

Exponent®
Engineering & Scientific Consulting

Brenton Cox, Ph.D., P.E., CCPSC, CFEI

Principal Engineer | Thermal Sciences
Warrenville
+1-630-658-7523 | bcox@exponent.com

Professional Profile

Brenton Cox, Ph.D., P.E., CCPSC, CFEI, is a principal engineer in Exponent's Thermal Sciences practice with over 14 years of experience in industrial incident investigation, combustible dust hazard assessment, and chemical process safety. He is a chemical engineer who specializes in the analysis and prevention of fires, explosions, and chemical releases for chemical manufacturers, agricultural processors, insurers, and legal counsel. He also applies his expertise to evaluate chemical process performance in the context of disputes.

Dr. Cox has helped clients solve technical challenges associated with potentially flammable and/or reactive materials in the chemical process industry, agricultural and agro-industrial facilities, mining and metal processing, pulp and paper manufacturing, hazardous waste treatment and disposal facilities, and consumer products. Based in suburban Chicago, Dr. Cox supports projects throughout the Midwest, across the United States, and internationally.

With deep expertise in process safety management (PSM), risk assessment, and incident investigation, Dr. Cox advises clients on best practices across a variety of topics, bringing clarity and technical rigor to regulatory and risk management challenges. These topics include:

- Managing risks associated with hazardous materials, e.g., flammable liquids, vapors, and combustible dust
- Advising clients on compliance issues associated with the OSHA Process Safety Management standard (29 CFR 1910.119), the Canadian PSM standard (CSA-Z767-17), and NFPA guidelines for flammable materials and combustible dust hazards
- Investigating and analyzing the direct causes of fires, explosions, and other incidents involving hazardous materials manufacturing, storage, transport, and disposal, as well as consumer products, and authoring expert reports and testifying on related issues in disputes and litigation.

Dr. Cox has conducted risk studies for industrial processes and consumer products. He is a trained process hazard analysis (PHA) facilitator whose consulting services have involved hazard identification (HAZID), checklist, what-if, hazard and operability (HAZOP) studies, quantitative risk assessment (QRA), failure modes and effects analysis (FMEA), and consequence modeling. He led root-cause investigations and has supported them as a subject matter expert. He has also been trained in advanced emergency relief design through a course developed by the Design Institute for Emergency Relief Systems (DIERS), of which he is a member. He is a member of the technical committee for NFPA 214: the Standard Water-Cooling Towers.

Recognized by the Center for Chemical Process Safety (CCPS) as a Certified Process Safety Professional (CCPSC) and an invited member of the CCPSC Exam Subcommittee, Dr. Cox is an active leader and participant in the process safety community, regularly contributing to conferences and technical publications. He has presented papers at the Global Congress on Process Safety (GCPS), the

Institution of Chemical Engineers (IChemE) Hazards Conference, and the Mary K O'Connor Process Safety Center International Symposium, as well as other regional and national conferences. In 2019, he served as chair of the Process Safety Management Mentoring Forum at the GCPS, and in 2026, he chaired the CCPS International Conference at the GCPS. In 2026, he was elected 2nd Vice Chair of the AIChE's Process Safety Division, which places him on a progression pathway to serve as Process Safety Division Chair in 2028.

Dr. Cox also co-authored a chapter on Combustible Dust Risk Assessment in *Dust Explosions*, a volume of Elsevier's series on *Methods in Chemical Process Safety*. He has also applied his expertise in chemical process safety to topics relevant to decarbonization, including carbon capture, use, and storage (CCUS), hydrogen production via electrolysis, and nuclear power generation.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Cornell University, 2011

B.S., Chemical Engineering, University of Florida, 2005

Licenses and Certifications

Professional Engineer, Illinois, #62066182

Professional Engineer, Indiana, #PE12100315

Professional Engineer Chemical, Louisiana, #PE.0050742

Professional Engineer, North Carolina, #060422

Professional Engineer, Pennsylvania, #PE099445

Professional Engineer, West Virginia, #27440

Professional Engineer, Wisconsin, #46956-6

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

Certified Process Safety Professional (CCPSC)

Credential in Grain Operations Management (CGOM)

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Dr. Cox's doctoral thesis examined the process dynamics, heat transfer, and fluid mechanics of a single-stage metal casting process. The focus of his research was the prediction and control of process instabilities affecting material thickness. This study included lab-scale casting of various aluminum alloys and theoretical modeling of transport phenomena and interfacial stability.

