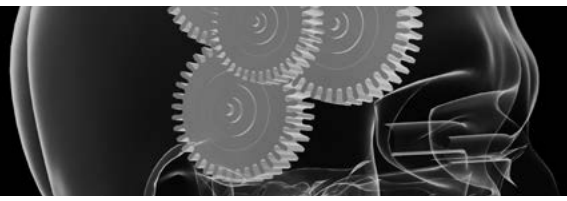

CASE STUDY 4 - Right job, wrong equipment…

What happened?

A work party unbolted the wrong valve on a flare line causing a large gas release.

Relief valves were being removed for recertification during a shutdown. Normally a "breaking-containment" permit would have been issued, but because the plant was hydrocarbon-free, this rule was relaxed, and a cold-work permit was issued for the task.

The recertification programme over-ran, and it was decided to complete the maintenance of some valves after the plant was back in production. However the rule requiring a breaking-containment permit, was not reinstated. The workscope was also handed over from project to operations leading to uncertainty of ownership and responsibilities.

The permit listed four valves. When the work team went to the site they found scaffolding erected next to relief valve PSV1068. They believed this to be the correct valve. Unfortunately it was not - they were supposed to be removing PSV1066 which was on the deck above.

They attempted to remove the bolts from the live-side of the valve, but the high pressure in the vessel prevented the bolts from releasing. Instead they removed all of the bolts from the flare-side of the flange. Gas was released as they split the two halves of the flange. They tried to remake the flange but could not as the valve had become misaligned with the pipe.

The control room was informed of the gas leak and several gas alarms triggered. A full plant blowdown was initiated by the control room operator. Several tonnes of gas were released from the open flange which, had an ignition source been present, would have generated a serious explosion.

What human factors were involved?

What did people do intentionally?

The permit rules had been relaxed and not reinstated
During the shutdown the rule requiring a breaking-containment permit was relaxed. It was not reinstated when the shutdown was complete.

Change of responsibility led to uncertainties of ownership
Uncertainty existed around who was responsible for the relief valve work post-shutdown i.e. production or maintenance supervisor.

What did people do without meaning to?

The work party selected the wrong valve
The permit stated that all the valves were on the same deck. The scaffolding access had been erected next to this valve. Furthermore, the valve tag was similar, and difficult to read. This was enough to suggest to the work party that they were working on the right valve.

Barriers

- Procedures
- Safety Critical Communication

- Maintenance, Inspection & Testing
- Managing Human Failure
- Supervision

What can we learn from this incident?

- Breaking containment on hydrocarbon systems is a high risk activity, involving people making judgements. Simple errors, assumptions or misjudgements can have disastrous consequences. Checking can catch errors.
- When breaking containment, you must confirm that you are working on the right equipment. You should also have a way of checking that the right steps have been taken before opening up the hydrocarbon system. When identifying equipment - walk - point - check!
- If something is not as you expected, step back and ask "why?". The difficulty in removing the live-side bolts should have indicated that something was wrong. Applying basic principles in breaking bolted joints could have recovered this situation.
- Changing conditions, scopes of work and responsibilities must be managed to ensure responsibilities and ownership are clear at all times.