

## **FACE Investigation Report**

October 5, 1998

**SUBJECT:** Derrick man dies of a crush injury following a 65-foot fall with a collapsing oil drilling rig in Oklahoma.

**SUMMARY:** In February 1998, a 32-year-old derrick man died after he fell 65 feet when the oil-drilling rig he was working on collapsed and fell to the ground. The 6-man drilling crew had taken the last pieces of drill pipe and drill collars out of the hole when the drilling rig collapsed. The derrick man was standing on the derrick board 65 feet above ground and was wearing a safety belt. Evidence suggests that the shifting of drill collars, improper anchoring of guy lines and a failed weld on the drilling rig leg may have contributed to the collapse of the rig. When the rig collapsed, the derrick man fell an estimated 65 feet to the ground and the rig fell on him. The derrick man died immediately and three co-workers were treated for injuries.

FACE investigators concluded that, to prevent similar occurrences, employers should:

- ensure that all structural welding on a rig meets the American Petroleum Institute Guidelines API 54-92, Section 8. 2.1, and that all welding is regularly inspected and properly maintained.
- ensure that the crew erects a wind gust line.
- ensure that an emergency escape device is installed on the drilling rig.
- develop, implement, and enforce a written comprehensive safety program.

**INTRODUCTION:** In February 1998, a 32-year-old derrick man died after he fell 65 feet when the oil drilling rig on which he was working collapsed and fell to the ground. Fourteen days after the fatal incident, officials of the United States Department of Labor, Occupational Safety and Health Administration (OSHA) notified the Injury Prevention Service at the Oklahoma State Department of Health of the incident. On March 18, 1998, the OKFACE field investigator and the Fatality Assessment and Control Evaluation (FACE) project officer from the Division of Safety Research (DSR) at the National Institute for Occupational Safety and Health (NIOSH) interviewed the company's owner and traveled to the drill site to conduct an investigation. Photographs of the rig and site were taken. The company's owner provided photographs taken the day of the incident. Newspaper clippings, a death certificate, and reports from the County Sheriff's Department and OSHA were reviewed. The employer in this incident was an oil well drilling company who had been in business for more than 30 years. A new insurance group and policy was begun with the new well. At the time of the incident, no comprehensive safety program was in place. Six employees were on site at the time of the

incident and a second crew arrived shortly after the incident. The company was drilling an oil well for a customer. The site was located 2 miles west and  $\frac{3}{4}$  mile north of a small town. Work started at the site on January 18, 1998. This was the company's first fatality. The derrick man had worked in the oil fields for more than 10 years and had worked briefly on the previous well drilled by his employer. He had worked on the site for 2 days prior to the incident.

**INVESTIGATION:** On January 18, 1998, a new oil well was started 2 miles west of town and one mile north on a pasture road. The drilling rig was erected on the crest of a small rolling hill. The drilling rig was bought as salvage in 1979 without a data plate; therefore, the history of the rig is unknown and no information was available on how to properly erect the rig. Upon inspection, some of the rig's welds were cracked. On the day of the incident, four workers were located on the rig floor (one on each guy wire). A driller was in the doghouse (control room), and a derrick man located 65 feet up on the derrick board (guiding the pipe out of the hole). It is unclear if a tool pusher (supervisor of crew) was on the site at the time of the incident. The skies were clear, and the wind was brisk and blowing from the southeast. Ground conditions were dry. Four guy wires were attached to the rig. At least one of the guy wires was improperly anchored to a flatbed truck.

The well reached the total depth of more than 2,000 feet, and the workers were removing the pipe from the hole and stacking them to the side of the rig just prior to the incident. When the pipe was out of the hole, the drill collars in the pipe rack began to shift. The shifting weight of the drill collars began a domino effect. The shifting weight of the drill collars caused a strain on the welds which started to give causing the rig to pull against the guy lines which were improperly installed. The driller heard something "pop" above him. He looked up and saw the rig falling. The rig fell into the wind, in a west, southwest direction.