Before performing his thesis research, Dr. Cox assisted in studies of bacterial growth kinetics, the mechanics and stability of powder flow, and the use of siloxane polymer coatings on wine corks to prevent corkage.

His laboratory experience includes metal casting, bench-scale biological reactor design and operation, and the use of a variety of analytical equipment, including high-performance liquid chromatography

(HPLC), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), fluorescent/ultraviolet/visible spectroscopy, and optical profilometry. He has captured and analyzed high-speed images at rates up to 50,000 frames-per-second.

Dr. Cox also has experience operating mathematical and process design software, such as Matlab, Mathematica, HYSYS, AspenPlus, AspenProperties, SuperChems, PHAST, and Safeti.

Professional Affiliations

American Institute of Chemical Engineers — AIChE (member)

National Association of Fire Investigators — NAFI (member)

National Fire Protection Association — NFPA (member)

Principal Member: Technical Committee on Water-Cooling Towers (WAC-AAA), NFPA 214: Standard on Water-Cooling Towers, National Fire Protection Association.

Design Institute for Emergency Relief Systems — DIERS (member)

Grain Elevator and Processing Society — GEAPS (member)

Publications

Cox BL, Schulman N, Morrison DR. "Blue skies, green risk matrices: Managing the hazards associated with air pollution control equipment," Process Safety Progress 2026; 45 (1), 30-37. DOI: 10.1002/prs.70011.

Morrison DR, Cox BL, Mastalski I. "Explosion of a cooling tower dosing system," Process Safety Progress 2026; 45(1): 98-104. doi:10.1002/prs.70017.

Schulman N, Reding N, Cox BL, Ogle RA. "Consequence Analysis of the Satartia Carbon Dioxide Release," Chemical Engineering Progress, 2025, November: 40-47.

Ogle RA, Schneider J, Schulman N, Cox, BL. "Risk-based facility siting of CO2 pipelines," Process Safety Progress 2025;44:606-614.

Ogle RA, Cox BL, Hietala DC. "What to do with your Dust Hazard Analysis," Occupational Health & Safety Magazine 2021; 90 (4):12-14.

Dee, SJ, Cox, BL, Ogle, RA, and Walters, MS. "Deciding Between Short-Term and Long-Term Solutions for Aging Infrastructure." Chemical Engineering Progress, 2021; August: 20-27.

Cox, BL, Hietala, DC, and Ogle, RA. "Dust explosions and collapsed ductwork," Journal of Loss Prevention in the Process Industries 2021, 69: 104350. doi: 10.1016/j.jlp.2020.104350.

Ogle, RA and Cox, BL. "Chapter 6 Dust Explosions: Risk Assessment," in Methods in Chemical Process Safety, Volume 3, Dust Explosions, 167-193, Elsevier, 2019.

Dee, SJ, Cox, BL, Ogle, RA. "When the fail open valve fails closed: Lessons from investigating the "impossible"," Process Safety Progress 2019, 38: e12031. doi:10.1002/prs.12031.

Cox, BL, Bishop, JA, Ogle, RA, Traina, NA, Prigmore, JR. "Bonded, Grounded, and Burned to a Crisp: Electrostatic Ignition of Flammable Gases," Process Safety Progress 2018, 38: e12024. doi:10.1002/prs.12024.

Dee, SJ, Cox, B, Ogle, R and Walters, M. "Evaluating inherently safer design with multiattribute utility theory," Process Safety Progress 2018, 38: e12022. doi:10.1002/prs.12022.

Cox, BL, Garner, SW, Carpenter, AR, Fecke, MT. "Hazards inherent to control systems: Case studies and lessons learned," Process Safety Progress 2017, 36: 273-279.

Dee SJ, Cox BL, Ogle RA. "Development of a slip hazard: partially wetted floors and film formation," Materials Performance and Characterization 2016; 5(1): 272-287.

