

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Leveraging over ten years of chemical engineering expertise, Dr. Reding provides technical scientific consulting services to manufacturers, owners, and insurers across a variety of industries including consumer products, steelmaking, agricultural and food processing, chemical manufacturing, mineral and coal mining, and oil & gas. In this time, he has evaluated a diversity of products, equipment, and processes to support clients' pursuit of code compliance, detailed process or equipment failure investigation, fire and explosion investigation, root cause analysis, and evaluation and mitigation of risks.

Investigation of Fires, Explosions, and Hazardous Releases

A Certified Fire and Explosion Investigator (CFEI) through the National Association of Fire Investigators (NAFI), Dr. Reding has considerable experience in reactive litigation through detailed analyses of numerous industrial process safety incidents. His investigations have concentrated around identification of likely ignition sources (including arc mapping), fire and smoke pattern interpretation, fuel characterization, spontaneous combustion, and cause & origin determination within an array of unique settings ranging from residential structure or vehicle losses involving consumer products to fires, explosions, mechanical failures, and hazardous material releases within industrial chemical processing plants. His work focuses on consistent application of scientific method principles from NFPA 921, repurposing fundamental physics, chemistry, and core engineering concepts to simplify otherwise complicated energetic incidents.

Prior to joining Exponent's Thermal Sciences practice, Dr. Reding worked for six years as an Explosion Protection Scientist at Fike Corporation where he managed guidelines for relief venting and explosion protection design, facilitated research for application extension and new product development, and provided consultation for hundreds of nonstandard hazards (dust, gas, hybrid) and unique processing applications. During this time, Dr. Reding served as chief scientific advisor for all nonstandard fire and explosion protection designs sold to end users within the Asia-Pacific region, from which he developed into an effective communicator of risk and hazards to project stakeholders and authorities having jurisdiction.

Through his academic achievements and project experiences as a Professional Engineer, Dr. Reding showcases an ability to assess subjects relevant to the release of hazardous materials – topics such as dust cloud explosibility, gas mixture flammability, overpressure relief (API 521) and deflagration vent sizing (NFPA 68), equipment failure or degradation, and material incompatibilities. Dr. Reding has developed expertise in his use of risk assessment tools (PHAST, licensed by DNV-GL) and computational modeling (FLACS, licensed by GEXCON) for evaluating risk and hazard consequences (associated with release of hazardous materials (flammable vapor dispersion, toxic exposure, vapor cloud explosion overpressure, thermal radiation) and for the evaluation of performance-based process safety solutions. He has applied this knowledge in settings concerning regulatory support for LNG import/export terminal owners, facility and building siting studies compliant with API 752 and API RP 753, and utility gas

transmission pipeline development initiatives. Dr. Reding also holds his HAZWOPER certification for inspection and emergency response involving hazardous substances or related site risks.

Workplace Safety, Process Safety, and Risk Analysis

With respect to proactive work for risk management, Dr. Reding has led audits on code compliance, reviews of preventive maintenance programs and safe equipment operability (chemical loading and unloading, Lock-out/Tag-out, hot work permitting, confined space entry, safety interlocks, process controls), dust hazard analyses, and complex process hazard analysis (PHA) techniques (HAZOP, What-If, LOPA, Fault Tree Analysis, Quantitative Risk Analysis, FMEA, SIL) for the identification of gaps and appropriate corrective actions to promote reliable CCPS Risk Based Process Safety principles and OSHA Process Safety Management best practices.

A comprehensive list of Dr. Reding's peer-reviewed journal publications and invited conference presentations are provided at the end of this curriculum vitae. Dr. Reding is dedicated to educating industry professionals and expanding industry know-how on concepts of combustible dust hazard management and learnings from critical process safety incidents. Dr. Reding is active in the process safety community through standards involvement and technical committee participation, where he has served both as a principal member on the Technical Committees for NFPA 484 on Combustible Metals & Metal Dusts and NFPA 67, 68, and 69 on Explosion Protection Systems and as an alternate member on the Technical Committees for NFPA 652 on Fundamentals of Combustible Dust and NFPA 660 on Combustible Dusts and Particulate Solids.

Process Design and Equipment Performance

Dr. Reding has analyzed process plants across a variety of industries – over his career, he has developed expertise in the evaluation of process equipment and design, as well as associated fire safety systems and maintenance requirements, to appraise reliability and performance against facility requirements, original equipment manufacturer (OEM) specifications, and Recommended and Generally Accepted Good Engineering Practice (RAGAGEP).

