of the Fire Challenge" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, November 26, 2018

"Hospital Security - Code Compliance is Possible" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 24, 2018

"Elevating Fire Safety: Advancing the Science of Building Envelope Materials" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, August 29, 2018

"Top 10 Fire Safety Challenges in Passenger Terminal Design" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, August 27, 2018

"Indiana Engineers' Laws and Rules" webinar, RedVector, 2 PDH, July 17, 2018

"Development of CFD Fire Suppression Model for Industrial Applications", The Society of Fire Protection Engineers (SFPE), 1 PDH, June 25, 2018

"Development of In-Rack Sprinkler Protection Guidance for Mini-Load Automatic Storage and Retrieval Systems", The Society of Fire Protection Engineers (SFPE), 1 PDH, May 3, 2018

"Fire Protection of Sloped Combustible Attic Spaces" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 19, 2018

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, March 7, 2018

"The Impact of Regulatory Policies on the Practices of Fire Protection Engineers in Australia" webinar, Society of Fire Protection Engineers (SFPE), 1 PDH, February 28, 2018

"Building Heights & Rack Storage" webinar, American Fire Sprinkler Association (AFSA), 1.5 PDH, January 24, 2018

"WUI Resiliency: Answering to Climate Change" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 22, 2018

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, December 7, 2017

"A Study of Reproducibility of a Full-Scale Multi-Room Compartment Fire Experiment" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, November 27, 2017

"HAZWOPER 8 hr. Annual Refresher" webinar, Institute for Safety and Health Management (ISHM), 8 PDH, November 16, 2017

"SFPE Performance-Based Design: Underground Car Park" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 30, 2017

"Understanding Commissioning and System Acceptance Testing" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 25, 2017

"Science of Electric Shock and Electrocution: Town Street Bridge Fatality" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, September 20, 2017

"Certified Vehicle Fire Investigation Training Program" course, National Association of Fire Investigators (NAFI), 32 PDH, September 18-21, 2017

"PEPCON Explosion of May 4, 1988: Lessons Learned" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, August 23, 2017

"Kansas City Hyatt Walkway: Root Cause Analysis" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, July 26, 2017

"Analysis of Wind in an FDS Simulation" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, July 17, 2017

"Performance-Based Designs Revisited: Updating Previously Completed Fire and Egress Models for Building Alterations and Additions" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, June 26, 2017

"Conducting Secondary Research: Lit Happens" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, June 21, 2017

"Arson Investigators Subrogation Series - Subrogation and the Fire Expert" webinar, National Association of Subrogation Professionals (NASP), May 19, 2017

"Role of an Expert Witness in Patent Litigation" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, May 17, 2017

"Protecting Your Cloud With Mist, High Pressure Water Mist - an Advanced Fire Protection Alternative, for Future Data Centers webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, May 17, 2017

"The SFPE Annual Report" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 19, 2017

"Effective Plots" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, April 19, 2017

"The SFE Annual Report" webinar, The Society of Fire Protection Engineers (SFPE), April 19, 2017

"NFPA 921 - What's New in Fire Investigation" webinar, The National Fire Protection Association (NFPA), April 19, 2017

"Diligence for Consulting Engineers" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, April 5, 2017

"Fires in the Middle East - Challenges and Opportunities" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, March 6, 2017

"Population Characteristics that Influence Movement Speeds" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, February 27, 2017

"NFPA 14, 2016 Ed. Updates and Performance Based Design" webinar, American Fire Sprinkler Association, 2 PDH, February 23, 2017

"Florida Laws & Rules for Professional Engineers" webinar, EZ-pdh.com, 1 PDH, February 22, 2017

"The New Standard of Care for Structural Fire Protection Analyses" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 30, 2017

"What is Linear Heat Detection? Is it Right for Your Application?" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, December 8, 2016

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, December 7, 2016

"The Design Fire: Selecting Fire Characteristics for a CFD Model" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, November 28, 2016

"A Picture Is Worth a Thousand Words: Tools and Techniques for Demonstrative Evidence" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, November 16, 2016

"A Fire Protection Engineering Nightmare: Fire Barriers" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 31, 2016

"Sprinkler Systems of the Future: The Benefit of Electronic Sprinklers" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, October 6, 2016

"Differences in Evacuation Responses from Word Choice" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 19, 2016

"Biomechanical Characterization of Persons with Movement Disorders During Simulated Evacuations" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, August 29, 2016 "Field Inspections: Tips and Techniques" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, August 17, 2016

"Indiana Engineers' Laws & Rules" webinar, RedVector, 2 PDH, July 28, 2016

"San Francisco Museum of Modern Art: A Case Study in Atrium Smoke Control Design", The Society of Fire Protection Engineers (SFPE), 1 PDH, June 27, 2016

