

Kyle M. Crosby

PROFESSIONAL HISTORY:

*Risk Management Professionals, Inc.
Irvine, California; Project
Engineer*

EDUCATION:

*Bachelor of Science, Chemical
Engineering, California State
University, Long Beach*

*Minor, Environmental Engineering,
California State University, Long
Beach*

PROFESSIONAL AFFILIATIONS:

*American Institute of Chemical
Engineers (AIChE)*

Mr. Kyle Crosby graduated from the California State University, Long Beach (CSULB) with a Bachelor of Science degree in



Chemical Engineering. Currently, Mr. Crosby provides technical support as a Project Engineer for Risk Management Professionals.

Through his experience and education, Mr. Crosby has developed technical writing, problem solving, and analytical skills. Since joining, Mr. Crosby has been involved in multiple aspects of United States Environmental Protection Agency (US EPA) Risk Management Plan (RMP), Occupational Safety and

Health Administration (OSHA) Process Safety Management (PSM) Program, and California Accidental Release Prevention (CalARP) Program development, including the following:

- Process Hazard Analyses (PHAs) including Hazard & Operability (HAZOP) studies, Layer of Protection Analysis (LOPA) studies, and Management of Change (MOC) PHAs
- Toxic and Flammable Gas and Liquid Dispersion Modeling
- Piping and Instrumentation Diagram (P&ID) Development and Field Verification
- Risk Management Plans (RMP) / Process Safety Management (PSM) Programs
- California Accidental Release Prevention (CalARP) Program
- What-If and Checklist Analyses

While Mr. Crosby has experience in diverse product lines, all completed projects have used high-end qualitative and/or quantitative risk analysis techniques for decision-making. He has been involved in a variety of engineering projects across several industries, including the following:

- Petroleum (Production, Storage, Refining)
- LPG Transportation and Storage
- Renewable Fuels (Production, Refining)
- Wastewater Treatment and Distribution Systems
- Aerospace testing and production
- Carbon Black production
- Ammonia Refrigeration Systems

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PROJECT EXPERIENCE

Process Hazard Analyses (PHA)

Mr. Crosby has been involved in several PHAs and Hazard Reviews (HRs) using the HAZOP, LOPA, and What-If/Checklist methodologies for refineries, gas processing facilities, renewable fuel plants as well as for other industry sectors. The following is representative of the projects that Mr. Crosby has been involved with during the conceptual design stage, detailed design stage, and operating cycle.

- *Sulfur Recovery Unit, Three Rivers, TX* – Provided in-person technical support for a 5 year PHA redo for the two (2) SRU Units. The study revolved around major system equipment like the Claus Combustor, Catalytic, Tail Gas Reactors, Hot Oil Heater, and an Incinerator. The study lasted eight (8) days and included a thorough review of all findings with engineering and operations supervisors.
- *Metal Processing Furnace, Nevada* – Provided technical support for the design stage of two (2) unique metal processing furnaces. The study included a review of the batch process steps to ensure improvements for the safety logic of the furnace. The study took place over the course of two (2) days.
- *Coker Rationalization, Lemont, IL* – Offered on-site technical assistance to optimize a Coker rationalization initiative, guaranteeing a robust and flawlessly integrated large-scale multi-facility Coker upgrade project. Additionally, conducted a thorough revalidation of the previous PHA (Process Hazard Analysis), providing extensive HAZOP (Hazard and Operability) and LOPA (Layer of Protection Analysis) support.
- *Light Ends Unit (LEU) and Liquid Petroleum Gas Unit (LPG), Cherry Point, WA* – Provided in-person technical support for a 5-year PHA revalidation for the LEU and LPG Unit including HAZOP and LOPA analysis. The study revolved around major system equipment including a Depropanizer, H₂S Absorber, Deisobutanizer, and Deethanizer. This study involved a thorough review of all operating procedures for the two (2) units to identify any deficiencies or uncover latent hazards.
- *CO₂ Seawater Capture, Long Beach, CA* – Provided remote technical support for a design PHA for a seawater CO₂ removal facility. The project included an initial review of safeguards to help the facility determine if the project could be operated remotely. The study lasted two (2) days and was completed with assistance from a multicompany team.
- *Sulfur Recovery Unit (SRU), St. Paul Park, MN* – Delivered on-site technical assistance for a 5-year PHA (Process Hazard Analysis) reevaluation of an SRU / Tail Gas Treating

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Unit. Conducted comprehensive HAZOP (Hazard and Operability) and LOPA (Layer of Protection Analysis) assessments while meticulously monitoring potential hazards to guarantee the system's utmost safety.