In application of this expertise, Dr. Reding has inspected and evaluated both modern and legacy process technologies and methodologies in multiple subject matter areas including bulk solids handling and storage systems such as conveyors (belt, drag, screw), bucket elevators, pneumatic cyclones, dust collectors, spray dryers, silos, bins, and mills; safe management of industrial gas discharge to regenerative and catalytic thermal oxidizers; key mechanical components of flow systems including piping and hoses, compressors, pumps, valves and actuators, monitoring equipment, mixers, reservoirs, heat exchangers, atmospheric tanks, and pressure vessels; and process operations decision-making and responsibility handover. Dr. Reding directly applies this knowledge through frequent involvement in facility evaluations and in international arbitrations for Engineering, Procurement, and Construction (EPC) disputes concerning the evaluation of plant design, process and equipment commissioning efforts, and contractual facility completion milestones.

Academic Credentials & Professional Honors

Ph.D., Chemical and Petroleum Engineering, University of Kansas, 2021

M.S., Chemical Engineering, University of Kansas, 2019

B.S., Chemical Engineering, University of Kansas, 2016

Frank Bowdish Ph.D. Research Award, 2022

Koerner Family Foundation Award, 2021

Outstanding Graduate Student Academic Achievement Award, 2019

Licenses and Certifications

Professional Engineer Chemical, Arizona, #85638

Professional Engineer Chemical, California, #7228

Professional Engineer Chemical and Mechanical, New Mexico, #31494

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

FI-210, Wildland Fire Origin and Cause Determination (AZ)

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Explosion Protection Application Scientist, Fike Corporation, 2016–2022

- Chief scientific advisor for nonstandard fire and explosion protection systems for end users within the Asia-Pacific region

- Research at-scale for application extension & new product development of fire and explosion protection solutions

- Explosion protection guideline development and training

- Internal consultation for nonstandard hazards and unique processing applications

Professional Affiliations

American Institute of Chemical Engineers – AIChE (member)

American Chemical Society – ACS (member)

National Association of Fire Investigators – NAFI (member)

National Fire Protection Association – NFPA (member)

- Technical Committee for NFPA 660 on Combustible Dusts and Particulate Solids (Alternate Member: 2024-present)

- Technical Committee for NFPA 484 on Combustible Metals and Metal Dusts (Principal Member: 2019-2022, Alternate Member: 2023-present)

- Technical Committee for NFPA 652 on Fundamentals of Combustible Dust (Alternate Member: 2023-present)

- Technical Committee for NFPA 67, 68, & 69 on Explosion Protection Systems (Alternate Member: 2019-2022)

Publications

Reding N, Mastalski I, Morrison DR. Oleum Release – When the Hose Breaks. Submission Pending to Process Saf. Prog.

Schulman N, Reding N, Cox B, Ogle R. Consequence Analysis of the Satartia Carbon Dioxide Release. Submission Pending to Chem. Eng. Prog.

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. Process Saf. Prog. 2025; 1-7.

Dee S, Buehler CS, Reding N, Zanganeh N, Ogle R. The Dogma of Process Safety. Chem. Eng. Prog., March, 2024; 28-33.

Reding N, Dufaud O, Shiflett MB. Development of a Thermodynamic Pressure Rise Model for Combustion of Variable Metal Dust Morphologies. J. Loss Prev. Process. Ind. 2022, 75, 104704.

Reding N, Farrell T, Verma A, Shiflett MB. Effect of Particle Morphology on Metal Dust Deflagration Sensitivity and Severity. J. Loss Prev. Process. Ind. 2021, 70, 104396.

Reding N, Shiflett MB. Consequence Prediction for Dust Explosions Involving Interconnected Vessels using Computational Fluid Dynamics Modeling. J. Loss Prev. Process. Ind. 2020, 65, 104149.

Reding N, Shiflett MB. Characterization of Thermal Stability and Heat Absorption for Suppressant Agent/Combustible Dust Mixtures via Thermogravimetric Analysis/Differential Scanning Calorimetry. Ind. Eng. Chem. Res. 2019, 58 (11), 4674-4687.

Reding N, Farrell T, Jackson R, Taveau J, Shiflett MB. Mitigation of Iron and Aluminum Powder Deflagrations Via Active Explosion Suppression in 1 m3 Sphere Vessel. Ind. Eng. Chem. Res. 2019, 58 (38), 18007-18019. [Awarded the journal cover art position]

Reding N, Shiflett MB. Metal Dust Explosion Hazards: A Technical Review. Ind. Eng. Chem. Res. 2018, 57 (34), 11473-11482. [Awarded the journal cover art position]

Jin X, Bobba P, Reding N, Song Z, Thapa P, Prasad G, Subramaniam B, Chaudhari RV. Kinetic Modeling of Carboxylation of Propylene Oxide to Propylene Carbonate using Ion-Exchange Resin Catalyst in a Semi-Batch Slurry Reactor. Chem. Eng. Sci. 2017, 168, 189-203.

