

Delmar “Trey” Morrison, III, Ph.D., P.E., CFEI
Principal Engineer

Professional Profile

Dr. Delmar “Trey” Morrison, III is a Principal Engineer in Exponent’s Thermal Sciences practice. Dr. Morrison’s practice areas encompass product safety, product liability, and chemical process safety. He specializes in investigations of origin, cause, and engineering issues related to hazardous chemicals incidents, fires, explosions, and chemical technology. Dr. Morrison’s expertise includes chemical engineering, fire dynamics, and the system safety of products and processes. Dr. Morrison’s doctoral studies in Chemical Engineering focused on the safety of self-heating materials and reactive chemical hazards. He developed highly specialized skills in the application of ignition theory of solid materials to wood and other cellulose through external heating and spontaneous ignition as a result of internal self-heating. He applies these skills to accident scenarios ranging from spontaneous ignition of oil-contaminated fabrics to self-heating of bulk solid oxidizers.

Dr. Morrison provides consulting services for a variety of industries. Beyond the wide range of consumer and industrial systems he evaluates, he has focused on heating systems including residential and commercial clothes dryers and industrial process dryers, ovens, and furnaces. He provides analyses of heat-producing processes such as self-heating materials, ignition, and combustion. As a chemical engineer, his areas of expertise include chemical process safety management and analyzing the effects of chemical plant operator actions, control system response, and process unit response during upset situations and hazardous operations that may lead to a hazardous release. As part of Dr. Morrison’s proactive safety consulting services, he leads hazard and risk assessments using industry-accepted process hazard analysis (PHA) methods such as HAZOP studies, What-If studies, and LOPA studies, combined with analytical techniques such as Fault Tree Analysis, Event Tree Analysis, Root Cause Analysis, and Consequence Analysis.

Dr. Morrison is an active professional in the product safety and chemical process safety communities. In addition to his technical committee memberships and publications, he has served in a leadership role in the field of chemical process safety through the American Institute of Chemical Engineers. Most recently, Dr. Morrison was the Chair for the 45th Loss Prevention Symposium in 2011 and will be the Chair for the 8th Global Congress on Process Safety in 2012. The objectives of these conferences are to aid in the prevention of major loss incidents that involve fires, explosions, runaway reactions, and hazardous material releases in the chemical, petrochemical, and related industries.

Academic Credentials and Professional Honors

Ph.D., Chemical Engineering, Illinois Institute of Technology, 2008
M.S., Chemical Engineering, Oklahoma State University, 1998
B.A., Chemistry (College Honors in Inorganic Chemistry), Knox College, 1996

Licenses and Certifications

Registered Professional Engineer, Illinois, #062-059506; North Carolina, #037722;
South Carolina, #28918

Certified Fire and Explosion Investigator, Reg. No. 12900-6508

40-Hour OSHA Certification, Hazardous Waste Operations and Emergency Response

40-Hour Training, Process Hazard Analysis (PHA) for Team Leaders

Professional Affiliations

Process Safety

- Global Congress Chair for the 2012 8th AIChE Global Congress on Process Safety, Houston, Texas
- Symposium Chair for the 2011 45th AIChE Loss Prevention Symposium, Chicago, Illinois
- Global Congress Vice Chair for the 2011 7th AIChE Global Congress on Process Safety, Chicago, Illinois
- Chair for Management of Change Session, 2011 3rd Latin CCPS Conference, Buenos Aires
- Symposium Vice Chair for the 2010 44th AIChE Loss Prevention Symposium, San Antonio, Texas
- American Institute of Chemical Engineers (Senior Member)
- Safety & Health Division of AIChE (Member)
- Member of the American Institute of Chemical Engineers (AIChE) Loss Prevention and Process Safety Programming Group (Area 11a of the AIChE Safety & Health Division)

Fire Safety

- National Fire Protection Association (member)
- National Association of Fire Investigators (member)
- Alternate Member: Technical Committee on Ovens and Furnaces, NFPA 86 *Standard for Ovens and Furnaces*, National Fire Protection Association

Product Safety

- Member of Underwriters Laboratories Standards Technical Panel (STP) for UL 2157, Standard for Electric Clothes Washing Machines and Extractors
- Member of Underwriters Laboratories Standards Technical Panel (STP) for UL 2158, Standard for Electric Clothes Dryers
- Member of Underwriters Laboratories Task Group for Clothes Dryer Exhaust Duct Power Ventilators

Journal Articles and Technical Publications

Morrison DR, Fecke M, Martens, JD. Migrating an incident reporting system to a CCPS process safety metrics model. *Journal of Loss Prevention in the Process Industries* 2011; 24:819–826.

