# Case incident Review: Metal Fabrication – Paint Store Explosion & Fire

# Time and place: August 2012 in Melbourne.

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#### **Overview:**

In the many years that I have been involved in the investigation of chemical and dangerous goods spills and fires, one of the most common being with fires associated with the storage and handling of flammable liquids. In my many investigations, such fires have occurred near or inside a flammable store. In many of these case investigations, an internal fire in such stores has spread outside of the store with resulting injury to people and damage to property.

My purpose for preparing this case incident article is to try and provide the reader with a better understanding of what can be learnt and what I see as the common areas of failure in such incidents in spending over 33 years working in State Government with the Victorian Health and Safety Regulator, being involved in the investigation of such chemical incidents.

#### Case Review:

In an industrial estate located in outer Melbourne, at a metal fabrication factory, a worker was involved in his normal daily work associated with cutting, grinding and welding of metal fabrication parts. As the factory owners had been very busy with high work orders to manage in recent weeks, the working floor space in the factory was very limited, as a result the worker was instructed several days earlier prior to the incident date, to relocate his metal cutting and welding operation closer to the main factory entry roller door and some 2-3m adjacent to the sites class 3 paints and thinners store.

The site had a flammable liquid store of approximately 2.5m wide x 4m long and 2.7m high. This store was well constructed some 15 years earlier when the current company started to operate at the site. The store was made of double brick with a concrete floor and roof. The entry door was a double skin fire rate self-closing door with fusible links. The store had some low level natural ventilation openings to allow flammable vapour dispersion out of the store.

This store contained over 1500 litres in various paint containers with several containers of highly flammable paint solvents and thinners. This store was also used for opening paint containers and thinners for mixing and adjustment prior to use on metal fabrications.

The housekeeping inside this store was not well maintained with spillages of paints and thinners constantly on the floor mixed with general rubbish and waste solvent cleaning rags. Operators would normally complain of the high paint and solvent odour inside the store. With the poor housekeeping some of the ventilation openings in the store had also become blocked.

The store was used by many operators but there was no person assigned to properly manage and maintain this store. The site Management had no system or procedures in place to do regular safety inspection programs and preventative maintenance.

## The incident:

At approximately 2.45pm just before the workers afternoon tea break, while one worker was cutting metal parts, just outside the store, an explosion inside the flammable store occurred that cause the heavy metal door of the store to be blown off its hinges and struck the operator welding outside, with this door being found some 15m away inside the factory.

The explosion inside the store caused an overpressure shock wave with several other workers inside the factory being injured. The explosion in the flammable stored caused the brickwork on two sides of the store to bulge

outwards. Shortly after a fire established itself within the store which spread into the factory causing a major factory fire which took fire fighters several hours to control.

The operator working outside the store obtained serious burns, hearing damage, shoulder and back injuries from being struck by the heavy metal door. Other operators received hearing damage and were able to return home after a short stay in hospital.

Prior to the explosion the operator was involved in the processing of cutting and welding metal lengths with equipment such as metal cutting, grinder and welder.

The door entry to the flammable liquid store was normally left with its door chocked open with a chair to allow dispersion of the high levels of flammable vapours inside the store. Prior to the explosion the metal worker had his back to the flammable store, using a heavy-duty grinder with hot metal sparks being produced behind him with metal sparks projecting inside the flammable liquid store.

## **Summary**

The following contributing factors to this incident:

- No formal system in place to deal with work change with associated safety reviews, risk assessments.
- No person or system in place for the management of the flammable liquid store and maintain proper housekeeping and good storage practices.
- Allowing hot work activity to be conducted near the store without any formal risk assessments and failure to identify and understand the risk of allowing ignition sources to be near or find their way into the flammable store.
- Compromising the fire door to the flammable liquid store in its open position with a chair.
- Allowing ventilation vents in the store to remain blocked or obstructed, with the workers addressing this problem by chocking open the door with a chair to the flammable liquid store.
- Allowing opening and mixing of paint and solvents inside the flammable store.
- Lack of supervision or training of operators in knowing the risk when working near or with flammable liquids.

In review of this case incident, it can be clearly seen that even with good design in providing a store suitable for class 3 flammable liquids. In a work environment where there is poor management control, supervision and lack of training, combined with no formal system for maintaining safety critical areas at premises where dangerous goods are stored and handled. These are the circumstances that will lead to cause such incidents.

Peter Vitali

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