



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Fatal Incident Summary Report: Conductor Pipe Falls onto Helper While Drilling a Well

FACE 8415

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) Division of Safety Research (DSR), is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Study. By scientifically collecting data from a sample of similar total incidents, this study Will identify and rank factors which increase the risk of tatal injury tor selected employees.

On June 5, 1984, a 29-year-old oil/gas well drilling helper was fatally injured due to a crushed mediastinum when a suspended conductor pipe slipped from its rigging and struck the employee.

CONTACTS/ACTIVITIES

By letter dated June 5, 1984, the Deputy Chief Medical Examiner for the State of West Virginia requested DSR's technical assistance to determine information on factors involved with the accident. Two Division of Safety Research personnel, a safety specialist and a safety engineer, visited the employer on June 11, 1984, to conduct a site survey, interview witnesses and obtain comparison data from randomly-selected co-workers.

A debriefing session was held with the president of the firm. During this meeting, information was obtained concerning the company's safety and health program. The president has responsibility for the company's safety and health program. The rig foreman, commonly referred to as of tool pusher," is assigned this responsibility for the drill rig site. In the event the tool pusher is not on site, the drill rig operator or driller assumes this responsibility.

SYNOPSIS OF EVENTS

The employer was contracted to drill a well of approximately 4500 feet in depth for the purpose of oil/gas extraction. On the morning of June 4, 1984, the rotary drill rig and appurtenant equipment were moved onto a graded well site for erection and preparation of drilling. Once on site, work activities are on a round-the-clock schedule. There is one tool pusher assigned to the rig. He is responsible for the drilling production, footage drilled, performed by the rig and crews. he has three crews which operate the drill and work scheduled eight-hour shifts. The crews are composed of one driller, one derrickman, and two helpers, commonly referred to as "worms." The tool pusher's normal workday is 12-14 hours during drilling operations, and each crew member averages 60-70 work hours per week. The average time to drill a 5000-foot well is seven days, which includes setup and teardown time.

During setup and teardown, it is normal to have more than one crew on hand. Teardown takes about two hours, while setup takes about three. Therefore, a crew may be required to work extra hours during this period. On June 4, 1984, the crew involved in the fatal accident helped set up the rig during the morning shift. They put in about two and one-half hours that morning and reported back to work at 10:30 p.m. for the night shift.

When they reported back to work, they found that the day shift had drilled the mousehole and had begun the conductor hole. (A mousehole is a shallow base under the derrick in which joints of drill pipe are temporarily suspended for later connection to the drill string. A conductor hole is the large diameter starter hole for the well. It is lined with a conductor pipe or casing to help keep seeping water out and to keep the loose material near the earth's surface from continually sloughing into the hole.) The tool pusher had left the driller instructions to continue the conductor hole to 40-feet in depth and then place the conductor pipe in the hole.

At approximately 5:00 a.m. on June 5, the driller estimated the conductor hole to be at its required depth. He pulled the drill bit from the hole and had a helper hook a winch line and chain sling to the 11 and 3/4-inch by 40-foot conductor pipe (refer to Figure 1). He lowered the pipe into the hole and realized the hole lacked two feet of being at proper depth. He then pulled the pipe from the hole. The derrickman and two helpers were maneuvering the conductor pipe over to the V-door in order to place it back on the supply tub (refer to Figure 2). This process required (a) the workers to push the pipe end beyond the upper edge of the V-door and (b) the driller to lower the winch line at the moment the pipe end cleared the V-door edge. It was during this process that the conductor pipe slipped from the chain sling and fell. (The driller stated that in his 7 years of working on a rig, this was the first time he had experienced a pipe slip from its chain choker. The grab hook was still attached to the chain forming a loop after the pipe slipped out.) The four workers, including the driller, scrambled to avoid being struck by the falling pipe. Figure 3 shows the approximate locations of individual crew members at the time the pipe began to fall and their paths of movement during the fall. The upper end of the pipe struck the derrick mast and fell onto the work deck, narrowly missing the driller and striking the deceased in the upper right torso area. The momentum of the pipe caused it to totally leave the work deck and come to rest on the supply tub. This incident occurred between 5:30-5:45 a.m.

Immediately following the incident, the remaining crew checked the victim to determine how severely he had been injured. The victim appeared to be breathing, but with great difficulty. The other helper, confused and excited, ran to a vehicle and proceeded to find a phone to call for emergency medical help. The helper could not find a phone; however, the driller ran to a house trailer near the drill site. He awoke the residents and made contact with an Emergency Medical Team (EMT) approximately 16 miles away. The helper returned to the site and was directed to go to the main highway to meet the EMT and escort them to the drill site. Approximately 45 minutes elapsed between the time of the incident and arrival of the EMT. The victim died before the EMT arrived.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The major contributing factor for this fatal incident was that the chain sling, which utilized a chain grab hook for making the connection, was not wrapped tightly enough around the pipe. This situation, combined with the pipe being damp from the heavy dew, created enough loss of frictional forces to allow the pipe to slip from the sling. This method of handling pipe was stated as being common industry practice and was verbally verified by a representative of the Independent Association of Drilling Contractors. This practice might be improved via use of a thread protector lifting attachment or a thread protector with a flanged lip and wire rope choker. A combination thread protector lifting attachment would allow use of a winch line cable lifting hook or chain sling with lifting hook. It would also allow for protection of the pipe threads. The flanged thread protector would keep the pipe from sliding through the chain sling. However, if the chain grab hook is not fastened properly (e.g., back of hook next to pipe) it could become unfastened and still allow the pipe to fall. For this reason, a wire rope choker sling would seem more appropriate for use with the flanged thread protector.

