Bowtie Method Risk Assessment

Potential PDH: 24

Description:

Participants will learn to:

- Explain the purpose, structure, and components of a bowtie diagram.
- Correctly identify hazards, top events, threats, consequences, barriers, escalation factors, and associated controls.
- Qualitatively evaluate barrier effectiveness and independence.
- Use bowties to demonstrate risks are managed to ALARP (As Low as Reasonably Practicable).
- Build, critique, and present bowties using four risk scenarios.
    - Incident investigation.
    - Interim risk management for process safety and asset integrity risks.
    - Manage risks of hazardous tasks.
    - Optimize design standards/specifications and procedures.
- Apply barrier-based thinking to real world scenarios.
- Compare bowtie software tools using a structured cost–benefit framework.

NOTE: This course is intended to provide knowledge and skills for the development of bowties. It is not intended to explore every possible application or application type for bowtie

Outline:

Day 1: Benefits, Structure, and ALARP

1. Review Course Learning Objectives
2. Benefits of Bowties
    - Risk Management
    - Visualization of Risk Pathways
    - Barrier-based Thinking and Accountability
    - Integration with Safety Cases
    - Supports Critical Task Management
    - Enhances Communication
    - Enables ALARP
    - Ensures Focus on Prevention, Mitigation, and Recovery from Consequences
3. What is a Bowtie?
    - Key Components:
        - Hazard

- Top Event
- Threats
- Consequences
- Preventive Barriers (Controls)
- Mitigative Barriers (Recovery Preparedness Measures)
- Escalation Factors
- Escalation Factor Controls
- Critical Tasks (Operations, Maintenance and Engineering)

4. Bowties and ALARP
   - Concept of ALARP
   - How bowties show risk pathways and control sufficiency, including barrier effectiveness and independence.
   - Identifying "reasonably practicable" improvements.
   - Using bowties to justify decisions to regulators, such as with Safety Cases.

Exercises: Create a Bowtie for Hazard; Demonstrate Bowtie Value for Incident Investigation and Prevention

Day 2: Bowtie Applications, Construction, and Barrier Quality

1. Bowtie Applications
   - Incident investigation (mapping failed barriers).
   - Interim risk management for process safety and asset integrity risks.
   - Manage risks of hazardous tasks.
   - Optimize design standards/specifications and procedures.
   - Major accident hazard management, such as with Safety Cases.
   - Maintenance & inspection planning.
   - Training & competency programs, e.g. using procedural bowties.
   - Regulatory submissions, e.g. demonstrating robustness of repair plans.
   - Promote barrier thinking, e.g. Safeguarding device bypass approval.
2. Bowtie Construction
   - How to Get Started
     - Stakeholders
     - Media
     - Brainstorming Content
     - Suggestions to Make Things Easier
3. Barrier Quality Attributes
   - Effectiveness
   - Independence
   - Auditability

Exercises: Flare Reliability Bowtie; Electrocution/Electric Shock Bowtie

Day 3: Guide to Bowtie Software Tool Selection, Integrating Bowties into Organizational Systems, and Final Projects

1. Guide to Bowtie Software Tool Selection
    - Comparison of Major Tools
    - Cost Benefit Analysis Framework
2. Integrating Bowties into Organizational Systems
    - Linking bowties to:
        - Risk registers
        - Incident management
        - CMMS
        - Training & competency
    - Governance and ownership
    - Keeping bowties “alive”
3. Final Bowtie Projects
4. Course Wrap Up

Who Should Attend:

This program is ideal for personnel involved in supporting implementation of Bowtie methodology or those seeking to gain familiarity with an already implemented Bowtie methodology that is a part of a company’s Risk Management Systems. The ideal audience would be Process Safety Engineers who are new to this methodology as well as those involved in process safety, risk assessment, operations, and maintenance within the oil and gas industry.

Subject Matter Expert (SME):

Michael “Mike” Lawton, P. Eng., is a seasoned mechanical engineer with over 30 years of experience in gas production operations, front-end engineering, and regulatory compliance across the upstream and downstream petroleum industry. He has led complex risk mitigation initiatives, including feasibility studies, process hazard analyses, and asset integrity reviews, with a strong focus on structured risk assessment methodologies such as the bowtie method to enhance process safety and operational reliability. Mike has managed large multidisciplinary teams and major capital and operating budgets, while driving improvements in integrity management, incident preparedness, and operations readiness assurance. In addition to his technical leadership, he has played a key role in developing competency frameworks and delivering technical training to build capability across engineering and operations teams, reinforcing a strong culture of safety and continuous improvement.