

DOUGLAS J. CARPENTER, MScFPE, C.F.E.I., P.E.

EDUCATION:

M.S., Fire Protection Engineering, Worcester Polytechnic Institute, Worcester, MA, 1996

B.S., Mechanical Engineering, University of Vermont, Burlington, VT, 1992

A.S., Mechanical Engineering, Vermont Technical College, Randolph Center, VT, 1984

THESIS:

Carpenter, D. J., "An Investigation into the Validity of Modeling Post-Flashover Fires and Flame Extension from Openings with the Fire Field Model JASMINE", Worcester Polytechnic Institute, August 1996.

PROFESSIONAL EXPERIENCE:

Vice President and Principal Engineer, Combustion Science & Engineering, Inc., Columbia, MD, 1998 to present. Responsibilities include fire investigations, fire reconstruction analyses, and performing fire hazard analyses utilizing computer fire modeling including both zone models and Computational Fluid Dynamics (CFD). Applied quantitative and performance-based fire hazard analysis skills to a wide range of projects including nuclear production reactors and facilities at DOE's Savannah River Site, building atria, manufacturing operations, transportation vehicles, airports, as well as United States research facilities and airport operations in Antarctica. Developed a flame-spread model for use in a CFD model of burning vehicles. Developed and taught classes and seminars in fire investigation, performance-based fire safety design, and computer fire modeling for such organizations as the Society of Fire Protection Engineers (SFPE) and the International Council of Building Officials (ICBO).

Staff Engineer, Hughes Associates, Inc., Baltimore, MD, 1996 to 1998.

Conducted in-house cone calorimeter tests for code equivalency evaluations and fire litigation support. Performed fire hazard analysis for military aircraft hush houses to determine technical requirements for alternative suppression system to existing Halon 1301 systems. Performed a review of fire hazards and fire suppression system options for the Halifax Class frigates of the Canadian Navy. Developed a computer program for the military evaluating alternative systems for existing Halon 1301 systems. Performed a comprehensive evaluation of the military's current Halon 1211 replacement program. Conducted on-scene fire investigations and computer fire modeling in support of fire litigation work. Conducted experiments that mapped the heat flux of Halogen Torchierie Lamps for development of a model to determine ignition potential of adjacent combustibles.

Fire Protection Engineer, Office of Polar Programs, National Science Foundation, Arlington, VA, 1995-1996.

Assisted engineers in examining fire protection engineering issues associated with Amundsen-Scott South Pole, McMurdo, and Palmer Stations in Antarctica. Projects emphasized equivalent levels of protection for fire hazards and life safety using a systems and performance-based engineering approach in this unique and challenging environment. Actively involved with the fire protection specification and design for the proposed new research station at the South Pole as part of the South Pole Redevelopment

Project (SPRP). Conducted a fire risk assessment of buildings in McMurdo Station, which included computer fire modeling. Conducted on-site visits of McMurdo and Amundsen-Scott South Pole Station.

Fire Protection Engineer, ABASCO Services, Inc., Augusta, GA, 1993.

Six-month graduate internship. Responsible for developing a framework for an alternative methodology to the average combustible loading method for fire barrier analysis. Reviewed and provided written critique for proposed on-site work connected with fire protection at the Department of Energy's Savannah River Site.

Fire Protection Engineer, MBS Fire Technology, Inc., Worcester, MA, 1993.

Six-month graduate internship. Part of a team responsible for writing a revision of a fire hazard analysis for a nuclear production reactor using a performance-based approach. Provided recommendations for alternative methods to using Halon 1301 for fire protection within the reactor environment. Reviewed and provided written critique for proposed on-site work connected with fire protection at the Department of Energy's Savannah River Site.

PROFESSIONAL REGISTRATION AND CERTIFICATION:

Certified Fire and Explosion Investigator, National Association of Fire Investigators, 2005. Professional Engineer (P.E.), State of Maryland, License No. 32633.

HONORS:

Antarctic Service Medal of the United States of America, May, 1999.
Salamander Honorary Fire Protection Engineering Society May 1995.
Campus Safety Association Scholarship Award, May 1995.
Percy Bugbee Fire Protection Engineering Scholarship, May 1995.
M&M Protection Consultants Scholarship, May 1994.
Deans List at University of Vermont: Fall 1988, 1991, Spring 1992.

