

# Carine M. Black

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## **PROFESSIONAL HISTORY:**

*Risk Management Professionals, Inc.;  
Irvine, California; Project  
Engineer; January 2017-Present*

## **EDUCATION:**

*Bachelor of Science, Chemical  
Engineering, University of  
California, Santa Barbara*

## **PROFESSIONAL AFFILIATIONS:**

*American Institute of Chemical  
Engineers (AIChE)*

*Refrigerating Engineers and  
Technicians Association (RETA)*

*Society of Women Engineers (SWE)*

Ms. Carine Black graduated from University of California, Santa Barbara with a Bachelor of Science degree in Chemical



Engineering. During the course of her education, Ms. Black participated in extensive educational outreach, and developing strong technical writing, problem-solving, and leadership skills.

Currently, Ms. Black provides technical support as a Project Engineer for Risk Management Professionals. In addition to her work with Clients, Ms. Black has been involved in educational outreach and has worked on improving the product lines provided by Risk

Management Professionals. Ms. Black has hosted several educational webinars on a wide variety of subjects involving HAZOPs, LOPAs and the Chemical Facility Anti-Terrorism Standards (CFATS). Recently, Ms. Black co-wrote a paper and presented at the 2018 AIChE Global Congress on Process Safety (GCPS) Conference on how to efficiently prepare for a HAZOP/LOPA study. She also co-wrote a paper on Avoiding Quality Pitfalls for HAZOP/LOPA Sessions and Documentation for the 2019 GCPS Conference.

Since joining, Ms. Black 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. Ms. Black has worked on projects concerning:

- Process Hazard Analyses (PHAs) and Hazard Reviews (HRs), including Hazard & Operability (HAZOP) and Layer of Protection Analysis (LOPA) Studies
- Risk Management Plans (RMP) / Process Safety Management (PSM) Programs
- California Accidental Release Prevention (CalARP) Program
- What-if and Checklist Analysis
- Piping and Instrumentation Diagram (P&ID) Development and Field Verification
- Emergency Action Plan Development
- Regulatory Compliance Audits and Support



- Toxic and Flammable Gas and Liquid Dispersion Modeling
- Hazard Mitigation Plans (HMP)

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

- Refining
- Gas Processing and Transportation
- Chemical Manufacturing
- Water Treatment and Distribution
- Agriculture & Fertilizer
- Ammonia Refrigeration Systems
- Selective Catalytic Reduction (SCR) Systems
- Cogeneration
- Pharmaceuticals & Medical Devices
- Aerospace Chemical Milling

## **PROJECT EXPERIENCE**

### **Process Hazard Analyses**

Ms. Black has provided technical support for the following Process Hazard Analyses (PHAs) and Hazard Reviews (HR) using qualitative analysis methodologies such as Hazard and Operability (HAZOP), What-If/Checklist, and Layer of Protection Analysis (LOPA).

- *Refinery Platformer Unit, Garyville, LA* – Facilitated a four-week five-year redo PHA for the Platformer Unit using the HAZOP/LOPA methodologies.
- *Refinery Crude Unit, Saint Paul, MN* – Facilitated a three-week five year redo PHA for the facility's Crude Unit using the HAZOP/LOPA methodologies.
- *Refinery Coker Unit, Garyville, LA* – Co-facilitated a Coker Upgrade Project Design HAZOP for two weeks for a refinery expansion project to increase the capacity of two Coker Units by ~10% each, using the HAZOP/LOPA methodologies.

- *Refinery Coker Unit, Garyville, LA* – Co-facilitated a new Coker Installation Project Design HAZOP for two weeks for a refinery expansion project to install a third Coker Unit, using the HAZOP/LOPA methodologies.
- *Refinery Penex Unit, Garyville, LA* – Facilitated two separate two-day expansion project MOC PHAs to increase the capacity of the Unit and install an additional reactor, using the HAZOP/LOPA methodology.
- *Refinery Waste Treatment Unit, Garyville, LA* – Facilitated a three-day Project Design HAZOP for the installation of a Dissolved Gas Flotation (DGF) facility to treat wastewater in the Wastewater Treatment Unit.
- *Refinery Waste Treatment Unit, Garyville, LA* – Facilitated a one-day PHA study for the installation of a temporary hazardous waste and biological sludge processing system in the waste treatment unit, using the HAZOP and What-If/Checklist methodologies.
- *Refinery Waste Treatment Unit, Garyville, LA* – Facilitated a two-day PHA study for the installation of a permanent hazardous waste and biological sludge processing system in the waste treatment unit, using the HAZOP methodology.
- *Refinery Coker Unit, Garyville, LA* – Provided scribe support for a six-week 5-year redo PHA for a Coker Unit, using the HAZOP methodology. Additionally, facilitated the Checklist portion of the study for External Events, Human Factors, and Facility Siting.
- *Refinery Penex Unit, Garyville, LA* – Provided scribe support for one week for a Penex Unit 5-year redo PHA using the HAZOP/LOPA methodologies.
- *Dairy Production Facility, Sacramento, CA* – Facilitated a full 5-year redo PHA on the ammonia refrigeration system using the What-If/Checklist methodology. Additionally, facilitated an MOC PHA on the relief system upgrade and piping expansion project using the What-If/Checklist methodology.
- *Cogeneration Plant, Bakersfield, CA* – Facilitated a PHA for two selective catalytic reduction systems which used aqueous and anhydrous ammonia for NOx reduction, using the HAZOP and What-If/Checklist methodologies.
- *Cogeneration Facility, Hermiston, OR* - Facilitated a full 5-year redo PHA on the selective catalytic reduction systems which used anhydrous ammonia for NOx reduction using the HAZOP and What-If/Checklist methodologies.

