

CSI Country Wide Case Study Safety Strategy Discussion

Construction Safety Investigator



Instructions

The objective of this tool is to provide field supervisors with information to proactively engage workers and discuss safety related concerns that they may encounter. Safety discussions should not be limited to the subject above and should pertain to the activities that workers will be involved in that may have the potential for safety related exposures.

Case Day:

March 2010

Accident Type:

Hot Work Accident - Storage tank Explosion

Relevant laws, rules and codes may include:

29CFR 1926.21(b) (2), 1926.64, 1926.152, 1926.352, 1910.119, 1910.252, Accepted Industry Standards and Best Practices.

Case:

Welder killed when the process storage tank he was working on explodes.

Accident Detail:

The accident occurred at a chemical processing facility which produces polymers and other materials. The process involves transferring the polymer in slurry form from a reactor through a flash tank and into storage tanks. The tanks were interconnected via an overflow line. The process system involved three tanks.

Before the incident, the process had been shut down for tank maintenance due to corrosion on tank agitator supports and the fill lines were locked out for safety. Tanks 2 and 3 were repaired and the process restarted, but work on tank 1 was delayed because the necessary parts were not available.

Subsequently, a welder and foreman were tasked with repairing the equipment support on top of tank 1. Although tank 1 remained locked out from the main process, the overflow line remained open which connected tank 1 to tanks 2 and 3. As the welder began his work, it is presumed that either; vapors in the tank were ignited as a result of the increased temperature of the metal tank and sparks from the welding or vapors wafting from the tank traveled up into the hot work area.

The explosion blew most of the top off the tank, leaving it and the equipment mounted on it hanging over the edge. The welder died instantly, and the foreman received burns and minor injuries.

Reconstructive Safety Evaluation:

- What are some of the possible causes of the accident being discussed?
- What actions could have been taken that might have prevented this accident from occurring?

Accident Scene Conclusion:

- The investigation found the company erroneously determined that any vapors that may enter tanks would remain below flammable limits.
- Investigators determined a hot work permit was issued for the task; however, plant personnel who issued the permit were not sufficiently knowledgeable about the chemical process involved.
- The explosion was caused by ignition of flammable vapors inside one of the process tanks
- Sparks or heat from welding most likely ignited the vapor.
- Although plant personnel monitored the atmosphere above the tank prior to authorizing hot work, no monitoring was done inside the tank for any existing flammable vapors.

Preventive Safety Measures Include:

- Ensure that all “hot work” to be performed is authorized and granted through the use of permits which include at a minimum, verification of any and all necessary and / or required monitoring, purging or other preparations and controls.
- Ensure that tanks, piping systems or other process systems are monitored, purged and absent of a flammable atmosphere in areas where hot work is to take place.
- Complete a Job Safety Task Analysis which includes scope of work, anticipated exposures and safety equipment and/or procedures needed to ensure the task is completed successfully and safely.
- Conduct a pre-work meeting to review the JSTA and ensure workers understand the task to be completed, any safe working procedures and have the necessary safety equipment.

Attendance Roster

Reference: This case was reported in a U.S. Chemical Safety Board (CSB) case study.

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