SUBJECT: Oil Field Worker Killed When Pressure Relief Valve Broke Off from Pump and Struck Victim in the Back of the Head

CDH Investigation # 89CO020

Introduction:

The Colorado Department of Health (CDH) performs investigations of occupational fatalities under the authority of the Colorado revised Statutes and Board of Health regulations which require the department to establish and operate a program to monitor and investigate those conditions which affect public health and are preventable. The goal of the case investigation is to prevent work injuries in the future, by study of: the working environment, the worker, the task the worker was performing, the tools the worker was using, and the role of management in controlling how these factors interact.

This report is generated and distributed to fulfill the Department's duty to provide relevant education to the community on methods to prevent severe occupational injuries.

A 38 year old oil field worker was killed when a pressure relief valve broke off from the pump and struck the victim in the back of the head.

Contacts/Activities:

Under the terms of a cooperative agreement the Occupational Safety and Health Administration (OSHA), Colorado Area, notified the Colorado Department of Health, and a joint investigation was initiated. The employers representatives and witnesses were interviewed, the accident site was photographed, Reports were obtained from the medical examiner, the county sheriff,the emergency medical responder and the trauma center.

Overview of Employer's Safety Program:

The oil company has been in operation for one month and employs two individuals. The company does not have a designated safety officer nor a comprehensive written safety program. The company did not have a training program of any type.

Synopsis of Events:

On September 15, 1989 an oil and gas field service company was preparing a natural gas well for operation. The operation being performed involved a high pressure test of a new well. Water is pumped, into the well casing, under high pressure to determine the integrity of the concrete casing. While assembling the required equipment an employee noticed that a pressure gage was defective. The operator of the pump stated that the gauge had worked the last time it was used and to install it. The pump being used was capable of providing in excess of 2000 pounds static pressure. A pressure relief valve was installed on the equipment by the rental firm that supplied the pump.

At approximately 1400 hours the operation was started. when the pressure in the well reached 600 pounds the pressure gauge failed and no record of pressures reached was available from that point on. The engine on the pump started to bog down and the operator shifted into first gear and continued to pump for approximately one to two more minutes. At that time the piece of welding rod being used as a shear pin in the pressure relief valve sheared off. When the valve popped open the pressure relief valve assembly separated from the pump and struck the victim in the back of his head just below his hard hat.

The pressure developed by the pump operating in first gear is in excess of 1500 pounds. Examination of the pressure relief valve assembly revealed that the connecting nipple was only screwed in three threads. When the valve released the internal gate slammed open and the shock created by that action stripped the connecting threads.

Cause of Death:

The cause of death was determined by autopsy to be posterior calvarial fracture caused by accidental blow to the head.

Recommendations/Discussions:

Recommendation #1: Defective equipment should be taken out of service and replaced.

Discussion: The use of the defective pressure gauge in this operation eliminated the only means of determination of pressures that the system was being subjected to.

Recommendation #2: A through inspection of all connecting joints should be conducted prior to the pressurization of a high pressure system.

Discussion: The high pressure pump in use at this site was rented from an equipment rental firm that was not represented on the site. The pump was assumed to be ready for operation. A close inspection of the connecting joints would have revealed the pressure relief valve assembly was only hand tightened onto the pump.

Recommendation #3: Manufacturers specifications for shear pins should be strictly adhered to.

Discussion: The use of a welding rod as a shear pin in the pressure relief valve created an unknown variable in the system. The pressure relief valve was designed to use common nails as shear pins with each different size nail assigned a specified value. The pressure required to shear the welding rod was unknown and eliminated an important factor in the safety system.

Recommendation #4: Employers should develop and implement comprehensive written safety programs. As part of this safety program, the employer should conduct regular training for all employees.

Discussion: This employer did not have a written comprehensive safety program. Even small companies should evaluate the tasks performed by workers to identify all potential hazards. The employer should then develop and implement a safety program addressing these hazards, provide worker training in safe work procedures and implement appropriate control measures.

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