- *Cogeneration Facility, Colver, PA* - Facilitated a revalidation PHA on the selective catalytic reduction systems which used anhydrous ammonia for NOx reduction using the HAZOP and What-If/Checklist methodologies.
- *Fertilizer and Pesticides Facility, Chico, CA* – Facilitated a preliminary HR for the aqueous ammonia stored onsite for agricultural use, using the HAZOP and What-If/Checklist methodology.
- *Metal Plating Facility, El Mirage, CA*- Facilitated a one day HR for the hydrofluoric and nitric acid systems at a metal plating facility, using a combination of HAZOP and What-If/Checklist methodologies.
- *Refinery Coker Unit, Garyville, LA* – Provided scribe support for a week long Coker Upgrade Project Design HAZOP for a refinery expansion project to increase the capacity of two Coker Units by ~10% each, using the HAZOP/LOPA and What-If/Checklist methodologies.
- *Titanium Production Plant, Henderson, NV* – Provided scribe support for a week long PHA for Titanium production, using the HAZOP and What-If/Checklist methodologies.
- *Refinery Potable and Plant Water Treatment Units, Garyville, LA* – Provided scribe support for an initial PHA on the Potable Water Treatment and Plant Water Treatment units using the HAZOP/LOPA and What-If/Checklist methodologies.
- *Hazardous Waste Treatment Plant, Beatty, NV*- Provided scribe support for a two-day design PHA using the HAZOP and What-If/Checklist methodologies to evaluate an aerosol can recycling system.
- *Natural Gas Processing Plant, Aliso Canyon, CA* – Provided scribe support for a two-day PHA for a design modification to a gas dehydration unit, using a combination of HAZOP and What-If/Checklist methodologies.
- *Winery, Shandon, CA* – Provided scribe support for a Hazard Review for an anhydrous ammonia refrigeration system, using a combination of HAZOP and What-If/Checklist methodologies.
- *Marine Gas/Diesel Oil Terminal, Long Beach, CA* – Provided scribe support for a marine vapor control system PHA using a combination of HAZOP and What-If/Checklist methodologies.

- *Cogeneration Plant, King City, CA* – Provided scribe support for a PHA for two selective catalytic reduction systems which used aqueous and anhydrous ammonia for NOx reduction.
- *Water Treatment Plant, Lancaster, CA* – Provided scribe support for a PHA for a chlorine injection system, using a combination of HAZOP and What-If/Checklist methodologies.
- *Beverage Production Facility, Montebello, CA* – Provided scribe support for a PHA for two ammonia refrigeration systems.
- *Waste Treatment Facility, Detroit, MI* – Provided scribe support for a design HAZOP for an aerosol recycling unit.

### **Compliance Audits**

- *Water Treatment Facility, Port Hueneme, CA* – Conducted a one-day CalARP/RMP Program 2 Compliance Audit for a water treatment facility which uses aqueous ammonia.
- *Dairy Production Facility, Sacramento, CA* – Conducted a two-day CalARP/RMP/PSM Program 3 Compliance Audit for the ammonia refrigeration system.
- *Medical Device Sterilization Facility, Laredo, TX* – Conducted a two-day RMP/PSM Program 3 Compliance Audit for the ethylene oxide sterilization process.
- *Cogeneration Facilities, Various Locations* – Conducted CalARP/RMP/PSM Program 3 Compliance Audits for three different facilities containing ammonia injection systems.
- *Cold Storage Facility, Fontana, CA* – Conducted a CalARP/RMP Program 2 Compliance Audit for the ammonia refrigeration system at a Cold Storage Facility.
- *Water Treatment Plant, Lancaster, CA* – On a team of three engineers, conducted a CalARP/RMP/PSM Program 3 Compliance Audit for multiple well sites which utilize chlorine injection in order to assess their CalARP/RMP/PSM compliance.
- *Cold Storage Facilities, Ontario, CA* – Conducted several CalARP Program 2 Compliance Audits for multiple Cold Storage facilities utilizing ammonia refrigeration to assess their CalARP/RMP/PSM compliance.
- *Refinery, El Paso, TX* – Helped develop the audit worksheets for a week-long refinery compliance audit. This included verifying that all current regulations were being audited and modifying the worksheets to include additional considerations to ensure the facility is adhering to Recognized and Generally Accepted Good Engineering Practices (RAGAGEP).

