

Russell A. Ogle, Ph.D., P.E., CSP
Principal Engineer

Professional Profile

Dr. Russell Ogle is a Principal Engineer in Exponent's Thermal Sciences practice. Dr. Ogle applies his expertise as a chemical engineer to the scientific investigation and prevention of accidents, with particular emphasis on fires, explosions, and chemical releases. He specializes in the investigation of complex industrial accidents, catastrophic fires and explosions, and incendiary fires (arson). Drawing from his diverse accident investigation experience, he has provided consulting services to the chemical, petroleum, natural gas, pharmaceutical, and environmental industries. He is experienced in process hazard analysis, consequence assessment, risk assessment, and decision analysis.

Dr. Ogle has investigated hundreds of fires and explosions in industrial, commercial, and residential settings. His investigations have involved the performance evaluation and failure analysis of a wide range of chemical processes, industrial equipment, and consumer products. Additionally, he has demonstrated expertise in evaluating the stability of chemicals and their fire and explosion hazards. He has investigated accidents involving flammable gases and liquids, thermal runaway and spontaneous ignition, the mixing of incompatible chemicals, vapor cloud explosions, boiling liquid expanding vapor explosions (BLEVE), pressure vessel bursts, and combustible dust fires and explosions. Dr. Ogle was awarded one of the first doctorates in the United States based on dust explosion testing using the 20-liter sphere, and he was one of the first investigators to analyze dust explosion data using chemical kinetics and computational fluid dynamics.

In addition to his work in process safety, Dr. Ogle regularly consults with clients on process systems engineering, particularly in the areas of plant performance and process operations. He has extensive experience in evaluating the performance of chemical process plants including the analysis of process flowsheets and production data, the determination of plant capacity, the identification of production bottlenecks, and the investigation of product quality issues. He has also investigated the detection and management of abnormal operating conditions, the impact of operator responses to process upsets, and the potential role of human error.

In addition to his consulting experience, Dr. Ogle has worked in both the defense and environmental industries. In the defense industry, he was responsible for the design, testing, and evaluation of military weapon systems. In the environmental industry, he performed and managed investigations, feasibility studies, and design projects for the cleanup of hazardous waste sites. Drawing on his environmental experience, he has investigated explosions and fires associated with the subsurface migration of natural gas, propane, or landfill gas into buildings.

Academic Credentials and Professional Honors

Ph.D., Chemical Engineering, University of Iowa, 1986
B.S., Chemical Engineering, Purdue University, 1980

Licenses and Registrations

Licensed Professional Engineer, Illinois, #062-026870
Licensed Professional Engineer, Texas, #102868
Licensed Professional Engineer, Arkansas, #12225
Licensed Professional Engineer, Alabama, #28089E
Certified Safety Professional, #15568
40-Hour Training, Process Hazard Analysis (PHA) for Team Leaders
40-Hour OSHA Certification, Hazardous Waste Operations and Emergency Response
10-Hour OSHA Certification, General Industry Standards

Professional Affiliations

- American Chemical Society
- American Institute of Chemical Engineers
- Center for Chemical Process Safety, Technical Steering Committee
- American Society of Safety Engineers
- Institute for Operations Research and Management Sciences
- National Fire Protection Association
- The International Society for Automation

Publications

Ogle RA, Ramirez JC, Smyth SA. Calculating the explosion energy of a boiling liquid expanding vapor explosion using exergy analysis. *Process Safety Progress* 2011; pre-publication view of article accepted for publication available online doi: 10.1002/prs.10465.

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

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

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

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.

Russell A. Ogle, Ph.D., P.E., CSP

Page 2

11/11

Su YS, Morrison III 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.

Ogle RA, Morrison III DR, Carpenter AR. The relationship between operator error and automation complexity. *Journal of Hazardous Materials* 2008; 159:135–141.

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 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, Morrison III DR, Viz MJ. Emergency response to a non-collision HAZMAT release from a railcar. *Process Safety Progress* 2005 Jun; 24:81–85.

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.

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, 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.

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

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

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

Ogle RA. The need for scientific fire investigation. *Fire Protection Engineering* 2000; Issue No. 8, Fall.

Ogle RA. Explosion hazard analysis for an enclosure partially filled with a flammable gas. *Process Safety Progress* 1999; 18:170–177.

Ogle RA, Schumacher JL. Fire patterns on upholstered furniture: Smoldering vs. flaming combustion. *Fire Technology* 1998; 34:247–265.

Ogle RA, Schumacher JL. Investigation of an explosion and flash fire in a fixed bed reactor. *Process Safety Progress* 1998; 17:127–133.

Ogle RA, Schumacher JL. Investigation of a steam explosion in a petroleum product storage tank. *Process Safety Progress* 1998; 17:171–175.

Ogle RA, Beddow JK, Vetter AF, Chen LD. An investigation of aluminum dust explosions. *Combustion Science and Technology* 1988; 61:75–99, 1988.

Ogle RA. Parametric sensitivity of a mathematical model for closed bomb dust explosions. *Chemical and Physical Processes in Combustion*, Eastern States Section, The Combustion Institute, Gaithersburg, MD, 1987.

Ogle RA, Beddow JK, Vetter AF, Chen LD. Thermal theory of laminar premixed dust flame propagation. *Combustion and Flame* 1984; 58:77–79.

Presentations

Ramirez, JC, Ogle RA, Smyth SA. Towards an exergy-based explosion energy model for boiling-liquid expanding-vapor explosions. ASME 2011 International Mechanical Engineering Conference & Exposition, Denver, CO, November, 2011.

Martens J, Fecke M, Bishop J, Ogle R. Functional testing for industrial control systems. ASME 2011 International Engineering Congress & Exposition, Denver, CO, November, 2011.

