

Andrew R. Carpenter, P.E.
Senior Managing Engineer

Professional Profile

Mr. Carpenter applies his expertise in chemical engineering to the scientific investigation of fires and explosions, reactive chemical accidents, chemical releases, chemical process and production analysis, process safety and risk assessment, and complex chemical process accident investigation. Mr. Carpenter has investigated and reconstructed numerous accident investigations relying upon a wide variety of information sources including on-scene investigations, artifact examinations, process and instrumentation data, witness interviews, and laboratory testing.

His accident investigations have included residential, commercial, and industrial fires and explosions; thermal decomposition of reactive chemicals; pressure relief systems; pressure vessels; railcars; air pollution equipment; and a wide variety of consumer products and chemicals. Mr. Carpenter has designed experimental test programs to evaluate various engineering issues associated with these investigations including full-scale fire testing, chemical compatibility, and thermal stability.

Mr. Carpenter's chemical facility process investigations have included the study of facility start-up operations, historical performance, evaluation of maximum production capacity, and the assessment of system safety. He has performed these studies for a wide variety of chemical processes and industries including oil and gas, plastics, specialty chemicals, and medical sterilization. In addition, Mr. Carpenter is a qualified process hazard analysis (PHA) facilitator and has led numerous HAZOP, What-If, and LOPA studies.

Mr. Carpenter's research interests include process safety, flammable liquid and vapor fuel storage, self-heating and thermal decomposition of reactive chemicals, safety instrumented systems, and alternative vehicle fuels. Mr. Carpenter is a licensed Professional Engineer in the states of Illinois and Ohio.

Academic Credentials and Professional Honors

M.S., Chemical Engineering, Illinois Institute of Technology, 2003
B.S., Chemical Engineering, Iowa State University, 1996

Licenses and Registrations

Professional Engineer, Illinois, #062-055678
Professional Engineer, Ohio, #69335

Publications and Presentations

Carpenter AR, Ogle RA, Ramirez JC. Risk assessment of a propane storage sphere, maintain or decommission? Paper presented at the American Institute of Chemical Engineers (AIChE) 7th Global Congress on Process Safety, Chicago, IL, March 13–16, 2011.

Ogle RA, Dillon SE, Carpenter, AR. Facility siting and hidden pathways for hazardous gas migration. Paper presented at the Mary Kay O'Connor Process Safety Center, 2011 International Symposium, College Station, TX, October 25–27, 2011.

Ogle RA, Dillon SE, Carpenter, AR. Fatal explosion caused by an intermittently used fuel gas piping system. Paper presented at the American Institute of Chemical Engineers (AIChE) 7th Global Congress on Process Safety, Chicago, IL, March 13–16, 2011.

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

Ogle RA, Carpenter AR. Facility siting, buffer zones, and community relations. 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).

Ramirez JC, Eby DJ, Bullen DB, Carpenter AR, Ogle RA. Inerted vessels: Avoiding hazards caused by buoyancy. *Journal of Loss Prevention in the Process Industries* 2009; 22:791–794.

Dillon SE, Carpenter AR, Ogle RA. Comparative fire risk of motor vehicle fuels: Gasoline vs. ethanol. *Process Safety Progress* 2009 Jun; 28:171–178.

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

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

Ramirez JC, Eby DJ, Bullen DB, Carpenter AR, Ogle RA. Inerted vessels: Preventing hazards caused by gas buoyancy. 2008 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2008.

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

Ogle RA, Carpenter AR. Guidelines for identifying, evaluating, and selecting safety instrumented functions. Process Plant Safety Symposium, 2007 Spring National Meeting, American Institute of Chemical Engineers, Houston, TX, April 2007.

Ogle RA, Morrison III 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.

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

Morrison III DR, Ogle RA, Viz MJ, Carpenter AR, Su YS. Investigating chemical process accidents: Examples of good practices. Process Safety Progress 2006 Mar; 25:71–77.

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

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

Ogle RA, Morrison III 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, Carpenter AR, Morrison III DR. Explosion of a railcar containing toluene diisocyanate waste. Process Safety Progress 2005 Jan; 23:316–320.

Ogle RA, Megerle M, Morrison III DR, Carpenter AR. Explosion caused by flashing liquid in a process vessel. Journal of Hazardous Materials 2004; 115:133–140.

Ogle RA, Viz MJ, Morrison III DR, Carpenter AR. Bulk transportation of hazardous materials by rail: Lessons learned from non-collision accidents. 2004 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2004.

Ogle RA, Viz MJ, Carpenter AR. Lessons learned from Hazmat accident investigations. 17th Annual AAR/BOE Hazardous Materials Seminar, Association of American Railroads/Bureau of Explosives, Houston, TX, May 2004.

Carpenter AR, Hinze PC. System safety analysis of hydrogen and methanol vehicles fuels. Process Safety Progress, 2004.

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

Ogle RA, Haussmann G, Lucas RJ, Carpenter AR, Morrison III DR. The scientific investigation of arson fire. Paper (with accompanying presentation by Russ Ogle), 2003 DRI Fire and Casualty Seminar, Defense Research Institute, Phoenix, AZ, November 2003.

Ogle RA, Megerle MV, Morrison III 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.

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

Ogle RA, Carpenter AR. Toxic gas release caused by the thermal decomposition of a bulk powder blend containing sodium dichloroisocyanurate. Process Safety Progress 2003; 22:75–82.

Carpenter AR, Okma C, Al-Hallaj S. System safety analysis of hydrogen and methanol vehicle fuels. 37th Annual Loss Prevention Symposium, American Institute of Chemical Engineers Spring National Meeting, New Orleans, LA, 2003.

Morrison DR, Ogle RA, Viz MJ, Carpenter AR, McKinney JM. Anatomy of a major process unit explosion investigation—An interdisciplinary approach to multiple causes. Mary Kay O'Connor Process Safety Center, College Station, TX, Fall 2002.

Ogle RA, Carpenter AR. An accident involving the thermal decomposition of a solid mixture containing sodium dichloro-isocyanurate. AIChE Spring National Meeting, American Institute of Chemical Engineers, New Orleans, LA, March 2002.

Ogle RA, Carpenter AR. Lessons learned from fires, flash fires and explosions involving hot work. AIChE Spring National Meeting, American Institute of Chemical Engineers, Houston, TX, 2001.

Morrison III 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, Carpenter AR. Lessons learned from fires, flash fires and explosions involving hot work. AIChE Spring National Meeting, American Institute of Chemical Engineers, Houston, TX, 2001.

Ogle RA, Carpenter AR. Lessons learned from fires, flash fires and explosions involving hot work. *Process Safety Progress* 2001; 20:75–81.

Ogle RA, Carpenter AR. Fire patterns on combustible flooring. *Society of Fire Protection Engineers, 3rd International Conference on Fire Research and Engineering, Chicago, IL, 1999.*

Professional Affiliations

- American Institute of Chemical Engineers
- National Fire Protection Association