The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Construction Worker Electrocuted in Maryland

FACE 87-44

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. The purpose of the FACE program is to identify and rank factors that influence the risk of fatal injuries for selected employees.

On April 29, 1987, one construction worker was electrocuted and a second worker received severe electrical burns, while guiding a load attached to a crane, when the boom of the crane contacted a 13 kV power line.

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the State of Maryland notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE Project. On June 11, 1987, a DSR research industrial hygienist conducted a site visit, collected incident data, photographed the site, and interviewed the owner and comparison workers.

Overview of Employer's Safety Program:

The employer is a construction company that employs 44 workers. The company installs water, sewer, and other underground utility lines.

The company does not have a written safety program and depends on its small size to communicate safety issues and concerns. Prior to the start of each construction project the owner conducts a pre-construction meeting with workers at the job site and occasionally discusses safety issues specific to the job.

Synopsis of Events:

The employer had been subcontracted to install a sewer line under a 47 foot wide highway. A work crew (consisting of a foreman (the victim), a crane operator, and a laborer) was assigned to bore a hole under the paved highway and insert 57 feet of 36 inch diameter steel casing. The sewer pipe was then to be installed inside the casing.

On April 29, 1987, at about 7:00 a.m., the work crew met at the site and began construction. In preparation for boring under the highway a pit (approximately 10' deep x 30' long x 12' wide) had been excavated to within five feet of the edge of the highway, and a steel track (approximately 1' high x 4' wide x 20' long) had been laid on the floor of the pit in order to support and direct the boring machine. The crane provided by the employer was capable of reaching vertically approximately 15 feet. However, for convenience in lifting and moving materials at the site, the victim called the employer and insisted that a boom extension be brought out to the site (giving the crane boom a potential vertical reach of approximately 35 feet). The employer delivered the boom extension to the site and cautioned the crew to ". . be careful, you're working under wire." A 13,000 volt, three-phase overhead power line (28.5 feet from ground level and parallel to the edge of the highway) was located directly above the end of the pit closest to the highway. The boring machine was attached by a steel cable to the end of the crane boom and was lowered into the pit at about 12:30 p.m. The victim and the laborer were in the pit attempting to guide the boring machine onto the track. The victim and laborer would periodically give directions to the crane operator to facilitate placement of the boring machine. Because the sun was almost directly overhead, it was difficult for the workers in the pit to see when they looked up. As the crane operator hoisted the boom upward, the upper end of the boom made contact with one of the power line conductors. The victim and the laborer had both hands on the boring machine when the crane contacted the power line. The victim provided a path to ground for the electrical current and was electrocuted. The laborer, who was wearing rubber work boots received severe electrical burns on his hands. It is estimated that both the victim and laborer were in contact with the electrical current for approximately five seconds.

The emergency medical service (EMS) rescue squad was notified and arrived at the scene about 15 minutes after the accident occurred. When the rescue squad arrived, a county sewer inspector (who had been working nearby) had been administering cardiopulmonary resuscitation (CPR) to the victim for approximately five minutes. Resuscitation was attempted at that time by rescue squad paramedics, but was unsuccessful. The victim was transported by ambulance to a local hospital where he was pronounced dead on arrival.

Cause of Death:

The medical examiner's report stated the cause of death as electrocution. Electrical burns were noted on the left hand, left arm, and left upper thigh.

Recommendations/Discussion:

Recommendation #1: Employers should enforce existing regulations concerning equipment operating in the vicinity of overhead power lines.

Discussion: OSHA regulation 1926.600 (a)(6) Subpart 0 – Motor vehicles, mechanized equipment, and marine operations requires that all equipment when working or being moved in the vicinity of power lines rated 50 kV or below must maintain a minimum clearance of ten feet. The crane operator did not comply with these requirements.

Recommendation #2: Employees should be trained in hazard recognition.

Discussion: Employees working in the vicinity of electrical power lines should be trained to recognize electrical hazards. The employer or supervisory personnel should conduct formal safety meetings with workers regularly. During these meetings employees should be made aware of all hazards, including electrical hazards, associated with the tasks to be performed at each construction site.

Recommendation #3: Non-conductive tag lines should be used to aid in guiding and stabilizing crane loads.

Discussion: The use of non-conductive tag lines could help prevent exposure of the worker to electrical current in the event of an electrical mishap. Note: Although all ropes will conduct electricity, dry polypropylene rope provides better insulating properties than most commercially available rope.

Recommendation #4: Additional personnel should be used to observe clearances when equipment is being operated in the vicinity of electrical power lines.

Discussion: A person should be designated to observe clearance of the equipment and to give timely warning for "all" operations where it is difficult for the operator and workers who are positioning the load to maintain desired clearances by visual means.

Recommendation #5: Primary contractors that subcontract construction projects should require that a safety program be implemented. The primary contractor should assure that all safety requirements are enforced.

Discussion: When hazardous tasks (such as operating cranes in the vicinity of electrical power lines) are to be performed by contractors or subcontractors, the contract should require compliance with safe work procedures. These requirements should be enforced by the company letting the contract.

Recommendation #6: Employees who work around electrical circuits and equipment should be trained in the use of cardiopulmonary resuscitation (CPR).

Discussion: To optimize results, CPR should begin within four minutes (in accordance with American Heart Association guidelines). To meet this criterion employees should be trained to support circulation and ventilation until trained medical personnel arrive. None of the employer's workers at the accident site were trained in CPR and, therefore, critical care was not provided in a timely manner.

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