Incident

Managing the risks of stored energy – positive isolations may be safest but are hazardous to install

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Summary

Even a small amount of stored energy can have catastrophic consequences if it results in the release of hazardous substances. This case study highlights a fatal accident that occurred when hydrogen sulphide and other hazardous materials were released whilst creating a physical isolation using blind flanges on a system that had not been prepared properly.

Keywords: Stored energy, isolation, blind flanges

Introduction

It is true to say that positive isolation is the safest isolation method we have. However, establishing positive isolation invariably requires containment to be broken, which is a hazardous activity. The irony is that a less secure method of isolation has to be used to create the positive isolation.

An accident at a Singapore refinery in September 2020 left one person dead and two injured when hydrogen sulphide and other hazardous materials were released whilst creating a physical isolation using blind flanges. A breakdown of the isolation and permit to work systems led to work taking place on a system that had not been prepared properly. The supervisor who issued the permit was jailed for committing a "negligent act".

Background

The accident happened whilst gas desulphurisation and amine treatment plants were being prepared for maintenance. This only occurred every four or five years and required blind flanges to be inserted into multiple pipelines around the plant.

Loss of containment

The sudden release of low-pressure hydrogen sulphide gas and hazardous liquid material that occurred when the blind flange was being installed led to the two maintenance personnel performing the task being overcome by gas and collapsing. Their foreman, who was working nearby at the time, tried to rescue them but was also overcome and collapsed.

Consequences

One of the maintenance workers suffered 40% chemical burns and breathing injuries. He was admitted to the intensive care unit at hospital but unfortunately died of multiple organ failure five days later. His colleague sustained superficial burns to his upper back, hip area and legs, while the foreman suffered chemical injury to both eyes as well as abrasions to his mid-back region.

Causes

Investigations concluded that the permit to work was issued for inserting the blind flanges without ensuring that sections had been isolated and made safe. At the time of issue only some pipelines had been prepared but the permit was issued to insert blind flanges to them all.

Negligence

The Permit Issuing Authority (person who issued the permit) was taken to court and pleaded guilty to committing a negligent act by approving the works to be carried out without ensuring that this could be done safely. This was despite having many years of experience and having received suitable training in the role. The prosecuting officer is quoted as saying "The court ought to impose a sufficiently deterrent sentence to not only highlight the importance of workplace safety but also to deter like-minded individuals in similar positions from committing similar offences."

Conclusions

This case study highlights that even a small amount of stored energy can have catastrophic consequences if it results in the release of hazardous substances. This has to be considered for any break of containment.

The use of a jail sentence as a deterrent is something that may not sit easily with many readers. Learning from accidents to reduce future risks should always be the aim of the safety community. Sometimes we may run into conflict with others including the judicial system and even the general public.

Additional comments

There is not enough information in the public domain to determine the underlying causes of this incident. Robust isolation procedures directly linked with the permit to work system would normally be expected, with a formal 'First Break' procedure to ensure the possibility of a hazard

knowledge and competence

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being present for any reason does not result in people being harmed. There is some guidance on this (e.g. HSG 253) but preparing equipment for maintenance is a complex task that requires robust procedures that are adhered to strictly.

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