- *Beverage Production Facility, Sacramento, CA* – Conducted the preliminary review of the CalARP Program 2 documentation to prepare for the Compliance Audit at a beverage production facility that utilizes anhydrous ammonia for refrigeration.
- *Gas Processing Plant, San Diego, CA* – Conducted a full CalARP Program 2 Compliance Audit for two selective catalytic reduction systems.

### **CalARP/RMP/PSM Program Development and Updates**

- *Cogeneration Facility, Stockton, CA* – Prepared a full CalARP/RMP/PSM Program 3 Compliance Workbook Update for a Cogeneration Facility with a selective catalytic reduction system.
- *Water and Waste Water Treatment Plants, Tracy, CA* – Completed two full CalARP Program 2 developments for both a water treatment facility and a waste water treatment facility both of which were regulated for aqueous ammonia injection systems. This involved working closely with the Client to develop a full Maintenance program, Safety Information, and Hazard Assessment for both facilities.
- *Gas Processing and Storage Facility, Brundage, UT* – Prepared a full RMP/PSM Program 3 Compliance Workbook for a gas processing and storage facility. This included the full development of a Training program, Incident Investigation procedures, as well as Management of Change and Pre-Startup Review procedures.
- *Winery, Shandon, CA* – Provided CalARP Program 2 update assistance for a Five-Year update to the program. This included development of the Hazard Assessment, Hazard Review, and the CalARP submittal reports.
- *Cold Storage Facility, Los Angeles, CA* – Developed a Hazard Assessment for a Program 3 CalARP/RMP/PSM facility with an ammonia refrigeration system and assisted the facility with submitting the appropriate documentation to the regulators.
- *Beef Manufacturing and Processing Facility, Selma, CA* – Assisted the facility with their Five-Year Update by submitting the appropriate documentation to the regulators.
- *Gas Processing and Storage Facility, Various Locations* – Developed and updated several Hazard Assessments for different gas processing and storage facilities. This involved working with numerous dispersion modeling programs to develop the offsite consequence analysis.

- *Metals Finishing Facility, Costa Mesa, CA* – Completed a full CalARP Program 1 development for a facility that used nitric acid and hydrofluoric acid for aerospace metal finishing. This involved dispersion modeling for the Hazard Assessment as well as communicating with the regulators to submit the final product.
- *Water Reclamation Plant, Burbank, CA* – Developed a Hazard Assessment for a water reclamation plant which has an aqueous ammonia injection system, and additionally assisted the facility with the CalARP/RMP/PSM Program 3 submittal information.
- *Beverage Production Facility, Montebello, CA* – Completed a full CalARP Program 2 development for the ammonia refrigeration systems at a soda bottling facility.

### **Piping and Instrumentation Diagrams (P&IDs)**

- *Metal Manufacturing Facility, Carson, CA* – Developed P&IDs for the aqueous ammonia system located at the facility.
- *Water Treatment Plant, Lancaster, CA* – Developed P&IDs for the chlorine injection systems.

### **CalARP/RMP/PSM Trainings**

- *Water Treatment Plant, Tracy, CA* – Completed Emergency Action Plan, CalARP/RMP/PSM Program awareness, and Proper Protective Equipment (PPE) trainings for the full Water Treatment facility.

## **CLIENT LIST**

The following is a partial list of clients that Ms. Black has managed and/or provided technical support for:

### **Oil and Gas**

- Berry Petroleum Company, LLC
- Calpine Corporation
- Chemoil
- Colver Power
- DTE Stockton Cogeneration, LLC
- Marathon Petroleum
- Perennial Power
- San Diego Gas and Electric
- Sentinel Peak Resources
- Southern California Gas Company
- Williams Midstream

### **Ammonia Handling Facilities**

- Capstan California
- Dr. Pepper Snapple Group
- E&J Gallo
- Glacier Cold Storage
- Harris Ranch
- HP Hood
- LA Bottleworks
- North Valley Ag Services
- Partners Alliance Cold Storage
- SVP Winery
- Systems Services of America

### **Municipalities and Water Treatment**

- City of Tustin
- City of Tracy
- LA Department of Public Works
- Port Hueneme Water Agency
- Suez Burbank Water Reclamation

### **Metal Processing and Production**

- Astro Pak
- Titanium Metals Corporation

- Ducommun

### **Additional Clients**

- Dupont Danisco
- Hydrochem PSC
- Midwest Sterilization
- SeneGence
- US Ecology