Conference Proceedings and Invited Presentations

Reding N, Schulman N, Cox B. Preventative Maintenance for New and Existing Dust Processing Equipment, 28th Annual Mary Kay O'Connor Safety & Risk Conference, Houston, TX, October 22, 2025.

Khaled H, Reding N, Ibarreta AF, Hart RJ, Morrison DR. Vapor Cloud Explosions in a Series of Complex Geometries – Application of the BST Method, 28th Annual Mary Kay O'Connor Safety & Risk Conference, Houston, TX, October 22, 2025.

Reding N, Rivera-Castro G, Hart RJ, Morrison DR. Chemical Loading and Unloading: Risks at the Intersection of the Truck Driver and the Facility, AIChE Southwest Process Technology Conference. September 2025.

Reding N, Mastalski I, Morrison DR. Oleum Release – When the Hose Breaks. Presentation at American Institute of Chemical Engineers, 2025 Spring National Meeting and 21st Global Congress on Process Safety, Dallas, TX, April 8, 2025.

Schulman N, Reding N, Schneider J, Cox B, Ogle R. Consequence Analysis of the Satartia Carbon

Dioxide Release. 2025 Spring National Meeting and 21st Global Congress on Process Safety, Dallas, TX, April 8, 2025.

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. 10th CCPS Latin American Conference on Process Safety, Barranquilla, Colombia, September 19, 2024. (Presented by Morrison DR)

Reding N, Ayla A, Ibarreta AF, Meyers T. Performance- and Risk-Based Approach Toward Combustible Dust Hazard Analysis & Mitigation Design. 26th Annual Mary Kay O'Connor Safety and Risk Conference, College Station, TX, October 11-13, 2023.

Wechsung A, Reding N, Ibarreta AF, Meyers T. Navigating Unfamiliar Territory – US Hydrogen Safety Regulations and European Standards. Center for Hydrogen Safety (European Conference), Rotterdam Ahoy, Netherlands, May 9-11, 2023.

Dee S, Buehler CS, Reding N, Zanganeh N, Ogle R. Catastrophic Explosion Investigation and the Dogma of Process Safety Management. American Institute of Chemical Engineers, 2023 Spring National Meeting and 19th Global Congress on Process Safety, Houston, TX, March 12-16, 2023.

Reding N, Ibarreta AF, Wechsung A, Hart RJ, Morrison DR. Blended Natural Gas/Hydrogen Fuel Gas Systems: An Evaluation of Risk. American Institute of Chemical Engineers, 2023 Spring National Meeting and 19th Global Congress on Process Safety, Houston, TX, March 12-16, 2023.

Reding N, Shiflett MB. Development of Pressure Evolution Modeling for the Combustion of Distinct Metal Dust Morphologies, AIChE Annual Meeting, November 18, 2021.

Reding N, Shiflett MB. Metal Dust Cloud Combustion & Nonstandard Explosion Protection Applications: A Comprehensive Review, AIChE Annual Meeting, November 15, 2021.

Reding N, Shiflett MB. Consequence Prediction for Dust Explosions Involving Interconnected Vessels using Computational Fluid Dynamics Modeling. AIChE Annual Meeting, November 17, 2020.

Reding N, Farrell T, Shiflett MB. Effect of Particle Morphology on Metal Dust Deflagration Sensitivity and Severity. AIChE Annual Meeting, November 17, 2020.

Reding N, Farrell T, Jackson R, Taveau J, Shiflett MB. Mitigation of Metal Dust Deflagrations vi Active Suppression at Large Scale, Fike Corporation 18th Annual Global Technical Exchange, Blue Springs, Missouri, November 7, 2019.

Reding N, Farrell T, Jackson R, Taveau J, Shiflett MB. Mitigation of Iron and Aluminum Dust Deflagrations Via Active Explosion Suppression in 1 m3 Sphere Vessel, AIChE Annual Meeting, Orlando, Florida, November 11, 2019.

Reding N, Shiflett MB. Metal Dust Explosion Risks: A Hazard Analysis and Review of Contemporary Industry Protection Objectives, AIChE Annual Meeting, Orlando, Florida, November 12, 2019.

Reding N, Shiflett MB. Characterization of Heat Absorption and Decomposition Products for Suppressant Agent/Combustible Dust Mixtures via TGA/DSC Analysis, AIChE Annual Meeting, Pittsburgh, Pennsylvania, October 29, 2018.

Reding N, Taveau J. Explosion Suppression of Metal Dust Deflagrations, Fike Corporation 17th Annual Global Technical Exchange, Blue Springs, Missouri, November 7, 2018.

Peer Reviews

Journal of Loss Prevention in the Process Industry