

Michael S. Pfaff

PROFESSIONAL HISTORY:

*Risk Management Professionals, Inc.
Irvine, California; Project
Engineer, 2019-Present*

*Networks Electronic, Co. Chatsworth,
California, Product Engineer II,
2018-2019*

EDUCATION:

*Bachelor of Science, Chemical
Engineering, University of
California, Riverside*

CERTIFICATION:

*California Engineer-in-Training
(EIT) Certification*

Mr. Pfaff graduated from the University of California, Riverside with a Bachelor of Science degree in Chemical Engineering with Cum Laude honors. Currently, Mr. Pfaff provides technical support as a Project Engineer for Risk Management Professionals.



In addition to his work with clients, Mr. Pfaff has been involved in educational outreach and has strived to improve the product lines provided by Risk Management Professionals. In 2019 and 2021, Mr. Pfaff has presented as part of RMP's webinar series on "Getting the Most out of you PHA Pro Software and "Latent Failures and Mitigation Techniques".

Since joining Risk Management Professionals, Mr. Pfaff has been immersed in multiple aspects of the 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. Mr. Pfaff has been involved with:

- Process Hazard Analyses (PHAs) including Hazard & Operability (HAZOP) scribe/facilitation support
- Layer of Protection Analysis (LOPA) scribe/facilitation support
- Latent Failure and Human Factor Analyses
- What-if and Checklist Analyses
- Risk Management Plans (RMP) / Process Safety Management (PSM) Programs
- Department of Transportation (DOT) Pipeline Integrity Management Program (IMP)
- California Accidental Release Prevention (CalARP) Program
- Human Factors and Latent Failures Analysis
- Toxic and Flammable Gas and Liquid Dispersion Modeling
- Regulatory Compliance Auditing and Support
- Piping and Instrumentation Diagram (P&ID) Development and Field Verification
- Standard Operating Procedure Development and Field Verification
- Development of Dust Dispersion Modeling for Bulk Cyanide Sources

While Mr. Pfaff 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 fields:

- Petroleum (Production, Refining, Storage)
- Renewable Fuels (Production, Refining)
- Gas Processing/Transportation/Storage
- Chemical Manufacturing
- Water Treatment and Distribution Systems
- Ammonia Refrigeration Systems

PROJECT EXPERIENCE

Process Hazard Analyses

Mr. Pfaff has been the facilitator or technical scribe for PHAs using the HAZOP, LOPA, and What-If/Checklist methodologies for refineries, ammonia refrigeration facilities, as well as for other industry sectors. The following list is representative of projects that Mr. Pfaff has provided facilitation and technical scribing support for in the conceptual design stages, detailed design stage, and operating cycle.

- *Hydrodeoxygenation Unit Renewables Conversion Project - Martinez, CA* – Facilitated two unit MOC PHAs for Hydrodeoxygenation Units that would be retrofitted to take renewable feedstock instead of fossil fuels. HAZOP and LOPA analyses were completed in accordance with Contra Costa County ISO requirements. The studies lasted two weeks each and were completed onsite in coordination with the engineering contractors and facility personnel.
- *Hydrogen Unit Renewables Conversion Project - Bakersfield, CA* – Facilitated a HAZOP and LOPA study for the renewable conversion of a former fossil fuel refinery in Bakersfield, CA. The PHA was conducted onsite working with engineering contractors and facility personnel.
- *Fuel Gas Terminal Project - Carson, CA* – Facilitated a HAZOP per company specific guidelines for the implementation of a new inter-tank transfer line. The on-site facilitation lasted a single day during the design phase of the project.