"Hydraulic Fracturing: Technology, Science and Controversy" webinar, The Practicing Institute of Engineering, Inc. (PIE), 1 PDH, June 15, 2016

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, June 8, 2016

"Systems Safety Approach to Evaluating Fire Risk Assessments" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, May 16, 2016

"Changes to NFPA 72-2016" webinar, Automatic Fire Alarm Association (AFAA), April 28, 2016

"Overcoming Cultural Differences in the Practice of Fire Protection Engineering" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, April 25, 2016

"Lithium Battery Losses and Subrogation Issues" webinar, Cozen O'Connor, 1 PDH, March 31, 2016

"Hazard Assessment of Lithium Ion Battery Energy Storage Systems" webinar, National Fire Protection Association's (NFPA) 2016 Foundation Webinar Series, April 2016

"Natural Ventilation - A Green Smoke Control Approach" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, March 28, 2016

"Introduction to Fire Science" webinar, The National Association of Subrogation Professionals (NASP), March 25, 2016

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, March 11, 2016

"Key Changes to the 2016 Edition of NFPA 72" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, February 29, 2016

"Interfacing Elevator Controls with Fire Alarm and Sprinkler Systems" webinar, Automatic Fire Alarm Association (AFAA), February 26, 2016

"3D Printing: Technology and Applications" webinar, Practicing Institute of Engineering, Inc. (PIE), 1 PDH, February 17, 2016

"Origin & Cause, Classification & Negative Corpus" webinar, The International Association of Fire Investigators (IAFI), 2 PDH, January 28, 2016

"The Lac Megantic Incident - A Worst Case Scenario" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 25, 2016

"The SFPE Annual Report" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, January 13, 2016

"Responding to Fuel Cell Vehicle Incidents" webinar, National Fire Protection Association (NFPA), January 12, 2016

"Responding to Hybrid/Electric Vehicle Incidents" webinar, National Fire Protection Association (NFPA), January 11, 2016

"Responding to Gaseous Fueled Vehicle Incidents" webinar, National Fire Protection Association (NFPA, January 8, 2016

"Obstructions and ESFR Sprinklers: Experimental Results" webinar, National Fire Protection Association (NFPA), December 15, 2015

"5 Major Benefits of Confirmed Temperature Initiation Linear Heat Detectors" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, December 2, 2015

"Beyond Cause & Origin: Engineering Analysis of Building Fire" seminar, The Society of Fire Protection Engineers (SFPE), 14 PDH, November 11-12, 2015

"Current State of Rooftop Solar" presentation, The Society of Fire Protection Engineers (SFPE), November 2015

"Tragedy at Isle Verte - Fire Protection Engineering Perspectives" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, September 28, 2015

"Metal Fractography" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, September 17, 2015

"PV Update Insurers Perspective" webinar, National Fire Protection Association (NFPA), 2 PDH, August 10, 2015

"Investigating Water Losses in Fire Sprinkler Systems" webinar, National Association of Subrogation Professionals (NASP), July 28, 2015

"Tall Timbers Buildings - Compliance and Engineering Solutions" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, July 27, 2015

"Smoke Alarm Nuisance Source Characterization" webinar, National Fire Protection Association (NFPA), 2 PDH, July 23, 2015

"Building Your Inspection Team and the Challenges with Anti-freeze Solutions" webinar, American Fire Sprinkler Association (AFSA), 1.5 PDH, July 14, 2015

"Health Care Fire Protection - Do We Have it Right?" webinar, Society of Fire Protection Engineers (SFPE), 1 PDH, June 29, 2015

"Centralized Automated Testing and Maintenance in Addressable Smoke Detectors webinar, The Society of Pire Protection Engineers (SFPE), 1 PDH, June 18, 2015

"TBPE Professional Practice Board Update and Ethics" webinar, Texas Board of Professional Engineers (TBPE), 1 PDH, June 4, 2015

"Proper Use of CFD Models" webinar, Society of Fire Protection Engineers (SFPE), 1 PDH, April 27, 2015

"Wildland Fire Ignition Pathways" webinar, National Fire Protection Association (NFPA), 2 PDH, April 21, 2015

"Update on Changes to NFPA 921 and 1033" webinar, National Association of Subrogation Professionals (NASP), January 27, 2015

Insurance Society of Philadelphia webinar, "Expert Challenges and the Revised NFPA 1033," 1 PDH, December 3, 2014

"Field Inspections: Tips and Techniques" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, November 12, 2014