Ponchaut NF, Kytömaa HK, Morrison DR, Chernovsky MK. Modeling the vapor source term associated with the spill of LNG into a sump or impoundment area. *Journal of Loss Prevention in the Process Industries* 2011, in press.

Fecke M, Martens JD, Cowells J, Morrison DR. A guide to developing and implementing safety checklists: Plant steam utilities. *Process Safety Progress* 2011; 30(3):240–250.

Ogle RA, Morrison DR. Burn injury caused by mixing incompatible chemicals with sodium permanganate. *Process Safety Progress* 2011; 30(2):148–153.

Ogle RA, Morrison DR. Hazards of unplanned power outages: Implementing appropriate safeguards. *Process Safety Progress* 2011; 30(2):99–103.

Ramirez JC, Ogle RA, Carpenter AR, Morrison DR. Preventing overpressure hazards from trapped liquids. *Process Safety Progress* 2010; 29(4): 313–317.

Morrison DR. Fire containment and clothes dryers. *Appliance Magazine* 2009 Nov/Dec; 66(9):16–19.

Su YS, Morrison DR, Ogle RA. Chemical kinetics of calcium hypochlorite decomposition in aqueous solutions. *Journal of Chemical Health and Safety* 2009 May/June; 16(3):21–25.

Morrison DR, Ogle RA. Further application of the Semenov model to evaluate the possibility of spontaneous combustion in tumble dryers. *Journal of Fire Science* 2008; 26(2):173–190.

Ogle RA, Morrison DR, Carpenter AR. The relationship between automation complexity and operator error. *Journal of Hazard Materials* 2006; 159(1–3):135–141.

Morrison DR, Su YS, Fecke MJ. Spontaneous combustion tendency of household chemicals and clothes dryers – Part 2. *Appliance Magazine* 2006 Jul; 6:26–30.

Morrison DR, Su YS, Fecke MJ. Spontaneous combustion tendency of household chemicals and clothes dryers – Part 1. *Appliance Magazine* 2006 Jun; 7:26–31.

Ogle RA, Morrison DR, Carpenter AR, Su YS. Missed opportunities in reactive chemical hazard evaluations. *Process Safety Progress* 2006 Mar; 25(1):2–7.

Morrison DR, Ogle RA, Viz MJ, Carpenter AR, Su YS. Investigating chemical process accidents: Examples of good practices. *Process Safety Progress* 2006 Mar; 25(1).

Ogle RA, Morrison DR, Viz MJ. Emergency response to a noncollision hazmat release from a railcar. *Process Safety Progress* 2005 Jun; 24(2):81–85.

Ogle RA, Carpenter AR, Morrison DR. Lessons learned from fire and explosions involving air pollution control systems. *Process Safety Progress* 2005 Jun; 24(2):120–125.

Ogle RA, Carpenter AR, Morrison DR. Explosion of a railcar containing toluene diisocyanate waste. *Process Safety Progress* 2004 Dec; 23(4):316–320.

Ogle RA, Megerle MV, Morrison DR, Carpenter AR. Explosion caused by flashing liquid in a process vessel. *J Hazard Mat* 2004; 115(1–3):133–140.

Morrison DR, Carpenter AR, and Ogle RA. Common causes and corrections for explosions and fires in improperly inerted vessels. *Process Safety Progress* 2002 Jun; 21(2):142–150.

Ogle RA, Morrison DR. Investigation of an acid spill caused by the failure of an air-operated diaphragm pump. *Process Safety Progress* 2001 Mar; 20(1):41–49.

Conference Proceedings and Invited Presentations

Ogle RA, Morrison DR, Hart RJ. Thermodynamic models for leak detection of natural gas in salt cavern storage. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October 19, 2011.

Morrison DR, Hart RJ, Heckel P. Exposing the blurry lines between personal safety and process safety education: contrasting NIOSH prevention through design (PtD) with CCPS Sache. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October 18, 2011.

Vaughen BK, Spicer TO, Morrison DR, Klein JA, Rockstraw DA. Continuing our journey to bridge the process safety gaps between academia and industry. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October 18, 2011.

Morrison DR, Fecke M, Ramirez JC. Using LOPA to understand necessary safeguards for steam boiler operation. 3rd CCPS Latin American Process Safety Conference and Expo, Buenos Aires, Argentina, August 8–10, 2011.

Morrison DR. Fire science and investigation. Lecture in the School of Engineering, Stanford University, April 8, 2011.

