

SUBJECT: A driller died after falling through an opening in the oil rig floor.

SUMMARY

A 59-year-old oil rig driller died on May 28, 2004 from head trauma he received after falling through an opening in the drilling floor. The decedent and his co-workers had just finished raising the derrick into the upright position. During the oil rig assembly process (rigging up), the crew worked on the drilling floor with unguarded openings due to an error in process sequencing where four floor panels were not available at the appropriate time for installation. As a result of the delay in the delivery of panels, the crew erected the derrick without them and intended to later use the rig's air hoist line to lift and place the panels. In order to install the air hoist, the bridle line had to first be disconnected. The victim and four other workers were coiling the legs of the line when the socket assembly at the end of one of the legs fell through an opening in the derrick floor causing the coils to start moving. The line caught the feet of the victim and dragged him over the opening. He struck his head on the edge of the opening and fell 27 feet to the ground. He was transported to the hospital and pronounced dead three hours later. Another worker was caught by the moving line, flung into the air, and dragged to the edge of the opening, but did not fall and only suffered minor injuries.

Oklahoma Fatality Assessment and Control Evaluation (OKFACE) investigators concluded that to help prevent similar occurrences, employers should:

- Ensure that all employees working at elevated heights are provided with and utilize proper fall protection equipment and are not exposed to unguarded openings or other hazards without adequate protection.
- Develop, implement, and enforce a comprehensive safety and health program that includes safe operating procedures for all drilling operations.
- Ensure that all employees are trained properly and possess the skills necessary to recognize and control hazards for all operations in which they participate.



Figure 1. Oil rig

INTRODUCTION

On May 28, 2004, a 59-year-old oil rig driller died from head trauma after falling through an unguarded opening in the drilling floor. OKFACE investigators were notified of the incident and conducted interviews with company officials in their offices and at the rig site on August 4, 2004. OKFACE investigators also reviewed the death certificate, medical examiner's report, sheriff's office report, and the Occupational Safety and Health Administration (OSHA) report.

Employer: The victim was employed by a contract oil production drilling company. The company had been in business for 3½ years, and at the time of the incident, employed approximately 60 full-time workers. The company was contracted to rig up and drill an 18,000-foot gas well. The total rig crew for the project consisted of 22 employees. The company did not have a comprehensive written safety program, a management safety and health committee, or written task-specific work procedures.

Victim: The victim had 29 years of experience in the oil and gas drilling industry. Although he currently had worked for this company for less than three months, he had been employed with them previously for other drilling jobs. The decedent was operating equipment with which he had experience and was performing tasks that were a part of his normal job duties. He was hired as an experienced driller and received no specific training aside from participating in a practice rig up.

Training: At the time of hiring, employees were given a handbook with minimal safety information included. The company utilized more experienced workers to provide informal, on-the-job training to instruct new employees on machine-specific and task-specific procedures. Tailgate-style safety meetings were conducted at the job site on a weekly basis. Fall protection was addressed verbally.

Incident Scene: The incident occurred on a well site during the assembly process (rigging up). The employer had recently obtained the rig being used (Figure 1). The electric drilling rig had been renovated, modified, and upgraded by the company using new and reworked components and had been inspected by a third party inspection contractor. A practice rig up had been conducted in the company yard before a trucking contractor delivered the rig to the site. The ground surface of the well site was firm and level. The derrick floor was approximately 27 feet above the ground. Since the incident occurred while the rig was being assembled, not all walking and working surfaces had been equipped with the required guardrails and handrails. However, all appropriate warning signs



Figure 2. Oil rig cable and hoisting mechanism

were in place and easily identifiable. The incident occurred around 12:30 p.m.

Weather Conditions: On the day of the incident, the weather conditions were dry, warm, and clear. The sun was brightly shining and the temperature was around 82 degrees Fahrenheit. The ground surface and all rig surfaces were dry.