"Electric/Hybrid/Fuel Cell Safety Course for Trucks, Buses," National Fire Protection Association (NFPA), Electric Vehicle Safety Training, October 9, 2014

"Global Professional Recognition of the Fire Protection Engineer," Society of Fire Protection Engineers (SFPE) webinar, 1 PDH, October 8, 2014

2014 NEC Seminar: "Wiring Methods - The Application of the Code and Lessons Learned," National Fire Protection Association (NFPA), 0.4 CEU, October 1, 2014

Mid Atlantic Propane Gas Association (MAPGA) Certified Employee Training Program (CETP) Course 1.0 Basic Principles & Practices of Propane, August 19, 2014

"The Role of Fire Protection Engineering in Sustainable Design" webinar, Society of Fire Protection Engineers (SFPE), 1 PDH, June 17, 2014

International Association of Arson Investigators (IAAI) Advanced Marine Fire Investigation Course (16 hours tested), May 29-30, 2014

"Voice Intelligibility" webinar, Society of Fire Protection Engineers (SFPE), 1 PDH, April 21, 2014

"The Science of Electric Shock and Electrocution" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, March 20, 2014

"Understanding the Analysis Behind Fire Investigations" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, March 19, 2014

"Suppression, Detection and Signaling Research and Applications Symposium" (SUPDET 2014), The Fire Protection Research Foundation (FPRF), 6.1 PDH, March 4-7, 2014

"The Evolution of the Residential Fire Environment" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, February 18, 2014

"The Use of Photography in Engineering" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, January 15, 2014

"Law and Rules for Professional Engineers of Indiana" online test, Engineer Educators, Inc., 1 PDH, December 12, 2013

"Addressing the Performance of Sprinkler Systems: NFPA 25 and Other Strategies," Fire Protection Research Foundation, Chicago, IL, December 9-10, 2013

"Ethics I for Professional Engineers" online test, Engineer Educators, Inc., 1 PDH, December 6, 2013

"Ethics II for Professional Engineers" online test, Engineer Educators, Inc., 1 PDH, December 6, 2013

"9/11 - World Trade Center Engineering Issues" webinar, The Practicing Institute of Engineering, Inc., 1 PDH, September 11, 2013

"Suppression, Detection and Signaling Research and Applications Symposium (SUPDET 2013), The Fire Protection Research Foundation (FPRF), 6 PDH, February 26 - March 1, 2013

Third Annual Electric Vehicle Safety Standards Summit, SAE International and National Fire Protection Association (NFPA), Detroit, MI, October 18, 2012

"Combustible Dust Hazard Assessment" webinar, National Fire Protection Association (NFPA), 2 PHD, October 11, 2012

Second Conference on Fires in Vehicles (FIVE), Chicago, IL, September 2012

"Electrical Arcing and Fires," National Association of Subrogation Professionals (NASP), July 26, 2012

"Connecting the Dots - Integrating, Managing and Controlling Protection of the Physical Environment" webinar, The Society of Fire Protection Engineers (SFPE), 1 PDH, June 5, 2012

"Gas Related Incident Investigations for Fire Investigators," The Maryland Fire and Explosive Investigators Association (MFEI-IAAI), a Chapter of the IAAI and Washington, Springfield, Virginia, 8 tested hours, March 21, 2012

"Best Practices for Emergency Response to Battery Incidents Involving Electric Vehicle Battery Hazards," Fire Protection Research Foundation, Quincy, Massachusetts, February 29, 2012 (Facilitator)

"Commercial Kitchen Fires: Investigations, Engineering, Subrogation," National Association of Subrogation Professionals (NASP), January 2012

"Electrical Engineering Fundamentals for Non-Electrical Engineers" webinar, PDHengineer, 8 PDH, January 23, 2012

"Preparing Construction Plans with Clarity for a Streamlined Approval Process and Constructability" webinar, PDHengineer, 2 PDH, January 19, 2012

"An Introduction to Fire Protection Engineering for Buildings" webinar, PDHengineer, 2 PDH, January 10, 2012

"An Ethical Analysis of Engineering Failures in History" webinar, PDHengineer, 2 PDH, December 29, 2011

"Introduction to Water System Design" webinar, PDHonline, 4 PDH, December 23, 2011

"Engineering Ethics: Accepting Gifts and Amenities" webinar, PDHengineer, 1 PDH, December 9, 2011

"The World of Fryers" The Maryland Fire and Explosive Investigators Association (MFEI-IAAI), a Chapter of the IAAI and Vulcan, a division of the ITW Food Equipment Group LLC, Dundalk, MD, October 5, 2011

