Steven T. Maher, PE CSP

EDUCATION:

Master of Science, Mechanical Engineering, Carnegie-Mellon University, Pittsburgh, PA, 1983

Bachelor of Science, Mechanical Engineering, Duke University, Durham, NC, 1979

CERTIFICATIONS:

Professional Engineer - Chemical Engineering – California

Professional Engineer - Mechanical Engineering – Pennsylvania

Certified Safety Professional - Systems Safety

Incident Command System (ICS) IS-100 Certified

National Incident Management System (NIMS) IS-700 Certified

National Response Plan (NRP) IS-800 Certified

TRAINING:

First Aid, CPR, and AED; 2019.

ASSOCIATIONS:

Refrigerating Engineers and Technicians Association (RETA), corporate member.

Southern California Society for Risk Analysis (SCSRA)

Mr. Maher has over 40 years of experience in safety, involving both qualitative and quantitative risk assessment. For the past 36 years, he has been responsible for the project management and technical performance of a broad spectrum of mitigation planning, emergency preparedness & response planning, security vulnerability assessment, process safety, risk assessment & management, loss prevention, and safety management system development & assessment projects for petroleum (flammables storage & distribution, production, refining, offshore), chemical, potable water treatment & distribution systems, wastewater treatment & distribution, chlorination, and anhydrous/aqueous ammonia systems.

Mr. Maher has published and presented numerous technical papers to the safety community. He has also authored/co-authored process safety books and technical manuals/guidebooks. Mr. Maher has also taught many classes associated with process safety and risk management, notably at the University of California (Irvine) and University of Southern California. He is currently the primary instructor for a multi-part Hazard and Operability (HAZOP) Study Facilitation Series and Offshore Facility Safety and Environmental Management Systems (SEMS) Series that are broadcast as webinars by Risk Management Professionals. Recordings of these webinars can be viewed at www.RMPCorp.com/Webinars.

In addition, Mr. Maher has been lead engineer or project manager for a wide spectrum of projects supporting clients':

- Process Safety Management (PSM) Program
- Process Hazard Analysis (PHA) – Especially, HAZOP & LOPA Studies
- Security Vulnerability Assessments (SVA) & SVA Implementation Plans
- Emergency Response Plans (ERP)

- ERP Training & Emergency Drill Coordination
- Urban Water Management Plans
- LOPA & Related Techniques (e.g., Risk-Graph, SOA)
- Safety Integrity Level (SIL) Assignment/Verification
- Prevention Program Development and Safety Management System Compliance Audits
- Safety & Environmental Management Program (SEMP)
- Safety & Environmental Management System (SEMS)
- Incident Investigation and Root Cause Analysis (RCA)
- Quantitative Risk Assessment (QRA)
- Fire/Explosion and Toxic/Flammable Gas Atmospheric Dispersion Consequence Modeling
- Hazard Mitigation Plans (HMP)
- National Incident Management System (NIMS) & NIMS Training
- CalARP and Federal Risk Management Plans (RMP)
- Chlorination and Anhydrous/Aqueous Ammonia System Process Hazard Analysis
- Chlorine and Ammonia Atmospheric Dispersion Modeling

Mr. Maher has performed hazard and risk assessments for a variety of wastewater collection, distribution, and treatment systems. These have included piping and distribution systems, pumping and lift stations, filtration systems, reverse osmosis systems, and chemical additive systems. Chlorine disinfection system risk assessments have included bulk tanks, one-ton cylinders, and 150-lb. cylinder systems. Sulfur dioxide dechlorination system risk assessments have included bulk tanks and one-ton cylinders. Key wastewater system projects have included the Hamaca Refinery, LA County Sanitation District, Eastern Municipal Water District, City of El Centro, as well as supporting roles for a number of other wastewater system risk assessment and emergency response planning projects.

Mr. Maher has played a lead role (typically as Project Manager and Key Technical Resource) in nineteen (19) Security Vulnerability Assessments (SVA) that applied the RAM-WSM methodology developed by Sandia National Laboratories for potable water treatment and distribution systems. Mr. Maher has also provided technical support to over a dozen additional potable water treatment and distribution systems. Specific to SVAs, Mr. Maher's key specialties have included:

- Application of a Pair-Wise Analysis Approach to Facility Prioritization
- Scenario Identification and Analysis

- Fault Tree Analysis
- Emergency Response Plan Development

Since 1983, Mr. Maher has performed detailed Quantitative Risk Assessments (QRA) for industrial facilities that included a detailed evaluation of risks posed from technological and natural hazards, including earthquake, fire, and flooding. Although these techniques were developed for industrial applications, QRA forms the basis of the approach and methodology utilized for hazard mitigation planning and emergency preparedness and response (i.e., Risk = Probability x Consequence) for a wide variety of systems and structures. As part of his project management responsibilities, he has created informative progress reports and provided high-profile deliverables to various agencies. Key QRA projects spearheaded, include:

- A comprehensive QRA contrasting HF alkylation vs. sulfuric acid alkylation
- Creation of a "Risk Communication Guide for State & Local Agencies" for the OES
- Co-Author of a landmark ASME Professional Development Course – "Risk-Based Decision-Making for Power and Process Facilities"
- QRA optimizing the design for the next generation of offshore oil platform safety shut-down systems
- QRA of an industrial space facility
- QRAs for several commercial nuclear power facilities
- QRA for critical equipment at a DOE nuclear waste isolation site

Mr. Maher has performed hazard and risk assessments for a variety of flammables storage and distribution systems, including more complex processes, at refineries, gas plants, and other processing facilities. In addition, Mr. Maher created a CalARP Submittal for a LNG Fueling Base in Orange County, a siting study that included a risk assessment for the propane and butane storage spheres at a refinery in Southern California, and has reviewed conformance with all relevant API and NFPA codes. Recently, Mr. Maher was one of the key speakers at a two-day Oil & Gas Industry "CalARP/RMP/PSM Compliance Workshop" in Bakersfield, hosted by Kern County Environmental Health Services. For the past 7 years, Mr. Maher has also been an invited speaker at the annual CalCUPA workshop, often speaking about petroleum facility safety, reflecting the confidence California regulatory agencies have in the quality and importance of the work performed by one of the few consulting companies invited to speak at this forum, Risk Management Professionals.

A key PHA and risk assessment technique, HAZOP Studies, has been a focal point for Mr. Maher's career. Mr. Maher has been teaching HAZOP Study training courses since 1986 and has applied the technique to complex industrial processes throughout the world. Mr. Maher is experienced in the application of SIL Assignment/Verification for Safety-Instrumented Systems (SIS), and also the application of Layer of Protection Analysis (LOPA). Mr. Maher also was the original architect for Risk Management Professionals' HAZOP Study Software Tool – PHAPlus™.

Mr. Maher has been performing HAZOP Studies and various types of hazard reviews for Onshore & Offshore Facilities since the late 1980s. Mr. Maher was the lead engineer for a landmark 1989 evaluation of Platform Safety Shut-down System reliability using Fault Tree Analysis and Quantitative Risk Assessment techniques that was published in "Offshore Platform Safety Shutdown System Effectiveness," Safety Developments in the Offshore Oil and Gas Industry, Institution of Mechanical Engineers, Glasgow, Scotland, April 1991. Recently, Mr. Maher has been a key presenter in a variety of Webinars associated with Offshore Facility Safety and Environmental Management Systems (SEMS) (see reference above), as well as championing a 12-part HAZOP Study Facilitation Webinar Series. Mr. Maher was also one of the architects in the creation of SEMS-Solution – a broad spectrum SEMS Compliance Software Package. Recent publications include:

- "Paradigm Shift in the Regulatory Application of Safety Management Systems to Offshore Facilities," published initially for the 2011 Global Congress on Process Safety (GCPS), summarizing the evolution of SEMS – Process Safety Progress, 2013, Vol. 33, Issue 4.
- "Assimilating Design Formulation and Design Review into a HAZOP," published for the 2012 GCPS
- "Practical Approach to Vendor Package HAZOP Studies and Preparing the Package Vendor," published for the 2012 GCPS

One of Mr. Maher's projects included functioning as the Program Manager and a key technical resource for a project that involved a comprehensive evaluation of all safety and environmental activities at a refinery in Los Angeles County, making necessary recommendations, and monitoring implementation. The broad scope of this project encompassed all key safety and environmental elements of plant design and operations, including Process Safety Management (PSM) and Risk Management Programs (RMP). Efforts included a key role in the quantitative risk comparison of a modified HF alkylation process vs. sulfuric acid alkylation. He has also played a key role in risk communication in televised public forums and industry panel discussions for this project.

Mr. Maher has played an active role in “setting the pace” for helping industry address process safety and risk management regulatory requirements. These activities have included serving on prestigious guideline development and best practices steering committees, such as the Center for Chemical Process Safety (CCPS) and the American Petroleum Institute (API). Mr. Maher also authored one of the sections in the “LEPC Region I – California Accidental Release Prevention Program (CalARP) – Implementation Guidance Document”. Thus, Mr. Maher has significant experience in the development of risk assessment and risk management methodologies, including statistical methods used in this project, such as the Delphi Method, Regression Analysis, and Various Statistical Fitting/Correlation Techniques.

Mr. Maher has also completed detailed Quantitative Risk Assessments (QRA) for industrial facilities that included a detailed evaluation of risks posed from technological and natural hazards, including earthquake, fire, and flooding. Although these techniques were developed for industrial applications, QRA forms the basis of the approach and methodology utilized for hazard mitigation planning (i.e., Risk = Probability x Consequence) for a wide variety of systems and structures.