PROFESSIONAL MEMBERSHIP:

Member, International Association for Fire Safety Science (IAFSS)
Member, National Fire Protection Association (NFPA)
Member, Society of Fire Protection Engineers (SFPE)
Member, National Association of Fire Investigators (NAFI)
Member, International Association of Arson Investigators (IAAI)
Member, DC/MD Chapter, International Association of Arson Investigators
Member, American Society of Mechanical Engineers (ASME)
Member, Building Officials Code Administration (BOCA)
Member, NFPA 92B Task Group, 1998
Member, SFPE Task Group on Computer Model Evaluation, 1998-present
Member, SFPE Educational Committee, 1999 - present
Member, Lexington Who's Who, 1999/2000
Alternate Member, NFPA 921, *Guide for Fire and Explosion Investigations*, 2000 – present
Associate Member, Engineering Sciences, American Academy of Forensic Sciences (AAFS), 2006

CONTINUING EDUCATION:

FPE 580L **"Case Studies in Fire Safety Engineering Science"**, Worcester Polytechnic Institute, Advanced Distance Learning Network (ADLN), 16-week course, Instructor: Dr. Patrick J. Pagni, University of California at Berkeley, Fall, 2000.

"Smoke Management for Atria and Other Large Spaces", one-day course sponsored by the Society of Fire Protection Engineers (SFPE), and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Baltimore, MD, October 6, 2000.

INSTRUCTOR:

"Advanced Fire Dynamics", Adjunct Lecturer for graduate level distance learning course for the Department of Fire Protection Engineering at the University of Maryland, December 2004 – February 2005.

"Introduction to Fire Modeling", two-day course sponsored by the Society of Fire Protection Engineers (SFPE), **Atlanta, GA**, November 12 –13, 1998; **Baltimore, MD** May 13 –14, 1999, **Baltimore, MD** October 2 – 3, 2000, **Idaho Falls, Idaho**, May 7 - 8, 2002.

"Introduction to Fire Modeling", one-day course sponsored by the International Fire Code Institute (IFCI), the International Conference of Building Officials (ICBO), and the Society of Fire Protection Engineers (SFPE), **St. Paul, MI**, November 17 & 19, 1998; **Tacoma, WA**, January 28, 1999.

"Engineering Design Alternatives", one-day course sponsored by the International Fire Code Institute (IFCI), the International Conference of Building Officials (ICBO), and the Society of Fire Protection Engineers (SFPE), **Tacoma, WA**, January 29, 1999; **Dallas, TX**, April 7, 1999.

"The Fire Safety Engineering Method", five-day course sponsored by Canadian Association of Building Code Officials, **Winnipeg, Canada**, May 30th - June 4th, 1999.

"Advanced Computer Fire Modeling", two-day course sponsored by the Society of Fire Protection Engineers (SFPE), **New Orleans, LA**, November 11 – 12, 1999; **Baltimore, MD**, October 4 – 5, 2000, **Santa Fe, NM**, March 14 – 15, 2002.

"Introduction to Fire Dynamics Simulator (FDS) and Smokeview", three-day course sponsored by the Society of Fire Protection Engineers (SFPE), **Baltimore/Washington**, September 16 – 18, 2002, **Las Vegas**, March 23 – 25, 2004, **Chicago**, September 21-23, 2004, **Hawaii**, February 1-3, 2005.

SELECTED PUBLICATIONS AND PRESENTATIONS:

Presentations (Non-Peer Reviewed):

Carpenter, D. J., "**Fire Protection in Antarctica**," presented to the Chesapeake Chapter of the Society of Fire Protection Engineers, **College Park, Maryland**, April 30, 1998; New England Chapter of the Society of Fire Protection Engineers, **Boston, MA**, February 7, 2000.

Carpenter, D. J. and Hamer, A. J., "**The Modeling of Experimental Compartment Fires Using Computational Fluid Dynamics**," presented at the 1998 STAR-CD North America User's Conference, **Detroit, MI**, May 19-20, 1998.

Carpenter, D. J., "**The Use of Quantitative Tools in Fire Investigation**," presented to the Vermont Chapter of the International Association of Arson Investigators, **Randolph Center, VT**, December 3, 1998; New Jersey Chapter of the International Association of Arson Investigators, **Morristown, NJ**, June 18, 1999.

Carpenter, D. J., Beller, D., and Sapochetti, J., "**Using the "Scientific Method" in the Analysis of the Cause and Origin of the Fire at the Cococnut Grove: Development of a New Hypothesis**", NFPA World Fire Safety Congress and Exposition, **Baltimore, MD**, May 16-20, 1999.

Carpenter, D. J., and Roby, R. J., "**Advanced Investigation and Technology: Application and Presentation of Fire Modeling in Arson Investigations**," presented to the National Society of Professional Insurance Investigators 1999 Advanced Insurance Fraud Seminar, **Cincinnati, OH**, November 11, 1999.

Watts, J. M., Jr., and Carpenter, D. J., "**Fire Dynamics and Fire Modeling & Human Behavior in Fire and Performance-Based Fire Safety Evaluation**", State of Vermont, Department of Labor, **Rutland, VT**, January 31st, 2000.

