Texas FACE
Fatality Assessment and Control Evaluation

Occupational Fatality Report

An operations manager for a well servicing company in Texas, died when a length of pipe mounted on top of a skid-mounted mud pump broke loose and struck him in the head.

Investigation # 99TX46701
Release Date: 1999

SUMMARY

On October 29, 1998, a 63 year-old male operations manager (the victim) died when a length of pipe mounted on top of a skid-mounted mud pump broke loose and struck him in the head. The work crew was in the process of sealing a well. They had finished pumping in cement and were starting to pump in water to displace the cement down to 10,000 feet. As the operations manager leaned over and looked into one of the two mud mixing tanks, he was struck on the side of the head by a length of pipe (return line) from the pump that had not been secured.

The TX FACE investigator concluded that to reduce the likelihood of similar occurrences, employers should:

**** ensure all piping (discharge and return lines)mounted on top of mud pump tanks is secured.***

**** develop a checklist for mud pump operators and supervisors to ensure that all the steps necessary to conduct a cementing operation have been performed.***

**** install fluid level indicators on the tanks to eliminate the need for someone to view the notches inside the tank.***

INTRODUCTION

On October 28, 1998, a 63 year-old male operations manager (the victim) died when a length of pipe mounted on top of a skid-mounted mud pump broke loose and struck him in the head. The TX FACE program officer was made aware of the incident by the regional OSHA office on December 17, 1998. A visit to another site by the TX FACE program officer, where the mud pump had been relocated, was made on February 17, 1999. The new operations manager and the mud pump operator were interviewed. Pictures were taken of the mud pump. An autopsy report was obtained.

The employer was a well servicing company. The company employed 50 workers, two of whom performed the same duties as the victim. The employer had been in business for 32 years. There were six other workers at the site at the time, however, no one witnessed the event. The mud pump operator was standing next to the victim but had his back to him.

The employer's safety program was managed by the operations manager. A written safety program was in place but there were no written work procedures specific to the victim's task. Safety meetings were conducted on a monthly basis. Tool pushers also conducted daily job site talks. New hire and/or refresher training was not conducted because the company hired workers with previous job-related experience.

The victim had been employed with the company for eight years. He had 26 years experience in well servicing which included cementing wells.

The company conducted pre-employment physicals and drug screening. This was the first fatality experienced by the employer.

INVESTIGATION

A work crew for the employer was in the process of sealing a well. They were performing an operation referred to as "squeezing off perforations" or "squeezing". It involved pumping cement into the hole and then pumping in water to displace the cement further down into the well formation. They were displacing the cement down to a depth of 10,000 feet.

A tri-plex, skid-mounted mud pump was used for this operation. The mud pump was equipped with two mixing tanks. Piping ran across the top of the two tanks which included two discharge lines and two return lines. Pipes were normally secured with u-clamps. In this incident, one return line had not been properly secured.

The work crew first pumped water into the annulus, which is the area surrounding the casing in a well. Cement, with a retarder mixed in to prevent the cement from hardening too soon, was then pumped into the well. The mud pump operator pumped in a total of 15 barrels of cement. After pumping in the cement, the mud pump operator started to pump in water in order to displace the cement down to a depth of 10,000 feet.

The victim was assisting the mud pump operator by looking into the mixing tanks. He was observing the "notches" on the inside of the tank which indicate how much water had been pumped into the well. The mud pump operator was pumping at 1,400 psi. He did not observe any abnormal fluctuations of pressure. The mud pump piping was rated at 5,000 psi. The relief valve was set at 4,000 psi.

After about 20 barrels of water were pumped, the mud pump operator heard a loud noise. The victim, who had been leaning over and looking into one of the mixing tanks, was struck on the upper left side of the head by the return line which had not been secured. Excessive pressure caused the return line to flip up and the ball valve to blow off the end of the return line. The

excessive pressure was instantaneous and caused the relief valve mechanism to fail. The ball valve was never found.

Emergency Medical Services (EMS), Sheriff, and the Justice of the Peace were notified and they responded to the scene. The Justice of the Peace pronounced the victim dead at the scene.

CAUSE OF DEATH

The medical examiner determined that the cause of death was blunt force trauma to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1 - Employers should ensure all piping (discharge and return lines) mounted on top of mud pump tanks is secured.

Discussion: The pipes mounted on top of the mud pump were connected together by "T" and 90 degree "elbow" connections. The place where the pipe is screwed into the elbow connection is the point thrust pressure can cause the elbow to blow. Securing the pipes to the tank on each side of the T's and elbows will help thwart the possibility that thrust pressure will cause the lines to burst. Also, the American Petroleum Institute recommends that "relief valve discharges should be located and anchored so as to prevent a hazardous condition due to sudden discharge or piping movement."[1]

The return line had not been secured. The Institute advises that valves and any sections of cementing lines should be secured to prevent whipping of the lines when pressure is bled off.[2] If clamp type connectors are used, they should be checked before use to make sure the safety pins are properly put in place and secured.

Recommendation #2 - Employers should develop a checklist for mud pump operators and supervisors to ensure that all the steps necessary to conduct a cementing operation have been performed.

Discussion: In this incident, the source of the excessive pressure could not be determined. Workers can protect themselves from this type of hazard by ensuring equipment is properly installed. In this incident the pipe that struck the victim was not secured. In addition, the ball valve that was blown off the end of the pipe (and never found) may have been closed.

A checklist can guide workers through a process that ensures all necessary tasks are completed and equipment is in the correct configuration.

Recommendation #3 - Install fluid level indicators on the tanks to eliminate the need for someone to view the notches inside the tank.

Discussion: To ascertain how much water had been pumped into the well, it was necessary for someone to lean over the tank being filled and view the level indicator notches on the inside of the tank. This puts that person in an extremely dangerous position with high pressure lines and

operating equipment in close proximity. The American Petroleum Institute recommends throughout its “Recommended Practices for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations” publication that, if at all possible, personnel should keep a safe distance from operating oilfield equipment .

---

1. American Petroleum Institute, **Recommended Practices for Occupational Safety and Health for Oil and Gas Well Drilling and Servicing Operations,** RP54-1992, para 8.13.4.

2. Ibid, para16.1.6