Learning from major incidents related to process safety audits

Dr. Zsuzsanna Gyenes
IChemE Safety Centre

Hazards31

**What is the IChemE Safety Centre?
Current Operating Partners**

IChemE Safety Centre

IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE
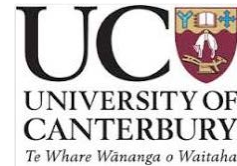
Audits

Process safety management auditing is a process of systematic examination to assess the extent of conformance with defined standards and recognised good practice and thereby identify opportunities for improvement.

Oil refinery

- Series of explosions at an oil refinery during the restarting of a hydrocarbon isomerisation unit.

- Liquid evaporated as it fell to the ground and formed a flammable vapour cloud.

- The cloud found an ignition source and exploded.

- Fifteen people were killed and 180 others were injured.

US Chemical Safety and Hazard Investigation Board

Key findigns

- Years prior to the explosion – internal studies raised concern about potential accident

- 80 hydrocarbon releases between 2000-2001

- Audits between 2002-2004 highlighted lack of early warnings

- External audits revealed insufficient incident investigation system in place

- Internal audit warned about potential catastrophic event.

Chemical manufacturing company

- Toxic methyl mercaptan was released from an insecticide production unit.

- Three operators and a supervisor got killed in the event.

- Personnel attempted to clear blocked piping outside of the manufacturing building.

- Liquid methyl mercaptan drained from the piping and filled the manufacturing building with toxic vapour.

Key findings

- External audit in 2007 identified the existence of the methyl mercaptan detection system but did not evaluate effectiveness.

- One third-party audit and six self-audits were completed between 2007 and the date of the incident.

- None of these audits identified or effectively corrected the many serious and long-standing process safety deficiencies at the site.

Recommendations

- Support both the auditors and the leadership in the facility in advancing good process safety outcome.

- A robust audit programme should be in place.

- Managers should seek to avoid audit fatigue.

- The challenge is to make audit as part of the business and not make it a disruptive process.

Hazards31

Targeted recommendations - What can I do?

The ISC believes that leadership across six key functional elements is vital to achieve good process safety outcomes. These elements are:

- ● systems & procedures
- ● engineering & design
- ● assurance
- ● knowledge & competence
- ● human factors
- ● culture

What can I do?

Management

As management

- Robust audit program and process safety metrics required.
- Comprehensive assessment of PSM programs and implementation.
- Audit should be carried out every five years.
- Corrective actions meet the intent of the recommendations.
- Response to the auditor's report.
- The audit program should identify complex issues and ensure that corrective measures are taken.
- Action items are tracked and effectively closed.
- Safety report or safety case describe auditing activities on site.
- Resources and competent personnel are available.
- Auditors possess a range of skills.

![Hazards31 logo]

![IChemE Safety Centre logo] ![IChemE logo — ADVANCING CHEMICAL ENGINEERING WORLDWIDE]

What can I do?

Process engineer/ Supervisor/Auditor

As a process engineer/supervisor/auditor

- Follow the audit protocols.
- During audits, make sure to focus on actual practices.
- Findings from the audit are recorded and submitted to the management.
- Record both negative and positive feedback from the audit.
- If you use checklist, each checklist calls for a list of action items.
- Be familiar with results of previous site audit findings.
- During the audit, emphasise openness and discuss concerns.
- Look for patterns or trends.

What can I do?

Operator

As an operator

- When being audited, make sure you provide the auditors with all information about your work and any issues or difficulties that you may face.

- Remember, an audit is about the process, not you as an individual.

- Make sure to follow operating procedures. If you discover any inconsistency in the procedures, be open about it to the auditor.

- Report any major concerns to your supervisor immediately.

Conclusions

- It is not only the responsibility of the auditors but also the site management or corporate management to ensure that audit results are neither ignored nor forgotten.

- Audit findings should be shared with all sites.

- Action plan to follow up on the audit findings.

- Clearly defined roles and reporting lines, resources for improvement, prioritisation of audit findings and how significant ones are escalated to board level.

- Once an audit programme is established, it should be expanded to include an evaluation of the quality of those programmes.

Hazards31

Any questions?

Zsuzsanna Gyenes, PhD, AMIChemE
Deputy to the Director IChemE Safety Centre
Phone +44 797 153 4540

Email safetycentre@icheme.org
www.ichemesafetycentre.org

| @SafetyIChemE | IChemE Safety Centre | @safetyicheme | fb.me/SafetyIChemE | IChemE Safety Centre |

https://www.linkedin.com/in/dr-zsuzsanna-gyenes