- *Ammonia Refrigeration - Holtville, CA* – Facilitated Hazard Review for the 5 year update of an ammonia refrigeration facility used to store produce during harvesting seasons. The in person Hazard Review was conducted over a day and included P&ID verification with a field walkdown.
- *WWTP Project – Refinery, Salt Lake City, UT* – Provided facilitation support for a one day project PHA for the implementation of a new waste-water storage tank. Microsoft Teams was utilized for remote collaboration.
- *Digester Gas Compression Project* – Facilitation support for HAZOP/LOPA study over the course of 5 days with a custom LOPA methodology. The project offered unique hazards for an unregulated process not normally analyzed. The HAZOP/LOPA study was conducted between design phases using Microsoft Team for remote collaboration.
- *FCCU Project - Refinery, Garyville, LA* – Provided HAZOP/LOPA scribe support over the course of weeks for the upgrade of a FCC unit for a 500,000 barrel per day refinery in Louisiana. The PHA scope encompassed reducing bottlenecks and increasing production for the FCC unit. The PHA Team included operations personnel from various areas of the refinery. Preparation support for the PHA included separation and delineation of P&IDs/PFDs into nodes, as well as pre-causing documentation of various hazard scenarios to be reviewed during session. The PHA was conducted onsite, and a report was created to present findings from the PHA.
- *Crude Distillation Unit - Refinery, Saint Paul Park, MN* – Provided HAZOP/LOPA scribe support for the 5-year update for a refinery in Minnesota. Preparation included noding the process and pre-causing each node to streamline session time. The PHA was conducted on-site and included a post-session report to deliver findings and action items.
- *Naphtha Hydrotreater and Catalytic Reformer Unit - Refinery, Saint Paul Park, MN* – Provided HAZOP/LOPA scribe support for a naphtha hydrotreater unit and the associated catalytic reformer. Also provided facilitation support for various checklists and created a PowerPoint to present action items to refinery personnel.
- *Biofuels Project PHA – Refinery, Dickinson, ND* – Provided HAZOP/LOPA scribe support for a project to transform parts of a oil and gas refinery to process biofuels. This included interfacing with contractors designing the process and refinery personnel and providing reports on findings for different parts of the MOC.
- *Titanium Recovery Process - Chemical Manufacturing Plant, Las Vegas Valley, NV* – Provided HAZOP support for a chemical manufacturing facility in Las Vegas Valley that produces titanium. The PHA specifically analyzed the new batch process being

implemented to remove sulfur and to further yield Titanium. As part of the PHA, the Team reviewed relevant MOCs and designs while taking into consideration other general issues.

- *Amine, SWS, and Sulfur Recover (Thiosolv) Units* – Refinery, Gallup, NM – Provided HAZOP/LOPA scribe support for a refinery in Gallup, New Mexico. This included three (3) separate units within the same area – Amine unit for recover of amine, sour water stripper unit to remove sulfur from process water, and the Thiosolv Unit, to reclaim sulfur. Also provided facilitation support for various checklists.
- *Naphtha Hydrotreater and Catalytic Reformer Unit - Refinery, Anacortes, WA* – Provided HAZOP scribe support for a naphtha hydrotreater and the associated CCR platformer to satisfy the 5-year update requirement.
- *Naphtha Hydrotreater - Refinery, Anacortes, WA* – Provided HAZOP/LOPA scribe support for a naphtha hydrotreater and facilitation support for various checklists in accordance with company and federal regulations/guidelines. Included preparation pre-causing scenarios to streamline session time. The PHA was conducted remotely utilizing Microsoft Teams collaborative software, and a report was created offsite to present PHA findings.
- *Wastewater Treatment Plant - Refinery, El Paso, TX* – Provided HAZOP/LOPA facilitator and scribe support over the course of two weeks for the first 5-year PHA update cycle. The waste water treatment plant treats sewer and surface runoff from the entire refinery and discharges to the city sewer or to storage. The PHA was conducted remotely, and a report was created offsite to present PHA findings.

CalARP/RMP/PSM Program Development and Updates

Mr. Pfaff has been deeply involved with the development of many California Accidental Release Prevention (CalARP) Programs, RMP, and PSM Programs for a wide spectrum of industries and processes. As part of these efforts, he has conducted compliance audits, Offsite Consequence Analyses (OCA), external events analyses, dispersion modeling, recommendations review, program development, United States Environmental Protection Agency (US EPA) and Administering Agency (AA) submittals, and review. Mr. Pfaff has been working closely with regulators to help his clients stay ahead of regulatory requirement amendments. Below is a partial list of projects for which Mr. Pfaff has provided CalARP/RMP/PSM Program Development/Update support:

- *Gas Processing Facility, CA* – Completed a program 3 audit of a gas processing facility and produced recommendations after reviewing on-site documentation. Included field verification walkdowns of equipment and the process information.

