

ioMOSAIC STATEMENT OF QUALIFICATION

PROCESS HAZARD ANALYSIS

OVERVIEW

“A process hazard analysis (PHA), sometimes called a process hazard evaluation, is one of the most important elements of the process safety management (PSM) program.”

Federal Register/Vol.57, No. 36/February 24, 1992.

The importance of the PHA derives from the need to identify potential hazards in order to mitigate their risks. You can't manage what you don't know. Given its importance to the PSM program, it follows that the quality of the execution of PHAs must also be considered. Despite investment of considerable resources to conduct PHAs, many companies are still experiencing a high rate of incidents, and find that the causes of these incidents have not been identified and/or addressed in their PHAs.

Inadequate process safety information and PHA facilitators with limited design or operating experience are leading causes of PHA quality issues. Often PHA leaders are mere facilitators and rely solely on the team to identify hazards. A PHA leader that has experience in conducting PHAs on several processes and for other companies will be able to identify more potential hazards.

EXPERIENCED PROFESSIONALS

Our senior PHA leaders have many years of process design and plant operating experience. In addition, they have led risk assessments and PHAs on facilities in many industries including chemicals, petrochemicals, pharmaceuticals, pulp and paper, polymers, ammonia/fertilizer, specialty chemicals, personal care products, oil and gas production, refining, and mining. In addition, they have conducted PHAs of many unique processes and equipment including: medical devices, analytical instruments, automobiles, household appliances and semiconductor manufacturing.

Leading A PHA Team

ioMosaic can provide senior process safety engineers to organize and lead PHAs utilizing your internal technical and operations staff. In addition to being knowledgeable on a wide range of industrial processes, each member of our team is a proven PHA leader. Our professionals have extensive experience in conducting hazard analyses, including the use of various industry recognized methodologies such as HAZOP, What-If, FMEA, FTA, and LOPA.



HAZOP Deviation Matrix

Guide Word	More	Less	None	Reverse	Part Of	As Well As	Other Than
Flow	High Flow	Low Flow	No Flow	Back Flow			Loss of Containment
Pressure	High Pressure	Low Pressure	Vacuum			HP/LP Interface	
Temperature	High Temp	Low Temp	Cryogenic				
Level	High Level	Low Level	No Level			Liq/Liq Interface	Loss of Containment
Composition or State	Additional Phase	Loss of Phase		Change of State	Wrong Concentration	Contaminants	Wrong Material
Reaction	High RXN Rate	Low RXN Rate	No Reaction	Reverse Reaction	Incomplete Reaction	Side Reaction	Wrong Reaction
Time	Too Long	Too Short	Not Started				Wrong Time
Sequence	Step Too Late	Step Too Early	Step Left Out	Step Backwards	Part of Step Left Out	Extra Action Included	Wrong Action Taken

Others parameters: pH, mixing, static charge, current, voltage.

PHA Quality Improvement

Our professionals have audited company and facility PHA programs and have provided valuable guidance and training in how to improve the quality and effectiveness of PHAs.

PHA Revalidation

The OSHA PSM regulation requires the revalidation of PHAs for covered processes every five years. Our experienced PHA leaders assist clients with planning a strategy and developing a scope for revalidation of the PHA. They then lead the client team through the revalidation PHA.

Safety Instrumented System Risk Assessment

Level of Protection Analysis (LOPA) is another technique that is gaining popularity as a simplified approach for performing the hazard analysis and risk assessment required for selecting safety instrumented systems (SIS) under ISA Standard 84.01. One of our professionals was involved with the CCPS committee that wrote the book on LOPA. We can perform LOPA for safety instrumented systems or provide training to safety professionals.



PHA Training

Through our on-site training courses, we can train your staff to lead OSHA PSM compliant PHAs. The training instructors are the same hands-on process safety engineers that lead PHAs for our clients. Our PHA courses can be customized to fit your needs. We can incorporate existing corporate and/or facility PHA standards or help you develop these standards.

SELECTED STUDY EXPERIENCE

- Our professionals led an extensive process hazards analysis effort for a major international oil company with facilities in Alaska. The scope of work included provision of several experienced HAZOP leaders, HAZOP refresher training, and day-to-day project management for a period of five man years (one and a half actual years). The HAZOP studies covered two major US oil fields, including the high risk utility systems (e.g., fuel gas systems, waste heat recovery systems, and LP flare/relief systems).
- For a pharmaceutical company with operations in Puerto Rico, our professionals led a team of process safety professionals in conducting a HAZOP of their chemical synthesis processes. The hazardous chemicals reviewed included organic ethers, chlorine, hydrogen fluoride, methanol, acetone, and caustic. The process equipment included reactors, distillation systems, and utility systems.
- For a major pulp and paper production company, our professionals completed an OSHA PSM PHA of a chlorine dioxide production unit at a large pulp mill in Mississippi. For this PHA, the HAZOP methodology was used, supplemented by What-If/Checklist questions to address facility siting and human factors issues.
- Another assignment involved conducting a PHA and a follow-up study on an ion implanter for a major chip manufacturer. The PHA identified plausible safety related failure scenarios associated with the operation and maintenance of the ion implanter. The PHA techniques employed included FMEA and What-If.
- For an international oil company operating in Colombia, our professionals performed a HAZOP study on the basic engineering design of an oil processing system. The review included the wellhead flowlines, chemical injection, separation, and the interface with the cross-country transportation pipeline.

A number of potential hazards were identified relating to the safety, operability, and maintainability of the plant.

- For a major international nickel mining company in Canada, our professionals provided on-site What-If/Checklist and HAZOP training to a class of engineers, safety professionals, and above ground and below ground supervisory and operating personnel. The course included both instruction and workshops in applying the techniques to designs of their actual mining systems.

Partial Listing From The Many Products And Processes Our Professionals Have Reviewed:

Agricultural	• LNG
• Ammonia/ammonium compounds	• All major refining processes
• herbicides	Pulp & Paper
Polymers	• Chlorine dioxide
• Polyolefins (LDPE, LLDPE & HDPE)	• Turpentine recovery
• Polycarbonate	• Pulp bleaching
• ABS/SAN	Chemicals
Petrochemicals	• Acrylonitrile
• Olefins	• Caustic/chlorine
• EDC/VCM	• Chlorosilanes
• Ethylene oxide	• Anhydrous hydrogen fluoride
• Propylene oxide	• Methyl isocyanate
Oil & Gas Production	• Phosgene
• Crude oil and gas production	• Phosphorous oxychloride
• Production of NGLs	

ABOUT US

ioMosaic Corporation is a leading provider of safety and risk technology consulting services and software solutions.

At ioMosaic, we are helping our clients discover practical and cost effective solutions to safety, risk, and business challenges.

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