Dee SJ, Cox BL, Hart RJ, Farina R, Morrison DR. "Effects of cooking on the thermal ignition behavior of vegetable oil," Proceedings, 2015 Fire and Materials Conference, San Francisco, CA, Interscience Communications Limited, London, February 2015, pp. 889-904.

Cox BL, Carpenter AR, Ogle RA. "Lessons learned from case studies of hazardous waste/chemical reactivity incidents," Process Safety Progress 2014; 33(4):395-398.

Dee SJ, Cox BL, Ogle, RA. "Using near misses to improve risk management decisions," Process Safety Progress 2013; 32(4):322-327.

Cox BL, Steen PH. "'Herringbone' defect formation in planar-flow melt spinning," Journal of Materials Processing Technology 2013; 213(10):1743-1752.

Cox BL. "Operating rooms as wet/dry locations risk assessment," Report for the Fire Protection Research Foundation, August 2012.

Cox BL, Steen PH. "Finite-amplitude dynamics of coupled cylindrical menisci," Journal of Colloid and Interface Science 2011; 362(1):215-220.

Conference Proceedings and Presentations

Schneider J, Sterling H, Cox B, Buehler C. Risk-Based Monitoring, Report, and Verification of Geological Carbon Dioxide Storage. 41st Global Congress on Process Safety, Dallas, TX, April 6-10, 2025.

Schulman NS, Reding N, Cox BL, Ogle RA. Consequence Analysis of the Satartia Carbon Dioxide Release. 41st Global Congress on Process Safety, Dallas, TX, April 6-10, 2025.

Morrison DR, Cox BL, Schneider J. Understanding Deflagration and Detonation Arresters. 10th CCPS Latin American Conference on Process Safety, Barranquilla, Colombia, September 18, 2024.

Morrison DR, Cox BL, Mastalski I. Explosion of a Cooling Tower Dosing System. 10th CCPS Latin American Conference on Process Safety, Barranquilla, Colombia, September 18, 2024.

Cox BL, Morrison DR, Schulman, N. Blue Skies, Green Risk Matrices – Managing the Hazards Associated with Air Pollution Control Equipment. 20th Global Congress on Process Safety, New Orleans, LA, March 24-28, 2024.

Ogle RA, Cox BL, Schulman, N, Schneider, J. The Urgency of Risk-Based Facility Siting of Carbon Dioxide Pipelines. 20th Global Congress on Process Safety, New Orleans, LA, March 24-28, 2024.

Cox BL, Ogle RA, Hietala, DC. Distillation Column Explosion. 20th Global Congress on Process Safety, New Orleans, LA, March 24-28, 2024.

Walters M, Cox BL, Dee SJ, Morrison DR. Is My Liquid Trapped? 19th Global Congress on Process Safety, Houston, TX, March 12-16, 2023.

Cox BL, Hietala DC, Walters MS, Dee SJ. Ignition Sources Are Free: A Discussion of Common (and Uncommon) Ignition Mechanisms for Gaseous Fuels and Combustible Dusts. 19th Global Congress on Process Safety, Houston, TX, March 12-16, 2023

Cox BL, Walters MS, Dee SJ, Ogle RA. Taking Action on Your DHA Action Items. 17th Global Congress on Process Safety, Virtual Meeting, April 18-23, 2021.

Cox, BL, Ogle, RA, and Hietala, DC. Distillation column explosion. 16th Global Congress on Process Safety, Virtual Meeting, August 17-20, 2020.

Dee SJ, Cox BL, Ogle RA, Walters MS. Is it time for an overhaul? Deciding between short-term and long-term solutions in aging infrastructure. 16th Global Congress on Process Safety, Virtual Meeting, August 17-20, 2020.

Cox, BL, Hietala, DC, Ogle RA. Dust Explosions and Collapsed Ductwork. Mary K O'Connor Process Safety Center 22nd Annual International Symposium, College Station, TX, October 22-24, 2019.

Dee SJ, Cox BL Walters MS Ogle RA. PPE – Can you have too much of a good thing? 22nd Annual International Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 22-24, 2019.