INVESTIGATION

On the day of the incident, the decedent and his co-workers were beginning the third day of rigging up. A trucking contractor brought the rig's components to the site; however, there was a miscue in the sequence of events. Four floor plates were to be installed on the rig floor while it was on the ground and the trucking company's cranes were available on site. However, the floor plates were delivered late, after elevation of the rig floor. Also, the mobile crane that was used to lift various parts in the assembly process left the site before the floor plates arrived. Unless the floor plates were put properly in place, the rig could not be operated safely. Without a means of installing the plates on the elevated rig floor, the derrick had to be erected so that the air hoist could be used (Figure 2). The hoisting mechanism on the derrick itself was routinely used to lift and lower equipment and materials throughout the drilling process. The derrick was ready to be erected at 11:30 a.m. and the process was completed without any problems around 12:00 p.m. Three employees using body harnesses and lanyards pinned the derrick to the legs; however, no fall protection was used by any other employees on the drilling floor during any of the rig up processes because additional equipment was not available. The three employees with harnesses did not have them anchored to a safety line once back on the drilling floor. Three supervisors were on site, had been on the drilling floor, and were aware of the situation (missing floor panels and lack of fall protection).

In order to install the air hoist, the bridle line had to be disconnected first. The bridle line, a 1.75-inch heavy wire rope used to raise and lower the assembled derrick, was in two sections with each end connecting to a derrick leg. The sections were connected with a socket assembly—an open and closed socket and a connecting pin. The decedent and another employee were on one side of the drilling floor coiling the bridle line as it descended, and three other employees (including the injured worker) were on the other side coiling the other section. One of two toolpushers, the most experienced operator on site, ran the drawworks, the machine used to reel in and out drilling line and lower the bridle line. Some employees were standing in the coils as they wrapped the legs of the line on the floor. Approximately, three 6-foot diameter coils had been made on each side. In the



Figure 3. Unguarded floor opening where victim fell



<http://iadc.org/index.html>) and OSHA's *Oil and Gas Well Drilling and Servicing eTool* (http://www.osha.gov/SLTC/etools/oilandgas/general_safety/general_safety.html) for information on safety and training. Written practices and procedures should be reviewed at least annually. In this incident, standard operating procedures for rigging up and training on those procedures were needed to help coordinate the delivery of rig components. Because the floor plates were delivered late and the crane had already left the site, employees were motivated to complete the job with the resources available, deviating from the normal sequence of events. Had a standard written operating procedure been in place and complied with by the crew, this incident may have been prevented.

Recommendation #3: Employers should ensure that all employees are trained properly and possess the skills necessary to recognize and control hazards for all operations in which they participate.

Discussion: Employees should be trained thoroughly and formally on the standard operating procedures that are relevant to their duties and assignments. Training should emphasize the importance of establishing and maintaining good communication between all crew members and the importance of performing all work procedures in the proper prescribed sequence so as to mitigate potential hazards. Documentation of the training should be kept on file and employees should be periodically retrained. Retraining should always occur when there are changes in the equipment, processes, or hazards present.

Proper instruction and supervision of employees will give workers the knowledge of safe operating procedures to prevent misuse of equipment and unsafe work practices. The employer and designated site supervisors should monitor the site for hazardous situations and non-compliance. Any deviations from written job procedures or safety standards, or any unsafe situations that arise from site-specific work, should be addressed by management and corrected immediately. All employees should take steps to address unsafe work procedures and to eliminate them by accepted means of control or modification, including, but not limited to, engineering controls, work practice controls, and the use of personal protective equipment. Employees should be aware of how they are positioned at all times to avoid standing, sitting, or working in hazardous zones. Controlling positioning hazards, such as employees standing in the coils and working around unguarded floor openings, may have prevented this event.

REFERENCES

- Occupational Safety and Health Administration, 29 CFR 1926.500-5003, *Fall Protection, Duty to have Fall Protection, Criteria & Practices, and Training Requirements*.
- Occupational Safety and Health Administration, 29 CFR 1926.552, *Subpart N, Material Hoist, Personnel Hoists, and Elevators*.
- Occupational Safety and Health Administration publication, *Oil and Gas Drilling and Servicing: The Potential Hazards of the Industry*.
- Occupational Safety and Health Administration, 29 CFR 1910.23, *Guarding floor and wall openings and holes*.
- American Petroleum Institute, *Occupational Safety for Oil and Gas Well Drilling and Servicing Operations* (API RP54).



The Oklahoma Fatality Assessment and Control Evaluation (OKFACE) is an occupational fatality surveillance project to determine the epidemiology of all fatal work-related injuries and identify and recommend prevention strategies. FACE is a research program of the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research.

These fatality investigations serve to prevent fatal work-related injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in injury, and the role of management in controlling how these factors interact.

For more information on fatal work-related injuries, please contact:

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