The rig hit the rear end of a pickup truck tailgate and then hit the ground. The derrick man was on the derrick board located 65 feet above ground and was wearing a safety belt that was secured to the derrick board. He fell with the rig to the ground. The pipes stacked to the west of the rig also fell with the rig. The pipes extended from the drilling rig floor to the back of the pickup truck that was damaged by the falling pipes. The derrick board, a white colored pipe structure on which the derrick man was standing was found among the pipes which had fallen on the tailgate of the pickup truck on the driver's side. The derrick board structure was tangled and twisted. There was no emergency escape line (geronimo line) on the rig.

The derrick man died immediately from multiple crush injuries. The time was approximately 1:55 p.m. A local drilling company located approximately three miles from the incident site provided machinery to remove the drill collars and debris that had fallen on the derrick man.

The emergency medical services arrived within 15 – 30 minutes of the incident. The local fire department and police department, a neighboring town's fire department and emergency medical service, the county sheriff's department, highway patrol, and an air ambulance from a metropolitan area responded to the scene.

Three co-workers were injured. One co-worker was transported by ambulance to a local hospital approximately 14 miles from the incident site. and was treated and released. One co-worker was transported via air ambulance to a metropolitan hospital and was hospitalized. One co-worker was transported by private vehicle to the local hospital and was treated and released.

**CAUSE OF DEATH:** The medical examiner at the area hospital listed the immediate cause of death as multiple crushing injuries, head, chest, abdomen, and limbs due to fall with oil rig. The approximate time interval between onset and death was immediate.

## **RECOMMENDATIONS/DISCUSSION:**

**Recommendation #1:** Employers should ensure that all structural welding on a rig should be in accordance with the rig operators and parts manual and/or American Petroleum Institute Guidelines API 54-92, Section 8.2.1. Employers should ensure that all welding is regularly inspected and properly maintained by a qualified inspector.

Discussion: The drilling rig was manufactured in the mid-1960's and bought as salvage in 1979 without a data plate. The driller heard a "pop" and looked up to see the rig falling to the ground. Evidence suggests that the welding on the leg gave way, contributing to the rig collapse. The employer should ensure that the place of employment is free from recognized hazards that were causing or likely to cause death or serious physical harm to employees. The employer and/or manufacturer should ensure that the welding on rigs should meet API guidelines.

Since the welding on the leg of the rig may have contributed to the collapse of the rig and other welds on the rig were found to be cracked, it is recommended that employers ensure that all welding is regularly inspected and properly maintained. Although the employer had recently replaced rig components and performed maintenance, the original cut and welding had not been maintained. The employee inspecting the welds was not qualified to do so. The employer should ensure that all welding on the equipment is inspected and maintained by a qualified inspector.

**Recommendation #2:** Employers should ensure that the crew erects a wind gust line and correctly install guy lines.

Discussion: The wind conditions the day of the incident were listed as brisk; however, actual wind speed and gusts are unknown. When the collapse occurred, the booms on the guy lines anchored away from the fall broke, allowing the rig to fully collapse. On the day of the incident, at least one of the guy lines was anchored to a flatbed truck. Proper anchoring of guy lines is by the use of deadman anchors and earth-base screw jack or pipe. Use of wind gust lines and proper installation of guy lines should prevent collapse of a rig. The employer should ensure the proper installation and use of guy/wind gust lines.

**Recommendation #3: Employers should ensure that an emergency escape device should be on the derrick board.**

Discussion: In accordance with 29CFR 1910.36(b)(2), structures are required to be equipped with a means of escape in case of an emergency such as fire or other emergency. The drilling rig was not equipped with an emergency escape device. The presence of an emergency escape device such as a geronimo line may have hastened the egress of the derrick man; thus, possibly preventing the death and/or serious injury.

**Recommendation #4: Employers should develop, implement, and enforce a written comprehensive safety program.**

Discussion: At the time of the fatal incident, the employer did not have a written safety program. The development, implementation, and enforcement of a comprehensive safety program should reduce and/or eliminate workers exposures to hazardous situations. The safety program should include, but not be limited to, the recognition, control, and avoidance of hazards (e.g. proper anchoring of guy lines, emergency escape devices, and weld inspection).

**REFERENCE:** 29 CFR, 1910.36(b)(2) Code of Federal Regulations, U.S. Government Printing Office, Office of Federal Register, Safety Requirements of Special Equipment, July 1997.  
American Petroleum Institute Guidelines API 54-92, Section 8.2.1.