CENTER FOR Hydrogen SAFETY
Connecting a Global Community

Safety Culture Spotlight

System Software Dis-empowers Workers—Hazards Analysis

- Failure to understand risk leads to 2 fatalities and 8 injured
- Heat exchanger ruptured releasing a flammable vapor that exploded
- Reliance on system software negates individual safety responsibilities

BACKGROUND

A plant sustained a small leak on the process side of a heat exchanger. Action was quickly taken to repair it, but during the shutdown, the coolant dropped the exchanger temperature dangerously low, embrittling the metal.

As the process restarted, the heat exchanger ruptured, releasing a flammable vapor cloud. The vapor cloud traveled 170 meters before finding an ignition source. The massive gas cloud exploded and then caught fire, killing 2 workers and injuring 8. Because the plant was the sole supplier of natural gas to the region, the entire region had no gas for cooking, and factories employing 250,000 workers were left idle.

WHAT HAPPENED

A corporate audit of the plant conducted just 6 months before the incident declared the plant's process safety management system was in order. However, the incident investigation team found (Ref E.3) significant deficiencies in process hazard analyses, training, documentation, workforce involvement and communication, and management oversight.

The Royal Investigation Commission noted the company had a world class computer-based system to manage its process safety programs, but concluded the company's use of it was flawed in that personnel over-relied on checking the boxes specified by the system rather than assuring actual safety, effectively failing to empower individuals to successfully fulfill their safety responsibilities. What other culture gaps might have contributed to this incident?

What culture factors led the Process Hazards Analysis team to fail to understand the hazards and risks they were evaluating and develop insufficient actions? Was failure to ensure open and frank communications and foster mutual trust the cause of the observed poor workforce involvement, communication, management oversight, and training?

SAFETY CULTURE FOCUS

- ✓ A questioning environment supports a more thorough hazards analysis process.
- ✓ Open, effective communications promotes greater awareness of risks and mitigation strategies.
- ✓ Over reliance on software programs can undermine individual responsibility for safety.

Only 54% of those surveyed indicated risk planning was a strength in their organization.*

IMPROVING HYDROGEN SAFETY CULTURE

LEARNING OPPORTUNITIES FROM OTHER'S EXPERIENCES

"Safety culture is how the organization behaves…
…when no one is watching."

Safety Culture Framework

- Safety is everyone's responsibility
- Strong leadership support
- Integrated into all activities
- Open, timely, effective communications
- Questioning/learning environment
- Mutual trust
- Continuous improvement

What are the benefits?

- ✓ Eliminates common weaknesses identified as contributing factors to catastrophic events.
- ✓ Promotes trust in the hydrogen energy industry's ability to deliver safe, reliable, quality products and services.
- ✓ Supports a sustainable legacy for companies and the hydrogen industry.
- ✓ Fosters efficiency and productivity in the workplace.

Resources

- ✓ For further information and resources on safety culture, see: https://www.aiche.org/ccps/safety-culture-what-stake
- ✓ For further case studies on safety culture, see: https://h2tools.org

Keywords: weak, poor, minimum, regulations, flammable, chemical, checklists, compliance