- *Metal Plating Facility, CA – Cyanide Utilized Process, Signal Hill, CA* – Developed an Applicability Assessment creating a Hazard Assessment/Offsite Consequence Analysis for a CalARP regulated process. Worked closely with the regulators and the facility to determine which Program level the plating facility was. As part of the analysis, Mr. Pfaff developed a new methodology approved by regulators to determine the dispersion of bulk cyanide solids, utilizing research within the industry and known correlations. This methodology was presented at the CalCUPA conference in February of 2020.
- Propane Storage and Loading Terminal, CA – Completed a program 3 audit of a propane terminal and produced recommendations after reviewing documentation on-site and electronically stored corporate guidelines.
- Provided RMP update, CDX submission, Hazard Assessment updates, and CalARP submissions per LEPC specific regulations, if applicable, for the following facilities' 5-year submissions:
 - Water Treatment Facility, Oxnard CA
 - Water Treatment Facility, Monterey CA
 - Gas Fractionator Plant, Paradis LA
 - Plastics/Foam Producer, Verona MS
 - SCR Power Facility, Shasta CA
 - Water Treatment Facility, Palm Springs CA
 - Gas Processing Plant, Wamsutter WY
 - Gas Processing Plant, Belridge CA
 - Metal Alloying Facility, Industry, CA

In addition to Hazard Assessment/OCA and 5-year update support, Mr. Pfaff has provided support for updating and creating operating procedures for the following facilities:

- *Gas Plant Procedures - Signal Hill CA* – RMP Program assistance including development of Hazard Assessment/Offsite Consequence Analyses and EPA RMP Submittals for multiple gas plant sites in Kansas.
- *Crude Terminal Procedures - Ingleside, TX* – Provided support creating procedures for the US Coast Guard regulated crude terminal in Ingleside, TX. Updated and created new procedures with the expansion of the terminal which included additional Crude holding tanks and loading arms to vessels. This project included process flow diagram creations and field verification walkdowns with the Client and discussions with Operators to ensure accuracy of the procedures.

- *Hydrogen SMR Plant Procedures - Rodeo, CA* – Provided support revising operating procedures per local regulations to mitigate human factors concerns including latent and active failures.

Mr. Pfaff has also demonstrated advanced proficiency within Human Factors and Latent Failure analysis. In addition to completing a webinar, and latent conditions checklists to support Contra Costa County ISO regulations, Mr. Pfaff has developed and given training courses on Latent Failures which included relevant research bases and industry best practices for analysis.

DOT Pipeline Integrity Management Program (IMP)Support

Mr. Pfaff has provided support to aid in compliance of the DOT Pipeline Integrity Management Program (IMP). Mr. Pfaff is knowledgeable in the various requirements of the IMP and has created a guideline for conducting Risk Assessments per ASME B31.8S specifically for compressor stations.

- *Compressor Station, MI* – Produced a guideline and ranking system for Risk Assessments conducted by the facility. Also used the ranking system to evaluate Risk Assessment based on guidelines and completeness.
- *Fuel Oil Terminal, CA* – Provided technical support for CMMS transition from mainly paper based maintenance program. Included aid in strategy of organization and data integration into the new system. Verified P&IDs and in field locations of equipment.

CLIENT LIST

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

Oil and Gas

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| • Marathon Petroleum Company | • Bridge Energy |
| • Air Liquide | • Consumers Energy Company |
| • MODA Midstream | • Williams Midstream |
| • Signal Hill | • Dominion Energy |
| • Seneca Resources | |

Ammonia Handling Facilities

- Wheelabrator Technologies
- Provender Partners LLC

Municipalities and Water Treatment

- Monterey One
- United Water
- Orange County Sanitation District
- City of Pittsburg
- Santa Fe Irrigation District

Manufacturing/Chemical Processing

- Edwards Life Sciences
- Artistic Silver Plating
- Air Liquide
- Custom Alloy
- Carpenter Co.
- FXI
- TIMET