A Learning Community Approach to Process Safety Competency

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Agenda

- Introduction
- Process Safety - The need for a new programme
- Learning Community Approach
- Structure & Content
- Learning Management System & Outcomes
Programme Need: Loss of Containment Events

HCR Data 1992-2016 [Ref 1]

Estimate range of initial gas leak in C-Module of Piper Alpha. Section 5.103-5.109, pp68-69, [Ref. 2]
The need for a new approach - The ‘Forgetting’ Curve

The diagram shows the ‘Forgetting’ Curve with data from Ebbinghaus, Mack, Seitz, and Dros. The x-axis represents the retention interval (days), while the y-axis shows normalized savings.

[Refs 3, 4]
Learning Community Approach

Social Presence
- Supporting Discourse
- Setting the climate

Educational Experience
- Selecting Content

Cognitive Presence

Teaching Presence

Communication medium

[Ref 5]
Process Safety Programme - Structure

• Blended Learning Approach
• Development of a ‘Learning Community’
• 3 Workshops spaced 1 month apart
• Workshops support by learning management system material
• Extra videos, reading, case studies.
• Learning Outcomes tested through Quiz
• Leadership Support
• Compulsory attendance

Process Safety Programme Structure

1. Process Safety Fundamentals
   - SIS / ESD / F&G
   - Layout
   - Risk Assessment
   - Case Study Exercises
     - ESDV Performance
     - New Fluids / Composition
   - [Ref 12]

2. Process Safety Barriers
   - Fire & Explosions
   - Barriers
   - HP/LP Interfaces
   - Relief & Blowdown
   - Practical ALARP
   - [Refs 2, 3, 11]

3. Process Safety Risk Assessment
   - Accident Sequence
   - Hazards, Failure, Consequences
   - Loss of Containment
   - Legislative Framework
   - ALARP Case Studies
   - [Refs 7-10]
Process Safety Programme - Content

HAZARD

Cause

FAILURE

Barriers trying to prevent the failure event

Failure Event

Barriers trying to reduce consequences following the failure event

Consequences

Consequence

Consequence

Consequence

RCLD
1. What else can I do to reduce risk? What have I not done?

2. What are the costs and benefits of doing it?

3. Is the sacrifice in money, time, or trouble 'grossly disproportionate' to the Benefit gained?

Hierarchy of Controls

- **Elimination**: Physically remove the hazard
- **Substitution**: Replace the hazard
- **Engineering Controls**: Isolate people from the hazard
- **Administrative Controls**: Change the way people work
- **PPE**: Protect the worker with Personal Protective Equipment
Learning Management System

Process Safety Skills - Spirit Energy

Description

Process Safety remains a critical issue for the Oil & Gas industry. Large releases, potentially resulting in multiple fatalities, are an ever-present risk on major plants with large hazardous inventories. The Piper Alpha disaster, Texas City Refinery, Macondo, Enchova South and Flixborough are all tragic examples of this. With an ageing asset base, changing competency levels, and a tough operating environment, ensuring sufficient barriers are in place to prevent major accidents is a challenge.

Key to delivering process safety performance is the competency and skills of the engineering team. All disciplines need to work together to ensure that the appropriate barriers are in place and sufficiently robust for the specific system. Without this multi-discipline input, it is difficult to ensure that risk has been reduced to a level considered as low as reasonably practicable (ALARP), and that a good and efficient business outcome has been achieved.

The Spirit Energy Process Safety Skills programme covers the key issues and runs as three 1-day workshops supported by an online Learning Community between sessions. The learning community involves additional case studies and ends with a quiz on learning outcomes to help delegates develop their Process Safety Skills.

Content

SECTION 1 - PROCESS SAFETY FUNDAMENTALS

- Anatomy of a Disaster - CSB Documentary on the causes of the Texas City Disaster
- The Flixborough Disaster - Report of the Court of Inquiry.pdf
- 1 - Welcome & Course Overview
- 2 - Introduction to Process Safety
- 3 - Flixborough Disaster
- 4 - Hazards, Failures, Consequences
- 5 - Group Exercise - HFC Thinking
- 6 - Loss of Containment Events
- 7 - Group Exercise - HFC Thinking 2
- 8 - Introduction to Legal Requirements
- 9 - Process Safety - Learning Community
- QUIZ Process Safety - Fundamentals
Learning Outcomes

Questions

What new hazard was introduced onto the Piper Alpha platform post construction? (One correct answer) (31 times answered - 30 times answered correctly)

- Fire walls
- Gas processing with gas import/export risers
- Additional oil production
- Link between Piper & Tartan & Claymore

How big was the initial gas release in Module C of Piper A that led to the explosion that did the initial damage to the... (31 times answered - 29 times answered correctly)

- 5-10 kg
- 110-220 kg
- 30-80 kg
- 2.2-3.1 Tonnes

Describe some of the root causes of the Piper Alpha disaster. (More than one correct answer) (31 times answered - 16 times answered correctly)

- Control room location.
- Gas leak from missing PSV flange.
- Organisational, management and competency issues within Occidental.
- Platform still in production during major brownfield modifications.
- Temporary promotion system to manage manpower shortages.

How long did the escalation take between the initial explosion in Module C to the Tartan gas riser falling releasing the... (31 times answered - 31 times answered correctly)

- 1 hr
- 5 minutes
Programme Outcomes

Outcomes

• Initial silo-thinking within the TA Group – basis for a common understanding by the end;
• Pressures of production and limited resources influences perceptions of the TA Community;
• Multi-site differences highlighted and begin to align (Barrow, Aberdeen, Hoofddorp);
• Understanding of Legal Requirements improved with a focus on identifying options and use of the Hierarchy of Controls;
• Comparison between company events and major accidents was powerful;
• Behaviour post workshop different – new interventions and decision making e.g. relief-valve lifting.

Going Forward in 2018

• Expanding the programme to the Asset Leadership team;
• Technical and Asset leadership team reinforcing the key concepts of the Process Safety Framework + Hierarchy of Controls + ALARP.
References


[6] Chemical Safety Board, Williams Olefins Case Study,


Thank-you

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