The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Electrocution of Carpenter, Setting Forms, When Crane Contacted 34,000 volt Power Line in Pennsylvania

FACE 85-15

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 injury for selected employees.

On April 11, 1985, a joint venture construction company was setting forms for a retaining wall on an outbound highway from Philadelphia. At this construction location approximately 15 carpenters and laborers, 2 supervisors, and an operating engineer had started work at 7:00 a.m. At 2:10 p.m. a carpenter was guiding a 4' X 8' metal form with a 3/4" plywood face into place with the assistance of an 18-ton, telescoping boom crane. The crane touched a 34,000 volt power line; the carpenter was electrocuted and another laborer, who was over 50 feet away, was severely burned.

Contacts/Activities

On April 12, 1985, the NIOSH Region III consultant contacted DSR about the case. DSR contacted the OSHA Area Director on April 12, 1985 and set up a meeting for April 16th with the investigating compliance officer. On April 17th the OSHA compliance officer, a NIOSH statistician, and a technical information specialist conducted a site visit to interview workers and take photographs of the accident site.

Synopsis of Events

The construction work crew had been working 10 hour days, from 7:00 a.m. to 5:30 p.m. with a 15 minute break in midmorning, 30 minutes for lunch, and no break in the afternoon. The carpenters and laborers would typically make forms, set forms in place, and knock down forms after the concrete was cured. On this site the crane was picking forms from a 15 foot hill behind the future location of the retaining wall, placing them on the ground alongside the highway, and moving them into place so that the carpenters and laborers could set and bolt the forms, prior to pouring the retaining wall. Immediately above the site on the hill was a 34,000 volt power line, which crossed the highway at a height of about 50 to 55 feet. The 18 ton (rough terrain) crane had a boom that could extend from 28 feet to 70 feet. The operator had 34 years of experience operating a crane. There was a supervisor on the site, but a signal man had not been assigned to spot the

location of the boom in relation to the power lines for the operator. No insulators or barriers were placed between the power line and crane. The weather that day was overcast, with 54 degrees F temperature and 55% humidity. The ground was dirt or gravel and there was no standing water.

At approximately 2:10 p.m. on April 11, 1985, the crane contacted the 34,000 volt power line. Electricity traveled through the crane cable, to the form, and to ground through the carpenter. The carpenter had both hands on the form and both feet on the ground. Another path to ground was through the crane outrigger, to an overhead sign, to a temporary electrical box on the sign post, to an electrical drill and to ground through the arm and leg of another worker over 50 feet from the crane. The carpenter was killed, and the other worker received burns to the left hand and lower left leg. Over 15 eyewitnesses stated that the electricity arced over 10 feet from the power line to the crane boom. However, examination of the crane cable indicated that the cable contacted the power line directly. The supervisor was 15 feet from the site of the electrocution.

The victim was immediately given CPR by a nurse, who had seen the accident from the highway and stopped to give aid. The victim was rushed by EMS to a local hospital where he was pronounced dead by a staff physician. The other worker was rushed by EMS to a different hospital, where he was treated and released on April 14, 1985.

Recommendations/Discussion

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

Discussion: OSHA standard 1926.550(a)(15) requires that the minimum clearance between electrical lines rated 50 kV or below and any part of the crane or load shall be ten feet, unless the electrical lines have been “de-energized and visibly grounded” or physical contact between the lines, equipment, or machines is “prevented” by the erection of insulating barriers. Additionally, 29 CFR 1926.550(a)(15)(IV) requires that a person be designated to observe clearance of the equipment and to give timely warning for “all” operations where it is difficult for the operator to maintain desired clearances by visual means. The crew in this case did not satisfy these requirements.

Recommendation #2: Employers should develop and enforce specific safety policies and procedures concerning specialized tasks, such as operation of a crane or other heavy equipment.

Discussion: The employer did not have specific safety policies concerning crane operation. The employer should identify hazardous conditions present when performing a task and should develop specific policies that reduce the hazard potential. These policies should be enforced to assure compliance.

Recommendation #3: Employers should hold management and first-line supervisory personnel accountable for job site safety.

Discussion: The supervisor permitted an unsafe operation to continue and did not take proper precautions. Safety responsibilities that include accountability for all levels of supervision should be developed and supervisory personnel should be held accountable for all safety responsibilities. Performance evaluations and other incentives should address safety.

Recommendation #4: Employers should assure that work related tasks are planned to minimize the hazards to which the employees are exposed.

Discussion: The materials to be used for construction of the retaining wall were stored directly under the power line. The employer should have considered all aspects of job planning, including safety, when originally laying out the job site.

Recommendation #5: Employer attitudes should demonstrate a concern for employee safety.

Discussion: The employer continued to unload and store forms under the high voltage lines after the fatality occurred. Supervisory personnel, if unaware of the hazard before the accident, should have recognized the hazard associated with this practice after the accident. Employers should understand that the attitudes towards safety that they convey to their employees are potentially the attitudes that the employees develop.

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