Cox, BL, Bishop, JA, Ogle, RA, Traina, NA, Prigmore, JR. Bonded, Grounded, and Burned to a Crisp: Electrostatic Ignition of Flammable Gases. American Institute of Chemical Engineers, 2018 Spring National Meeting, 14th Global Congress on Process Safety, Orlando, FL, April 22-26, 2018.

Dee, SJ, Cox, B, Ogle, R and Walters, M. Evaluating inherently safer design with multiattribute utility theory. American Institute of Chemical Engineers, 2018 Spring National Meeting, 14th Global Congress on Process Safety, Orlando, FL, April 22-26, 2018.

Garner S, Cox B, Bobbitt B, Parrish B, Ogle R. Managing the chemical reactivity hazards associated with hazardous waste. Institution of Chemical Engineers (UK), Hazards 27, Birmingham, UK, May 10-12, 2017.

Garner S, Cox B, Bishop J, Fecke M. Electrical Area Zoning: Its role in a risk-based process safety program for combustible dusts. Institution of Chemical Engineers (UK), Hazards 27, Birmingham, UK, May 10-12, 2017.

Morrison DR, Cox BL. Investigating chemical process incidents & near misses, Short Course. 13th Global Congress on Process Safety, San Antonio, Texas, March 26, 2017.

Cox BL, Dee SJ, Ogle RA. When the fail open valve fails closed: lessons from investigating the "impossible." American Institute of Chemical Engineers, 2017 Spring National Meeting, 13th Global Congress on Process Safety, San Antonio, TX, March 26-29, 2017.

Fecke M, Garner S, Cox B. Review of global regulations for anhydrous ammonia production, use, and storage. Institution of Chemical Engineers, Proceedings of Hazards 26, 2016.

Cox BL, Garner SW, Carpenter AR, Fecke M. Hazards inherent to control systems: case studies and lessons learned. American Institute of Chemical Engineers, 2016 Spring National Meeting, 12th Global Congress on Process Safety, Houston, TX, April 10-14, 2016.

Morrison DR, Cox B. Investigating chemical process incidents & near misses, Short Course. 12th Global Congress on Process Safety, Houston, Texas, April 10, 2016.

Morrison, DR, Kumar V, Dee SJ, Cox BL, Al-Shamary M, Al-Qabandi A. Fire from the cascading failure of an oxygen supply system. American Institute of Chemical Engineers, 2015 Spring National Meeting, 11th

Global Congress on Process Safety, Austin, TX, April 27-April 29, 2015.

Cox BL, Dee SJ, Carpenter, AR, Ogle RA. Hazards inherent to batch processing: Lessons learned from case studies. American Institute of Chemical Engineers, 2015 Midwest Regional Conference, Chicago, IL, March 13-14, 2015

Ogle RA, Cox BL, Dee SJ. Scaling analysis for confined dust flame propagation. American Institute of Chemical Engineers, 2015 Midwest Regional Conference, Chicago, IL, March 13-14, 2015

Dee SJ, Cox BL, Ogle RA. Ignition of flammable vapors in partially filled containers. American Institute of Chemical Engineers, 2015 Midwest Regional Conference, Chicago, IL, March 13-14, 2015.

Dee SJ, Cox BL, Hart RJ, Farina R, Morrison DR. Effects of cooking on the thermal ignition behavior of vegetable oil. 14th International Conference, Fire and Materials, San Francisco, CA, February 2-4, 2015.

Cox BL, Carpenter AR, Ogle RA. Overlooking hazards in hazardous waste: lessons learned from case studies of hazardous waste/chemical reactivity incidents. American Institute of Chemical Engineers, 2014 Spring National Meeting, 48th Annual Loss Prevention Symposium, New Orleans, LA, March 30-April 3, 2014.

Dee SJ, Cox BL, Ogle RA. Process safety in the classroom: the current state of chemical engineering programs at US universities. American Institute of Chemical Engineers, 2014 Spring National Meeting, 10th Global Congress on Process Safety, New Orleans, LA, March 30-April 3, 2014.

