The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

20-Year-Old Construction Worker Electrocuted when Backhoe Contacts 7200 Volt Power Line at Construction Site in Kentucky

FACE 85-32

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) Project, which is focusing primarily upon selected electrical-related and confined space-related fatalities. By scientifically collecting data from a sample of fatal accidents, it will be possible to identify and rank factors that influence the risk of fatal injuries for selected employees.

On July 8, 1985, the owner of a construction company was driving a crawler backhoe through a partially developed residential subdivision. The raised boom of the backhoe struck the bottom three lines (cable TV, phone, and neutral) of a four-wire utility line (approximately 26 feet above the road), breaking a 40 foot utility pole located approximately 70 feet from the point of contact (east of the road). The top line (a 7200 volt single-phase primary distribution line) fell to the ground after striking the rear of the backhoe. A 20-year-old construction worker was approaching the backhoe from the rear and was electrocuted when the 7200 volt line fell a few feet away from him.

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the Commonwealth of Kentucky notified DSR of this fatality and requested technical assistance. This case has been included in the FACE Project. On July 17, 1985, the DSR research team (the project director, a research occupational health nurse, a safety specialist, and an epidemiologist) conducted a site visit, met employer representatives, interviewed comparison workers, discussed the incident with the Kentucky OSHA Compliance Officer, and photographed the accident site.

The construction company, which has seven employees, specializes in excavation, carpentry, residential construction, and landscaping. All safety training is on-the-job with no written safety procedures. Employees work approximately 40-45 hours per week.

Synopsis of Events:

The construction company had been building houses in a residential subdivision for over a year. A four-wire utility line had been installed perpendicular to the road approximately one month before the accident. The top line was a 7200 volt single-phase primary distribution line. The owner of the construction company stated that although he had moved the backhoe through the subdivision many times before the installation of the utility lines, he had only travelled the road once, since the lines were installed.

On July 8, 1985, at approximately 7:45 a.m. the owner entered the cab of the backhoe and raised the boom. This was done at the beginning of each workday to eliminate air pockets in the boom's hydraulic system. He then began to drive the backhoe along the road with an empty concrete bucket suspended from the raised boom. Since the owner was concerned with damaging the curb, his attention was focused on the location of the backhoe tracks, not the boom. Additionally, his view of the top hinge of the raised boom may have been obscured by the roof of the cab. As the vehicle moved forward, the boom contacted the three bottom utility lines (cable TV, telephone, and neutral) creating enough tension on the lines to break a forty-foot utility pole at the base and causing the pole to fall towards the backhoe. Two construction workers saw the backhoe hit the lines. The victim was approaching the rear of the backhoe when it hit the utility lines. The three lower lines were held up by the boom of the backhoe. However, enough slack was created, in the top line when the utility pole broke, that the top energized line fell, hit the rear of the backhoe, and came to rest in the street perpendicular to traffic flow. The backhoe operator felt a tingle in his hands, arms, and legs. He immediately released the controls, allowing the backhoe to stop, then jumped clear of the vehicle. A witness stated that the victim was "only a few feet" from the energized line when it fell. The victim apparently staggered from this location and was found lying face down approximately 19' from the downed power line.

The victim was pronounced dead at the scene of the incident. Police measurements indicate the height of the backhoe boom top hinge to be 26' above the ground.

Recommendations/Discussion:

Recommendation #1: Employees should be trained to recognize the hazards associated with the operation of equipment around power lines.

Discussion: The operator of the backhoe was concerned about damaging the curb along the road and disregarded the hazard presented by the overhead power lines. Employers should train employees to recognize all hazards associated with the tasks that they are to perform. This would require surveying the area for overhead obstructions prior to moving the backhoe.

Recommendation #2: The design of heavy duty equipment should incorporate design criteria that eliminates/minimizes safety hazards associated with the use of this equipment.

Discussion: The operator may not have been able to see the entire boom of the backhoe, because his vision was obstructed by the roof of the cab. Design criteria for this equipment should quantitatively address visibility and other design aspects related to safety.

Recommendation #3: A signalman/guide should be used to assist in the performance of tasks that may overextend the capabilities of an operator.

Discussion: The operator's attention was diverted to the tracks of the backhoe. A signalman/guide would have assisted the operator and provided him with another pair of eyes and ears.

Recommendation #4: Construction sites should be constantly assessed for hazardous conditions.

Discussion: Construction sites often change very rapidly. These work sites should be continually evaluated to assure that employees are made aware of hazardous conditions as they develop and that these conditions are abated as soon as possible.

Return to In-house FACE reports

Last Reviewed: November 18, 2015