West, L. E., Reiter, D. A., and Carpenter, D. J., "**Forensic Fire Investigation**", The 2000 Claims Conference, Professional Loss Research Bureau (PLRB), **Chicago, IL**, March 26 – 29, 2000.

Conference Poster Sessions (Editorially Reviewed):

Carpenter, D. J., and DiNunno, P. J., "**Halon Alternative Selection Tool Software**", *Proceedings of the Halon Alternatives Technical Working Conference*, May 6-8, 1997, Albuquerque, NM.

Carpenter, D. J., and Barnett, J. R., "**The Modeling of Fire Tests Conducted at the National Research Council of Canada Using the Fire Field Model JASMINE**," presented at the International Conference on Fire Research and Engineering, Orlando, FL, September 10-15, 1995.

Conference Papers (Editorially Reviewed):

Carpenter, D. J., and Cummings, W., "**Performance-Based Analysis of ARFF Requirements for Air-Fields at McMurdo and South Pole Stations, Antarctica**," NFPA World Safety

Conference, Dallas, TX, May 18-21, 2003.

Carpenter, D. J. and Zhang, W., "**Validation of Fire Modeling by Fire Dynamic Simulator for Fire Protection Engineering**," NFPA World Safety Conference, Dallas, TX, May 18-21, 2003.

Zhang, W., N. L. Ryder, R. J. Roby, and D. J. Carpenter, "**Modeling of the Combustion in a Compartment Fire by Large Eddy Simulation Approach**," *Proceedings of the Chemical and Physical Processes in Combustion*, Eastern States Section of the Combustion Institute Fall Technical Meeting, Hilton Head, SC, December 2001.

Sutula, J. A., Carpenter, D. J., and Roby, R. J., "**Use of the FDS Model to Analyze Two Competing Scenarios in an Alleged Arson Case**," presented at 3rd Technical Symposium on Computer Applications in Fire Protection Engineering, Society of Fire Protection Engineers, Baltimore, MD, September 2001.

Zhang, W., Hamer, A. J., Klassen, M. S., Carpenter, D. J., and Roby, R. J., "**Verification of the Turbulence Statistics for Fire Dynamic Simulator in a Room Fire**," presented at 3rd Technical Symposium on Computer Applications in Fire Protection Engineering, Society of Fire Protection Engineers, Baltimore, MD, September 2001.

Zhang, W., Hamer, A., Klassen, M., Carpenter, D., and Roby, R., "**Turbulence Statistics in a Fire Room Model by Large Eddy Simulation**," presented at 2nd Joint Meeting of the U.S. Sections of the Combustion Institute, Oakland, CA, March 2001.

Carpenter, D. J., "**Development of a Waiver/Deviation Process for Determining Equivalent Fire Protection at United States Research Stations in Antarctica**," presented at the International Conference on Performance-Based Fire Safety Codes and Design Methods, Ottawa, Canada, September 23-26, 1996.

Journal Publications (Peer Reviewed):

Olenick, S. M., and Carpenter, D. J., "**An Updated International Survey of Computer Models for Fire and Smoke**," *Journal of Fire Protection Engineering*, Vol. 13, No. 2, 2003.

Zhang, W., Hamer, A., Klassen, M., Carpenter, D., and Roby, R., "**Turbulence Statistics in a Fire Room Model by Large Eddy Simulation**," *Fire Safety Journal*, 37, pp. 721-752, 2002.

Wade, C. A., and Carpenter, D. J., "**A Performance-Based Analysis of an Industrial Facility Containing Flammable Liquid Storage**," *Journal of Fire Protection Engineering*, Vol. 9, No. 2, 1998.

Carpenter, D. J., and Wade, C. A., "**A Performance-Based Fire Hazard Analysis of an Industrial Process Using Pressurized Hydraulic Fluids**," in preparation for submission to the *Journal of Fire Protection Engineering*.

Published Reports:

DiNenno, P. J., Verdonik, D. P., and Carpenter, D. J., "**U.S. Navy Halon 1211 Replacement Plan Part I - Development of Halon 1211 Alternatives,**" Navy Research Laboratory (NRL), NRL/MR/6180-99-8410, November 1, 1999.

Mawhinney, J. R., and Carpenter, D. J., "**A Review of Fire Hazards and Fire Suppression Options for the Halifax Class Frigates of the Canadian Navy,**" Client Report A-4424.1, for Department of National Defence, National Research Council Canada, Ottawa, Canada, March 10, 1997.

Amy, J., Carpenter, D. J., and Pucci, W. E., "**Alternative Combustible Loading: Conceptual Matrix Development and Implementation (U)**", WSRC-RP-93-1445, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC, October 29, 1993.

Carpenter, D. J., "**Alternative Combustible Loading: An Overview and Methodology Framework (U)**", WSRC-RP-93-1194, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC, September 30, 1993.