CENTER FOR Hydrogen SAFETY
Connecting a Global Community

Safety Culture Spotlight

Failure to Act—Risk Planning

- Failure to respond to safety concerns leads to fatalities
- Failure to identify flammable hazards
- Oxygen atmosphere causes minor electrical short to accelerate into a significant fire

BACKGROUND

In February 1967, an electrical fire within the crew capsule of the Apollo 1 spacecraft killed all three astronauts as they conducted a simulated launch drill on the launch pad. The investigation determined the oxygen atmosphere in the capsule caused a minor electrical short to accelerate into a significant fire. The crew and launch attendants outside the capsule tried to open the hatch, but the combustion gasses had raised the cabin pressure enough so the inward-swinging hatch would not budge.

WHAT HAPPENED

Before the incident, Apollo astronauts had expressed many concerns about their new spacecraft, including a significant amount flammable nylon webbing throughout the crew cabin. The investigation board noted the National Aeronautics and Space Administration had failed to identify flammability hazards so that they could have been addressed. During the investigation hearings, an astronaut termed the failure to connect flammables plus oxygen to fire was a "Failure of Imagination." Of course, it was not a failure of imagination because the Apollo 1 crew had imagined it – and have even complained about it.

If the crew complained about a safety problem, was there an understanding of hazards and risk, but a failure at some level of the organization to act on these hazards and risks? Were the crew aware of the hazards but other astronauts failed to imagine it? If so, was there a gap in open and frank communication? Did the others not have the same sense of vulnerability, or did they not trust their colleague's judgment?

SAFETY CULTURE FOCUS

- ✓ Safety is everyone's responsibility and open communication can help identify and mitigate risk when acted upon.
- ✓ Strong leadership involves fostering a questioning environment to better understand risk.
- ✓ Risk analysis and management of change must integrate with the safety system

****Only 37% of those surveyed indicated management of change 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