

H S E

HEALTH

SAFETY

ENVIRONMENT



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Advanced Process Risk Analysis

Duration: 5 Days

Introduction:

When it is required identify and quantify hazards and potential accident scenarios associated with hazardous processes, it may be necessary to conduct a process risk analysis. Conducting this analysis requires the application of advanced hazard identification and analysis

techniques as many of the hazards are not obvious and can occur at any time during the processing activities. The outcome of these analyses provides managers and engineers with unique insights that help in the selection of the most cost-effective solution among various alternatives. It thus enables appropriate decision-making to limit risk levels in process situations. The course will cover the basics of this approach as well as advanced features in the practices and procedures involved in the implementation. Participants will be exposed to current approaches and methodologies used to classify & quantify hazards. The course will provide the technical and leadership skills necessary for decision-making based on the likelihood and consequences of various hazards and is the first step for organizations interested in developing in-house leadership skills in process risk analysis.

Course Objectives:

The course objectives include:

- To provide participants with a technical and managerial understanding of Process Risk Analysis
- Learn practical ways of using the results of risk analysis to effectively reduce risk by minimizing the consequences and impacts of chemical accidents involving highly hazardous chemicals on people and environment
- Use risk analysis results as one of the inputs in the decision-making process
- Appreciate the strengths, limitations, and possible uses of process risk analysis to support Process Safety Management
- The course aims to impart these principles using practical application of techniques, with industry-related case studies and examples

Course Outline:

Day 1 Overview of Process Risk Analysis approach

- Techniques and benefits of Process Risk Analysis studies
- Understanding the ALARP concept
- Basic elements of Process Risk Analysis
- Layers of Protection Approach to Process Risk Analysis

- Identification of Initiating Event
- Concept of Independent Protection Layer
- Concept of Probability of Failure on Demand
- Selection of Safety Measures

Day 2 Hazard spotting -- Identifying Vulnerable Sections of a plant Use of Hazard Identification Techniques

- Analyzing the Workplace
- Problem Solving
- Monitoring the Results
- Strategy for Hazard Assessment
- Hazard Identification Process
- General Techniques of Hazard Identification
- Ranking Methods
- Use of Historical Frequencies in analysis
- Selection of Techniques
- The HAZOP Technique
- The What-If Technique
- Fault Tree and Event Tree Analyses
- Evaluation of HAZOP results through Quantification techniques
- Hazard Assessment Software demonstrations & exercises

Day 3 Reliability Analysis for Instrument and Human failures

- Factors contributing to degradation of equipment and performance
- Development of LOPA Scenario
- Risk Reduction & Control
- Process Control – Abnormal Situations, Detection and Recovery
- Safety Instrumented Systems
- Safety Integrity Level
- Human Error Failure rates

Day 4 Quantification of Risk -- Employing HAZAN technique

- Fundamentals of consequence modelling techniques
- Loss of containment calculations
- Case Studies of Accident Scenarios
- Identification of hazard prone areas
- Assessment of Consequences
- Consequences of Spills & Leaks
- Major Effects from Chemical Accidents

Day 5 Process Safety Management

- Risk Evaluation

- Acceptance of risk levels
- Risk management and loss control
- Risk-based decisions & communication
- Building Process Safety Management System
- Safety, health and environmental auditing
- Examples & case studies