Morrison DR, Hart RJ. Guidelines for identifying and mitigating thermal hazards of sustainable materials. American Institute of Chemical Engineers, 2011 Spring National Meeting, 45th Annual Loss Prevention Symposium, Chicago, IL, March 13–15, 2011.

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

Ramirez JC, Fecke M, Morrison DR, Martens JD. Root cause analysis of an industrial boiler explosion (and how hazard analysis could have prevented it). Proceedings, ASME 2010 International Mechanical Engineering Congress & Exhibition IMECE2010, Vancouver, Canada, November 12–18, 2010.

Morrison DR, Ogle RA. Developing process safety capsules for the chemical engineering classroom. American Institute of Chemical Engineers, 2010 Annual Meeting, Salt Lake City, UT, November 9, 2010.

Morrison DR, Fecke M, Martens J. Migrating an organizational incident reporting system to a CCPS process safety metrics model. 2010 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2010.

Ponchaut NF, Kytömaa HK, Morrison DR, Chernovsky MK. Modeling the vapor source associated with the spill of LNG into a sump or an impoundment area. 2010 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2010.

Ogle RA, Morrison D, Carpenter AR, Ramirez JC. Process safety management of combustible and flammable liquids. The 2010 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2010), Caracas, Venezuela, October 19–21, 2010. (In Spanish).

Ogle RA, Morrison DR. Burn injury caused by mixing incompatible chemicals with sodium permanganate. American Institute of Chemical Engineers, 2010 Spring National Meeting, 44th Annual Loss Prevention Symposium, San Antonio, TX, March 22–24, 2010.

Fecke M, Morrison DR, Martens J, Cowells J. A guide to developing and implementing safety checklists: Plant steam utilities. American Institute of Chemical Engineers, 2010 Spring National Meeting, 25th Center for Chemical Process Safety International Conference, San Antonio, TX, March 22–24, 2010.

Ogle RA, Morrison DR, Henriksen T. Hazards of unplanned power outages: Implementing appropriate safeguards. American Institute of Chemical Engineers, 2010 Spring National Meeting, 25th Center for Chemical Process Safety International Conference, San Antonio, TX, March 22–24, 2010.

Morrison DR, Fecke M, Dillon SE. Lessons learned from a thermal runaway incident involving an organic peroxide intermediate during a power outage. American Institute of Chemical Engineers, 2010 Spring National Meeting, Case Histories and Lessons Learned Joint Session, San Antonio, TX, March 22–24, 2010.

Morrison DR, Ogle RA, Gidaspow D. Internal natural convection effects on the self-heating of solids. American Institute of Chemical Engineers, 2009 Annual Meeting, Nashville, TN, November 13, 2009.

Morrison DR. Analysis of a two decade old arson investigation using scientific fire investigation methods: The People vs. Madison Hobley. Invited guest lecture, Knox College Forensic Sciences Class, October 2009.

Blum A, Long RT, Ogle RA, Morrison DR, Dillon SE. 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.

Morrison DR. Industrial accident investigation. Lecture in the McCormick School of Engineering and Applied Science, Northwestern University, May 20, 2009.

Morrison DR, Martens JD, Ogle RA, Cowells JT. Root cause analysis of a cryogenic refrigeration system explosion. American Institute of Chemical Engineers, 2009 Spring National Meeting, 43rd Annual Loss Prevention Symposium, Tampa, FL, April 26–30, 2009.

Morrison DR, Martens JD, Ogle RA, Cowells JT. Accident investigation using process control event diagrams. American Institute of Chemical Engineers, 2009 Spring National Meeting, 24th Annual CCPS International Conference, Tampa, Florida, April 26–30, 2009.

Morrison DR, Ogle RA, Dillon SE, Lucas RJ. Analysis of a two decade old arson investigation using scientific fire investigation methods: The People vs. Madison Hobley. Proceedings, 2009 Fire and Materials Conference, San Francisco, CA, Interscience Communications Limited, London, January 2009.

Ogle RA, Morrison DR, Carpenter AR, Ramirez JC. Common causes and corrections for explosions and fires in improperly inerted vessels. The 2008 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2008), Caracas, Venezuela, October 29–31, 2008. (In Spanish).

Ogle RA, Morrison DR, Carpenter AR, Ramirez JC. The relationship between automation complexity and operator error. The 2008 Annual Meeting of the Venezuelan Society of Safety Executives (SegurShow 2008), Caracas, Venezuela, October 29–31, 2008. (In Spanish).