"Lithium Ion Battery Storage Protection Strategies," Fire Protection Research Foundation Research Planning Workshop, Baltimore, Maryland, August 30, 2011 (Facilitator)

"Beyond Cause & Origin: Engineering Analysis of Building Fire" seminar, The Society of Fire Protection Engineers (SFPE), 1.4 CEU, October 5-6, 2010, Instructor

"Inspection, Testing, and Maintenance of Fire Alarms," National Fire Protection Association Seminar on NFPA 72-2007, 7 PDH, October 2008

"Advanced Fire, Arson, & Explosion Investigation Training Program," National Association of Fire Investigators, Sarasota, Florida, 36 tested hours, August 4-6, 2008

Fire Protection Research Foundation (FPRF) Upholstered Furniture Fire Performance Research Planning Workshop, Southpoint, Durham, NC, January 30-31, 2008

American Home Furnishings Alliance (AHFA) Upholstered Furniture Flammability Stakeholder Meeting, Arlington, VA, July 25, 2007

"Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," National Fire Protection Association Seminar on NFPA 25-2002, 0.7 CEU's (7 PDH hours), May 2007

"Understanding 16 CFR Part 1633: Standard for the Flammability (Open-Flame) of Mattress Sets," U.S. Consumer Product Safety Commission (CPSC) Staff Mattress Seminar, Bethesda, MD, March 28, 2007

"Suppression Systems Seminar," The Viking Corporation, Hastings, MI, March 12-13, 2007 (Hands-on system training and presentations, wet, dry, deluge, foam, pre-action, and sprinklers)

"Symposia: Partners for Protection: Fire Protection Engineer and the Fire Service," Sponsored by the Society of Fire Protection Engineers, October 2006

"How to Study for the FPE/P.E. Exam," Sponsored by the Society of Fire Protection Engineers (SFPE),

1.6 CEU's (16 PDH hours), September 2004

"Workshop to Identify Research Needs to Foster Improved Fire Safety in the United States," sponsored by the Board on Infrastructure and the Constructed Environment (BICE) of the National Research Council at the request of the National Science Foundation (NSF), April 15-16, 2002

IAAI/CFITrainer.net:

• "Documenting the Event", 4 hour tested, April 30, 2008

• "Investigating Motor Vehicle Fires", 4 hour tested, April 30, 2008

• "The Fire Investigator & the 2011 NFPA 921 Changes", 4 hour tested, May 26, 2011

• "Critical Thinking Solves Cases", 4 hour tested, August 8, 2017

• "Charleston Sofa Super Store Fire", 4 hour tested, August 7, 2017

• "Communicating the Value of Membership in the IAAI", August 7, 2017

• "An Analysis of the Station Nightclub Fire", 4 hour tested, August 2, 2017

• "Accreditation, Certification, and Certificates", 3 hour tested, August 2, 2017

• "Discovery in Criminal Cases", 3 hour tested, August 2, 2017

• "Fire Protection Systems", 3 hour tested, August 2, 2017

• "Arc Mapping Basics", 4 hour tested, August 1, 2017

• "Basic Electricity", 4 hour tested, August 1, 2017

• "Electrical Safety, 3 hour tested, August 1, 2017

• "Introduction to Evidence", 4 hour tested, August 1, 2017

• "Residential Electrical Systems", 4 hour tested, August 1, 2017

• "Electrical Aspects of Fire Investigation" course, International Association of Arson Investigators, Inc. (IAAI), 24 hour tested, August 16-18, 2017

• “Alternative Fuel Vehicles”, 3 hour tested, November 2, 2021

• “NFPA 1033 & 921: 2022/2021 Editions Important Updates”, 3 hours tested, July 20, 2022

• “Commercial Kitchen Fires 1: Fundamentals”, 3 hour tested, February 26, 2024

Project Experience

Special Experience

Served as the project manager for the third-party review, testing, and evaluation of the Fire Department City of New York (FDNY) Personal Safety System (PSS), a compact, lightweight escape system intended

for use by firefighters for quick escape from burning buildings. This device was named one of the best safety inventions of 2006 by TIME Magazine.

Peer Reviews

Technical Reviewer, Compartment Fires Track, 8th, 9th Annual International Fire Safety Science Symposium (IAFSS), 2005, 2008.

Technical Reviewer, Burning Finished Products and Measurement Methods Track, 9th Annual International Fire Safety Science Symposium (IAFSS), 2008.

Technical Reviewer, SAE World Congress and Exhibition, 2007, 2008, 2014.

Technical Reviewer, Fire Technology, 2008, 2009, 2011 (SI: Fire Investigations), 2013, 2014, 2015, 2018

Technical Reviewer, Fire Safety Journal, 2009.