Ogle RA, Carpenter RA, Dee SJ, Cox BL. Inherently safer design: lessons learned about the principle of simplification. American Institute of Chemical Engineers, 2014 Spring National Meeting, 10th Global Congress on Process Safety, New Orleans, LA, March 30-April 3, 2014.

Cox BL, Dee SJ, Hart RJ, Morrison DR. Development of a steel component combustion model for fires involving pure oxygen systems. American Institute of Chemical Engineers, 2013 Spring National Meeting, 47th Annual Loss Prevention Symposium, San Antonio, TX, April 28-May 2, 2013.

Viz MJ, Ogle RA, Dee SJ, Cox BL. Hydrogen sulfide exposure from molten sulfur — A Forgotten Hazard? American Institute of Chemical Engineers, 2013 Spring National Meeting, 9th Global Congress on Process Safety, San Antonio, TX, April 28-May 2, 2013.

Dee SJ, Cox BL, Ogle RA. Using near misses to improve risk management decisions. American Institute of Chemical Engineers, 2013 Spring National Meeting, 28th Center for Chemical Process Safety International Conference, San Antonio, TX, April 28-May 2, 2013.

Cox BL, Steen PH. High-frequency casting-defects in planar-flow melt spinning. Thousand Islands Fluid Dynamics Meeting, Gananoque, ON, Canada, 2010.

Cox BL, Steen PH. Capillary oscillations and periodic defect formation in planar-flow spin casting of molten metal. American Physical Society Division of Fluid Dynamics 62nd Annual Meeting, Minneapolis, MN, 2009.

Cox BL, Steen PH. Finite-amplitude dynamics of coupled cylindrical menisci. American Physical Society Division of Fluid Dynamics 61st Annual Meeting, San Antonio, TX, 2008.

Cox BL, Steen PH. Dynamics of coupled liquid menisci. Thousand Islands Fluid Dynamics Meeting, Gananoque, ON, Canada, 2007.

Cox BL, Steen PH. Volume scavenging in multi-element capillary droplet systems. Thousand Islands Fluid Dynamics Meeting, Gananoque, ON, Canada, 2006.

Project Experience

A representative sampling of Dr. Cox's project experience across practice areas appears below.

Safety Management Systems Consulting

Dr. Cox regularly helps clients evaluate and strengthen safety management systems at all stages of development, including initial implementation, gap assessments, hazard analyses, area hazard classification, and root-cause investigations. Dr. Cox also provides expert technical support in litigation and regulatory matters, delivering clear, evidence-based findings to clients, legal teams, and regulators. His consulting emphasizes practical solutions that strengthen safety culture, improve regulatory compliance, and reduce operational risks in complex chemical and industrial systems. Example facilities include chemical plants, refineries, steel mills, research laboratories, pulp and paper mills, ethylene oxide sterilization facilities, and battery manufacturing plants.

Combustible Dust Hazard Management

Dr. Cox has extensive experience analyzing and mitigating risks associated with combustible dust hazards across industries including chemical processing, food production, and manufacturing facilities. His work includes conducting specialized and complex dust hazard analyses (DHAs), evaluating recommendations generated from third-party DHAs, and other services related to the control of ignition sources, confinement, and fuel hazards in accordance with NFPA standards and OSHA process safety requirements. He has investigated incidents involving combustible dust fires and explosions, identifying root causes, and evaluating the role of policies and procedures, equipment, and process performance in catastrophic events.

Consumer Product Safety

Dr. Cox has investigated fires, explosions, or other performance issues involving consumer products, including candles, clothes dryers, aerosol products, comfort heating equipment, cooking appliances, and biomedical devices. These investigations have included testing guided by UL, ASTM, ANSI, and ISO standards and assisting clients in understanding and applying the results, often relative to observed or hypothesized failure scenarios.

Chemical and Agro-industrial Process Engineering

Dr. Cox has investigated client issues associated with the performance of various processes in the chemical process industry and related industries, including fluid and heat transfer equipment, air pollution control systems, glass furnace operation, pulp and paper manufacturing, bitumen processing, solution mining, and precious metal refining. He also has a credential in grain operations management from the Grain Elevator and Processing Society (GEAPS) and Kansas State University.