- *Pre-treatment Unit (PTU) Renewables Conversion Project, Martinez, CA* – Provided remote technical support for a 5-year PHA revalidation for the PTU Unit including HAZOP analysis in accordance with Contra Costa County Industrial Safety Ordinance (ISO) requirements to identify any hazards as part of the facility's conversion to renewable fuels. This includes post-session documentation such as HAZOP report development. The study lasted four (4) days and was completed in coordination with engineering contractors and facility personnel.
- *Cryogenic Extraction Facility, Oklahoma* – Provided on-site technical support for a 5-year PHA redo for a Cryogenic Extraction and Transport Facility. The study involved the changeover of HAZOP and LOPA requirements as part of a change in ownership. The study took place in person over the course of five (5) days and included a review of all PSM regulated areas of the facility.
- *Cooling Towers, Garyville, LA* – Provided on-site HAZOP technical scribe support over the course of five (5) days for eight (8) separate Cooling Towers. The study involved a rotating team of Marathon personnel to provide coverage for the several domains that were directly affected by each tower. The PHA was conducted onsite working with engineering contractors and facility personnel. Diligent tracking of interconnecting domains and equipment was necessary to ensure potential hazards were properly analyzed.
- *Fuel and Oxidizer delivery to Rocket Propulsion, Kern County, CA* – Provided remote HAZOP technical support over the course of two (2) days for a jet engine storage, delivery, and testing system. This study included a thorough review of facility sitting and external events that had yet to be performed for the unit.
- *Gasoline, Ethanol, and Diesel Storage Tanks Unit, Salt Lake City, UT* – Provided remote HAZOP/LOPA technical scribe support over the course of eleven (11) days for the gasoline, ethanol, and diesel storage tanks along with the associated equipment. This includes post-session documentation such as HAZOP/LOPA report development.
- *Natural Gas and Fuel Gas – Bakersfield Renewable Fuels, Bakersfield, CA* – Provided technical scribing support for a HAZOP and LOPA study for the renewable conversion of a former fossil fuel refinery in Bakersfield, CA. Major pieces of equipment evaluated during the study included propane/butane bullets, diesel storage tanks, and multiple

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interconnected vapor recovery systems. This study involved the detailed review of the Issued for Construction (IFC) P&IDs to ensure the accurate depiction of facility following the conversion project. The PHA was conducted onsite working with engineering contractors and facility personnel.

- *Rental Boiler, Salt Lake City, UT* – Provided technical HAZOP support for the installation of a rental boiler for use in a Refinery in Salt Lake City, UT. The project required a thorough review of the boiler controls to ensure that the rental boiler complied with corporate guidance. The study was conducted in person over the course of one (1) day.
- *Hydrocracker – Bakersfield Renewable Fuels, Bakersfield, CA* – Provided technical scribing support for a HAZOP and LOPA study for the renewable conversion of a former fossil fuel refinery in Bakersfield, CA. The PHA scope included two (2) hydrodeoxygenation (HDO) reactors, the isomerization unit, and their use in production of final gasoline product.
- *High Pressure and Low Pressure Flare System, Bakersfield, CA* – Provided onsite HAZOP/LOPA technical scribe support over the course of two (2) days for a high pressure and low-pressure flare system for the renewable conversion of a former fossil fuel refinery in Bakersfield, CA. This includes pre-session preparation such as nodding and pre-causing. The PHA was conducted onsite working with engineering contractors and facility personnel.
- *Amorco Pipeway/Wharf* – Martinez, CA – Provided HAZOP/LOPA technical scribe support over the course of two (2) days. Preparation support for the PHA included separation and delineation of P&IDs/ Process Flow Diagrams (PFDs) into nodes, as well as pre-causing documentation of various scenarios to be reviewed during session.
- *Wastewater Treatment Plant* – Martinez, CA – Provided onsite HAZOP and What-If technical support for the renewable conversion of a former fossil fuel refinery in Martinez, CA. The study was conducted onsite working with engineering contractors and facility personnel.
- *Boilers and Steam System, Salt Lake City, UT* – Provided HAZOP/LOPA technical scribe support over the course of two (2) days, for the combustion side of five (5) boilers, the Boiler Feed Water Supply and the steam generation and delivery to the steam header. Preparation support for the PHA included separation and delineation of P&IDs/PFDs into nodes, as well as pre-causing documentation of various scenarios to be reviewed during session. The study was conducted onsite working with engineering contractors and facility personnel.

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- *Tank Farm, Salt Lake City, UT* – Provided onsite HAZOP technical scribe support for an existing Tank Farm. This study included a rotating team of operators and engineers to address the hazards that could arise from the different feeds and transfers that could happen within the Tank Farm. This also included post-session documentation such as HAZOP report development. The study was conducted onsite working with engineering contractors and facility personnel.

CLIENT LIST

The following is a partial list of clients that Mr. Crosby has managed and/or provided technical support:

Oil and Gas

- Marathon Petroleum Company
- Marathon Logistics
- Valero
- HF Sinclair
- PECL
- World Energy
- Olympus Energy
- British Petroleum Company Limited
- The Williams Companies
- Citgo

Carbon Black

- Birla Carbon

Renewable Energy

- Bakersfield Renewable Fuels (Global Clean Energy)
- WaterTectonics
- UCLA

Municipalities and Water Treatment

- City of Poway
- City of Redlands

Manufacturing/Chemical Processing

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- Capstan Permaflow
- TIMET
- Nucor

Ammonia Refrigeration Facilities

- Peter Rabbit Farms
- SVP Winery
- Boskovich Farms

Aerospace

- GKN Aerospace
- Northrop Grumman Corporation