



SAFETY IN INDUSTRIAL PLANTS

5-Day Training Program

INTRODUCTION

Oil & Gas plants have the potential for large losses due to the severity of operating conditions and the volume of material being processed and stored. The main risk arises from the production and handling of flammable and explosive petroleum products such as LPG and gases under pressure such as natural gas (LNG). Loss of containment of these products together with formation of flammable mixtures with air and the availability of suitable ignition sources to ignite the mixture can give rise to various accident scenarios. In addition to the inherent risk of the chemical, and the hazardous nature of operation and process other factors such as degrading equipment and performance can also contribute to hazardous situations. Identification of hazards provides an early warning to management, which can then take the necessary measures. Operators require an improved understanding of the operation to troubleshoot the process and prevent hazardous situations. The course will cover assessment of process risk, matching risk levels to safety system performance requirements and estimating overall system performance. Safety aspects during design, implementation, and ongoing maintenance/ testing, emergency shutdown systems, etc., in the process industry will be discussed.

WORKSHOP OBJECTIVES

- Provide the basis for identifying and preventing hazardous occurrences.
- Integrate Safety in normal operations
- Acquaint with approaches and methodologies used to classify & quantify hazards.
- Help understand the impacts of changing operating conditions and design modifications on the operation of a process.
- Initiate response to deviations and deficiencies in process design and its control system;
- Anticipate problems & implement corrective measures
- Ensure safe practices and reduction of errors, mishaps and/ or accidents; analyze incidents & near-misses
- Acquaint engineers and managers with recent advances in Hazard Assessment tools and supporting software.
- Increase efficiency, safety and productivity



PROGRAM

Day One - Overview of Safety & Loss Prevention

- Safety Policies & Procedures
- Safety Culture
- Traditional Goals of Safety
- Elements of Safety Program
- System Safety Analysis
- Developing Loss Prevention Policies & Procedures
- Risk Control & Safety
- The Safety Case Approach
- Assessing Risk potential of a facility

Hazard Identification & Control

- The Goal of a Hazard Identification & Control Program
- What Is Hazard?
- Modes of Hazard
- Classification of Hazard
- Principles & techniques of identifying chemical hazards

Industrial Fires/ Explosions

- Types of Industrial Fires & Explosions
- Sources of Ignition & Fire spread possibilities
- Assessment of Consequences
- Vulnerability Analysis
- Identification of hazard prone areas
- Learning from Incidents
- Case Studies

Day Two- Hazard Analysis

- Analyzing the Workplace
- Problem Solving
- Monitoring the Results

Use of Hazard Identification Techniques in Safety Analysis

- Strategy for Hazard Assessment
- Hazard Identification Process
- General Techniques of Hazard Identification
- Ranking Methods
- Checklists
- WHAT-IF....?
- HAZOP
- FTA/ ETA
- Failure Modes & Effects Analysis (FMEA)
- Use of Historical Frequencies in analysis
- Techniques used in Incident Prediction/ Prevention
- Hazard-Barrier-Target Analysis (HBTA)
- Change Analysis
- Job Safety Analysis
- Materials Failure Analysis
- Selection of Techniques

Hazard Assessment Software demonstrations & exercises

Day Three- Overview of HAZOP technique

- Definitions & terminology
- Illustrating the sequence of application
- Human factors in HAZOP study
- Use of special features in computerized HAZOP techniques
- Analysis of information from P&I diagrams, PFD, etc
- Composition & Selection of the team
- Preparation of Reports

Application of HAZOP to operations

Workshop/ discussion using PC based HAZOP software

Examples & case studies

Follow-up of HAZOP results

- Evaluation of HAZOP results through Quantification techniques
- Consequence Modeling Aspects
- Description of Accident Scenarios
- Results from Hazard Quantification procedures
- Probability Analysis using Fault Tree/ Event Tree Analysis
- Shortlisting of Events and Follow up

Day Four- Hazardous Area Classification for Protection of Equipment

- Purpose & Objectives of HAC
- Approach to HAC using Codes & Standards
- How & when is HAC carried out?
- Description & Definitions of Zoning
- Identification of Flammable & Combustible Material

Selection & Safeguarding of Equipment in Hazardous Locations

- Safety of Electrical Equipment
- Basic Principles in the various types of protection
- Methods of Protection
- Classification & Selection of Electrical Apparatus
- Safeguarding of the Equipment
- Marking & Certification of Equipment

Case Studies, examples & application

Day Five - Safety Performance & Reliability of Equipment

- The need for safety systems
- Safety Availability and Reliability terms and concepts
- Methods for matching process risk to safety performance requirements
- The difference between process control and safety control
- Identification of Critical Equipment for Preventive maintenance
- Management of Incidents
- Safety Performance and Monitoring
- Regulatory Requirements



Management of Fire & Explosion Incidents

- Control Measures
- Detection of leaks
- Emergency Response Plan
- Basic Plan Requirements
- Detailed Emergency Response Plan
- Sections of a Detailed Emergency Response Plan
- Maintaining the Plan
- Examples & Exercises