Advanced Hazard Identification, Risk Analysis and Layers of Protection Analysis (LOPA) For Offshore, Midstream, and Downstream Operations Training Course

Introduction

The success of every company depends on each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development are an investment in future success - give yourself and your employees the keys to success

It is strategically important that your team understands the fundamentals of Hazard Identification and Risk Analysis. This is the difference between being in the best quartile of operational safety and being in the last quartile. There is vast difference in the operational ability of operating companies and most benchmarking studies have confirmed this gap in operational abilities.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts are very beneficial in closing the gap if you are not in the best quartile or maintaining a leadership position. Most studies show that a continuous reinforcement of best practices in operational safety principles is the most effective way to obtain the desired results. Training and learning should be an on going continuous lifelong goal.

Course Objective

This course will review Hazard Identification and Risk Analysis (HIRA) for Offshore, Midstream and Downstream Operations. HIRA is a term that encompasses all activities involved in identifying hazards and evaluating risk at facilities, throughout their life cycle, to make certain that risks to employees, the public, or the environment are consistently controlled within the organization's risk tolerance. These studies typically address three main risk questions to a level of detail commensurate with analysis objectives, life cycle stage, available information, and resources.

The three main risk questions are:

Hazard – What can go wrong?
Consequences – How bad could it be?
Likelihood – How often might it happen?

When answering these questions, the objective is to perform only the level of analysis necessary to reach a decision, because insufficient analysis may lead to poor decisions and excessive analysis wastes resources.

A suite of tools is available to accommodate varying analysis needs:

(1) tools for simple hazard identification or qualitative risk analysis include hazard and operability analysis (HAZOP), what-if/checklist analysis, and failure modes and effects analysis (FMEA),

(2) tools for simple risk analysis include failure modes, effects, and criticality analysis and layer of protection analysis (LOPA),

(3) tools for detailed quantitative risk analysis include fault trees and event trees. For example, some companies may judge the mere existence of an explosion hazard to be an unacceptable risk, regardless of its likelihood. Others may be willing to tolerate an explosion risk if proper codes and standards are followed.

Still others may be unwilling to accept an explosion risk unless it can be shown that the expected frequency of explosions is less than 10-6/y.

HIRA encompasses the entire spectrum of risk analyses, from qualitative to quantitative. A process hazard analysis (PHA) is a HIRA that meets specific regulatory requirements in the U.S.

Process Hazard Analysis (PHA) studies are the foundation for process safety and risk management of hazardous process systems. They help companies identify hazard scenarios that could adversely affect people, property, or the environment.

There are several predictive PHA techniques and methodologies. They include Hazard and Operability Studies (HAZOP), What If Studies, Failure Modes and Effect Analysis (FMEA), and Major Failure Analysis (MFA).

The HAZOP leader's roles are;

1. Prepares for the study
2. Advises on the selection of team members – insuring core knowledge needed for the HAZOP is among the team members
3. Methodology and definition of study scope
4. Oversees the team's brainstorming of cause and consequences of possible accidents
5. Formation of recommendations for appropriate corrective actions

Course Syllabus

Introduction

- Overview of the Offshore, Midstream, and Downstream Chemical Processing Industry

Review of Process Incidents

- Safety for the Chemical Processing Industry

Fundamentals of Petroleum Chemistry

- Description of a Hydrocarbon Molecule
- Types of Hydrocarbon Molecules

Hazard Identification

a. Core knowledge needed for hazard identification

- Chemistry of the process
- Hazards of mixing
- Introduction to Metallurgy
- Introduction to Relief Valve Sizing
- Introduction to Process Control
- Introduction to Safety Integrity Levels
- Auditing Operating Procedures

b. What If

- Typical What If checklist

c. HAZOP

- Hazard Assessment Definition
- Review of actual industry hazards
- PHA Study Objectives
- Introduction of PHA Techniques / Probability Matrix
- Team Leader Responsibilities
- Preparation and Organization of PHA Studies
- Importance of Business Records / PHA Terminology
- Selection of Study Nodes / Design intent of node
- Introduction of Guide words
- Guidelines for managing the team
- Recording Study Results / Maintaining Quality Control
- Management of Results and Recommendations
- Communication of Results to Management

Risk Assessment

- Society Acceptable Risk
- Understanding Risk
- Understanding Consequence
- Understanding Likelihood
- Typical Risk Matrix
- Risk Probability

Understanding LOPA

- Concept, purpose and principles of LOPA
- LOPA methodology (selecting scenarios, the LOPA process, describing scenarios, estimating initiating event frequencies, independent protection layers and their reliability)
- LOPA study and documentation
- Advanced aspects
- Facilitating a LOPA study
- Responsibilities and challenges

Control Measures

a. elimination
b. substitution
c. engineering
d. administration
e personal protective equipment

Control Measures – Engineering

a. process design
b. relief valves
c. Safety Integrity Levels
b. fire protection and controls

Who Should Attend

- People who are making day to day decisions regarding operation, design, maintenance, and economics of offshore, midstream and downstream process industry plants.

    1. 1st Line Operations personnel,
    2. Operation Supervisors,
    3. 1st Line Maintenance personnel,
    4. Maintenance Supervisors,
    5. Senior Plant Supervisors,
    6. Operations Engineers
    7. Process Support Engineers,
    8. Design Engineers,
    9. Cost Engineers

- Engineers, Operating Personnel, PSM Coordinators, HSE Managers and Engineers

- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding of process safety.

- Other professionals who desire a better understanding of the subject matter.

What You Can Expect to Gain

- How to conduct a Hazard Identification and Risk Analysis (HIRA)
- Learn Core Knowledge needed in a Hazard Identification
- How to perform a Process Hazard Analysis to meet Process Safety Management requirements for initial PHAs and management of change analyses.
- How to analyze operating procedures for critical scenarios.
- Review of Engineering Controls
- LOPA Guidelines