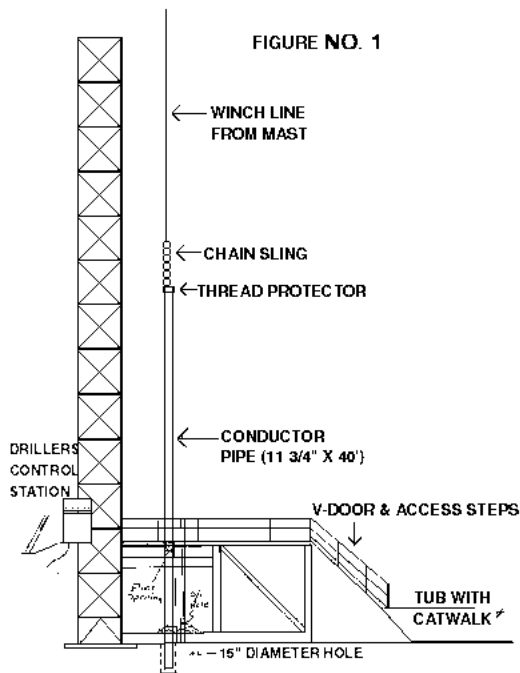
Another factor is that the driller miscalculated the depth of the conductor pipe hole. Proper depth of hole would have eliminated the need for pulling the pipe to deepen the hole. This error created extra exposure of the workers to suspended loads.

Other contributing factors were the non-use of tag lines for guiding suspended loads and the size of the work deck (approximately 16 feet x 16 feet). 'Use of tag lines would help keep employees from having to work directly under suspended loads. This would allow them more safe clearance should a load be dropped onto the work deck. However, the congested work area of the deck limits effective use of tag lines. The helpers would have to be off the deck to effectively use tag lines and remain a safe distance from suspended loads.

Another factor is that employees had not been subjected to critical situation response training. The workers should be pre-conditioned on appropriate actions to take in critical situations should a piece of pipe fall from its sling or should the derrick mast start to fall/collapse.

The company has no formal written safety and health program to address the hazards of the work. It would be appropriate to have a program which includes:

- (a) a written policy conveying top management's intent, the scope of activities covered by the program, the delegation of authority within the safety program, and the applicable safety rules and procedures,
- (b) assignment of responsibility for implementing the safety and health program within the organization,
- (c) identification and control of hazards associated with oil/gas well drilling activities,
- (d) safety training of employees in hazard identification and appropriate safe work practices. Rig crews should be trained in first-aid, cardiopulmonary resuscitation, and emergency procedures.
- (e) accident investigation procedures to determine causes of accidents for recurrence prevention purposes and not just for worker compensation benefits, and
- (f) emergency plans outlining procedures to be taken in emergency situations such as employee injury or fire. The plan should include procedures for reporting emergencies to authorities; emergency telephone numbers of the nearest rescue squad, hospital, doctor, fire department and police; and provisions for first-aid and medical treatment. This is essential because of the remoteness of the drill sites and the response time for emergency help.



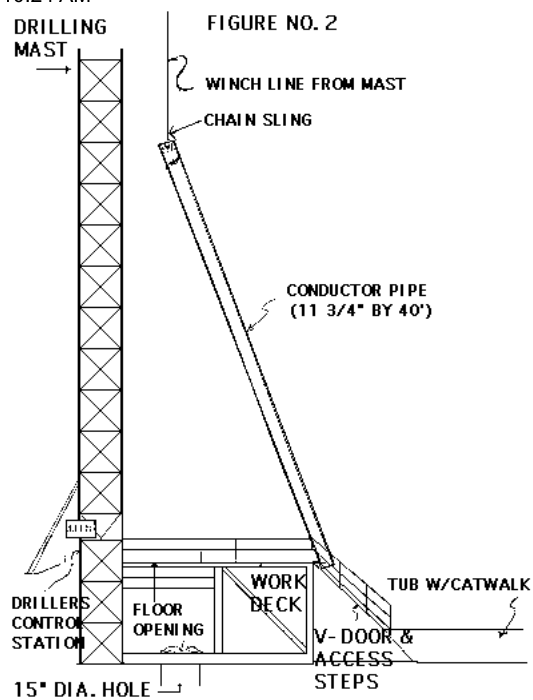
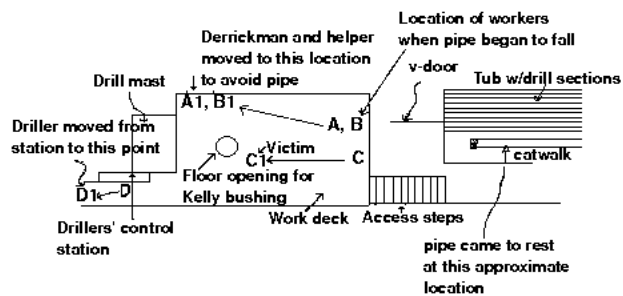


Figure 3.



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