Morrison DR, Ogle RA, Ramirez RA. Evaporator upset investigation in a sugar processing plant. First Andean Congress on Safety and Health at Work, Lima, Perú, October 22–24, 2008. (In Spanish).

Morrison DR. Thermal ignition studies of wood flour. Ph.D. dissertation in Chemical Engineering, Illinois Institute of Technology, May 2008.

Morrison DR. Self-heating materials and thermal stability hazards. Lecture in the School of Engineering, Stanford University, May 5, 2008.

Morrison DR, Ogle RA. Evaluating kinetic parameters for solid substances exhibiting complex self-heating behavior. American Institute of Chemical Engineers, 2008 Spring National Meeting, 42nd Annual Loss Prevention Symposium, New Orleans, LA, April 7–9, 2008.

Dillon SE, Carpenter AR, Ogle RA. Comparative fire risk of motor vehicle fuels: Gasoline vs. ethanol. Presented at American Institute of Chemical Engineers, 2008 Spring National Meeting, 42nd Annual Loss Prevention Symposium, New Orleans, LA, April 7–9, 2008.

Morrison DR, Ogle RA, Gidaspow D. A new assessment of the finite Biot number correction to thermal ignition tests. American Institute of Chemical Engineers, 2007 Annual Meeting, Salt Lake City, UT, November 8, 2007.

Morrison DR. Transient self-heating vs. steady state theory for ignition of wood flour' and 'scientific investigation of incendiary fires.' Invited guest lectures, Knox College Chemistry Department, October 2006.

Morrison DR, Su YS, Fecke MJ. Spontaneous combustion tendency of household chemicals and clothes dryers. 2006 International Appliance Technical Conference, March 2006. This paper received the Dana Chase Memorial Award for the Best Paper presented at the conference.

Ogle RA, Morrison DR, Carpenter AR. The relationship between operator error and automation complexity. 2006 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2006.

Caligiuri RD, Morrison DR. Using root cause analysis in product safety investigations. Presentation for Association of Home Appliance Manufacturers Product Liability Seminar, Washington, D.C., October 2005.

Morrison DR, Ogle RA, Viz MJ, Carpenter AR, Su YS. Investigating chemical process accidents: examples of good practices. Engineers Process Plant Safety Symposium, 2005 Spring National Meeting, American Institute of Chemical Engineers, Atlanta, GA, April 11–13, 2005.

Ogle RA, Morrison DR, Carpenter AR, Su YS. Missed opportunities in reactive chemical hazard evaluations. 39th Annual Loss Prevention Symposium, American Institute of Chemical Engineers Spring National Meeting, April 11–13, 2005.

Ogle RA, Morrison DR, Viz MJ. Emergency response to a non-collision HAZMAT release from a railcar. 19th Annual CCPS International Conference, Emergency Planning: Preparedness, Prevention and Response; Orlando, FL, June 2004.

Ogle RA, Carpenter AR, Morrison DR. Lessons learned from fires and explosions involving air pollution control systems. 38th Annual Loss Prevention Symposium, American Institute of Chemical Engineers, New Orleans, LA, April 2004.

Morrison DR, Ogle RA, MacDonald M. Analyzing lint deposition within the residential electric clothes dryer. 2004 International Appliance Technical Conference, March 2004.

Morrison DR, Ogle RA, MacDonald M. Assessing electric dryer lint fire cause scenarios. 2004 International Appliance Technical Conference, March 2004.

Ogle RA, Carpenter AR, Morrison DR. Explosion of a railcar containing toluene diisocyanate waste. 18th International CCPS Conference and Workshop: Managing Chemical Reactivity Hazards and High Energy Release Events, American Institute of Chemical Engineers, September 25, 2003.

Ogle RA, Haussmann G, Lucas RJ, Carpenter AR, Morrison DR. The scientific investigation of arson fires. 2003 DRI Fire and Casualty Seminar, Defense Research Institute, Phoenix, AZ, November 2003.

Ogle RA, Megerle MV, Morrison DR, Carpenter AR. Explosion caused by a flashing liquid in a process vessel. 2003 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October, 2003.

Morrison DR. Basic fire origin and cause investigation. Presentation and Training Program for the Illinois Association of Special Investigation Units, March 2002.

Morrison DR, Carpenter AR, Ogle RA. Common causes and correction for explosions and fires in improperly inerted vessels. Beyond Regulatory Compliance: Making Safety Second Nature, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, 2001.

Ogle RA, Morrison DR. Evaluation of accident investigations conducted by regulatory authorities and advisory agencies. Beyond Regulatory Compliance: Making Safety Second Nature, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2000.