Ogle RA. Scene characterization: chemical hazards. Chemical Plant Explosion Case Study, Institute of Forensic Investigation Annual Conference and Trade Show, Homeland Security Education Center, College of DuPage, Glen Ellyn, IL, October, 2011.

Ogle RA, Dillon SE, Carpenter AR. Facility siting and hidden pathways for hazardous gas migration. 2011 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2011.

Ogle RA, McCann DM, and Viz MJ. Sizing safety stock for supply chain risk management. American Institute of Chemical Engineers, 2011 Annual Meeting, Minneapolis, MN, October, 2011.

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, 2011.

Ogle RA, Dillon SE. Combustible dust. 23rd Annual Chicagoland Safety and Health Conference, Northern Illinois University, Naperville, IL, September, 2011.

Ogle RA, Dillon SE, Carpenter AR. Fatal explosion caused by an intermittently-used fuel gas piping system. 7th Global Congress on Process Safety, American Institute of Chemical Engineers, 2011 Spring Meeting, Chicago, IL, March 16, 2011.

Ogle RA, Carpenter AR, Ramirez JC. Risk assessment of a propane storage sphere: Maintain or decommission? 7th Global Congress on Process Safety, American Institute of Chemical Engineers, 2011 Spring Meeting, Chicago, IL, March 16, 2011.

Ogle RA, Ramirez JC, Smyth SA. Calculating the explosion energy of a BLEVE using exergy analysis. 7th Global Congress on Process Safety, American Institute of Chemical Engineers, 2011 Spring Meeting, Chicago, IL, March 16, 2011.

Morrison III DR, Ogle RA. Developing process safety capsules for the chemical engineering classroom. American Institute of Chemical Engineers, 2009 Annual Meeting, Salt Lake City, UT, November 9, 2010.

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 III DR, 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 III 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.

Ogle RA, Morrison III 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 III 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.

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

Morrison III DR, Martens JD, Ogle RA, Cowells JT. Accident investigation using process control event diagrams. Proceedings, American Institute of Chemical Engineers, 2009 Spring National Meeting, Fifth Global Congress on Process Safety, 24th Annual CCPS International Conference, Tampa, FL, April 26-30, 2009.

Morrison III 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 III DR, 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 III DR, 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).

Morrison III DR, Ogle RA, Ramirez JC. Evaporator upset investigation in a sugar processing plant. Proceedings, 1st First Andean Congress on Safety and Health at Work, Lima, Perú, October 22–24, 2008. (In Spanish).

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

Morrison III 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.

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.

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, 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, Morrison III 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; American Institute of Chemical Engineers, Orlando, FL, June 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.

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.

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

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

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, 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. An accident involving the thermal decomposition of a solid mixture containing sodium dichloroisocyanurate. 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. Ethics in forensic chemical engineering. AIChE Spring National Meeting, American Institute of Chemical Engineers, Atlanta, GA, 2000.

Ogle RA, Morrison III 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.

Ogle RA. Explosion risk analysis for a commercial building near a closed landfill. SFPE Symposium on Risk, Uncertainty and Reliability, Society of Fire Protection Engineers, Baltimore, MD, 1999.

Ogle RA, Smith KM, Strack S. Investigation of a boiler explosion caused by a natural gas detonation. American Society of Mechanical Engineers Pressure Vessels and Piping Conference, Boston, MA, 1999.

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.

Ogle RA, Schumacher JL. Application of fire testing and modeling in a forensic investigation. Society of Fire Protection Engineers, 2nd International Conference on Fire Research and Engineering, Gaithersburg, MD, 1997.

Ogle RA, Strack S. The role of incident investigation in mechanical integrity programs. American Petroleum Institute, 61st Spring Refining Meeting, Chicago, IL, 1996.

Ogle RA, Brumleve CB, Joyner S. Hydrogeology and remedial action modeling for a superfund site in a glaciated area. Solving Ground Water Problems with Models Conference, National Ground Water Association, Dallas, TX, 1992.

Ogle RA, Peterson EH, Souka OA, Holmquist TJ. The effect of recoil dynamics and soil response on the interior ballistics of a lightweight launcher. 1989 JANNAF Propulsion Meeting, Cleveland, OH, 1989.

Ogle RA. A new strategy for dust explosion research; a synthesis of combustion theory, experimental design and particle characterization. Ph.D. Dissertation, University of Iowa, 1986.

Ogle RA, Beddow JK, Vetter AF, Chen LD. A new strategy for dust explosion research. 17th Annual Meeting of the Fine Particle Society, San Francisco, CA, 1986.

Ogle RA, Beddow JK, Vetter AF, Chen LD. Dust explosion kinetics. 17th Annual Meeting of the Fine Particle Society, San Francisco, CA, 1986.

Ogle RA, Scholz PD, Beddow JK, Vetter AF. Free molecular electrophoresis of highly dispersed aerosol particles in an isothermal gas. 16th Annual Meeting of the Fine Particle Society, 1985.

Ogle RA, Beddow JK, Vetter AF. Applications of symmetry classifiers in morphological analysis. 9th Annual Powder and Bulk Solids Conference/Exhibition, Rosemont, IL, 1984.

Ogle RA, Beddow JK, Vetter AF, Chen LD. Thermal theory of laminar premixed flame propagation. Chemical and Physical Processes in Combustion Eastern States Section: The Combustion Institute, Providence, RI, 1983.

Ogle RA, Beddow JK, Vetter AF. Numerical modeling of dust explosions: The influence of particle shape on explosion intensity. Process Technical Program: International Powder Bulk Solids Handling Process, Rosemont, IL, 1983.