The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

Roofer Electrocuted When Ladder Contacts 7200-Volt Power Line

FACE 89-16

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

On October 20, 1988, a 23-year-old male roofer was electrocuted when the 40-foot aluminum extension ladder he was positioning contacted an overhead 7200-volt power line.

Contacts/Activities:

State officials notified DSR of this fatality and requested technical assistance. On January 25, 1989, a DSR research safety specialist discussed the incident with the Occupational Safety and Health Administration compliance officer and the victim's partner.

Overview of Employer's Safety Program:

The victim had been a partner with his uncle in a roofing company since his graduation from high school 5 years earlier. At the time of the incident, the company employed four workers. Although no written safety policy or program existed, it was standard company practice to avoid using aluminum ladders within 12 feet of overhead power lines. If a 12-foot clearance could not be maintained, it was standard practice to call the local utility company to request that protective sleeves be placed on the power lines.

Synopsis of Events:

On the day of the incident, the victim, his uncle, a cousin, and a fourth worker were replacing the asbestos shingles on a church roof. The crew had been working on the roof for 3 days, and was almost finished. It was late in the day when the victim suggested to his uncle that they stop and complete the job the following day. The uncle agreed and began to gather the tools on top of the roof. After telling his uncle that he would make sure that the cleanup work on the ground was

completed, the victim descended one of the two 40-foot aluminum extension ladders that were used to access the roof of the church. The edge of the roof against which the ladders were placed was 27 feet above ground. The uncle estimated that the ladder was extended to about 30 feet in length. A 7200-volt power line was 15 feet from the side of the church against which the ladders were placed, and 35 feet above ground level.

After the victim descended the ladder, the uncle noticed that the ladder was being raised higher. Although the uncle could not see the workers on the ground, he heard the cousin tell the victim not to raise the ladder any higher and to watch the power line that ran parallel to the side of the church. As the uncle turned to face the edge of the roof, he again heard the cousin warn the victim. The victim replied that he knew what he was doing. The uncle saw that the ladder was still being raised, and was being moved in the direction of the power line. (It was standard company procedure to lower the ladder to the ground by sliding it to the left or right down the face of the building.) The uncle walked to the edge of the roof to see what was going on. As he reached the edge of the roof he saw the ladder contact the power line. The cousin attempted to pull the victim from the ladder, received an electrical shock, and lost consciousness. The ladder fell breaking contact with the power line and the victim collapsed on the ground. The uncle immediately descended the second ladder. He reached the cousin first and began to administer cardiopulmonary resuscitation (CPR). The cousin immediately responded and regained consciousness. The uncle then began CPR on the victim while the third worker summoned the rescue squad. The rescue squad transported the victim and the cousin to the hospital. The victim was pronounced dead by the attending physician, and the cousin was hospitalized. During interviews with the uncle it was learned that the victim had been “unusually distracted” for the two days prior to the incident. The uncle also stated that the victim was well aware of the electrical hazard presented by the power line since that was one of the hazards they addressed before beginning any new job.

Cause of Death:

The attending physician listed electrocution as the cause of death.

Recommendations/Discussion:

Recommendation #1: Aluminum ladders should never be used when the possibility of contact with overhead power lines exists.

Discussion: The workers believed that the 15-foot clearance between the power line and the church roof was sufficient to ensure their safety. They knew that the ladder, which was not fully extended, was not long enough to contact the power line. No one could explain why the victim raised the ladder and moved the ladder in the direction of the power line, especially after being warned, OSHA Standard 1926.450 (a) (11) states that “portable metal ladders shall not be used for electrical work or where they may contact electrical conductors.” The aluminum ladder used in this incident was conductive. If a ladder constructed of non-conductive material had been used in this case the incident may have been prevented.

Recommendation #2: To ensure proper protection for anyone working near electrical power lines, arrangements should be made with the power company to cover the lines with insulating hoses or blankets.

Discussion: Energized power lines in proximity to a work area constitute a safety hazard. Extra caution must be exercised when working in the vicinity of energized power lines. A safe working distance between ladders and power lines should be maintained at all times. At least one state (California) requires that a 6-foot minimum clearance be maintained. The power company should be contacted and requested to place insulating hoses or blankets on any power lines in close proximity to a work area. This passively protects workers who are working near power lines.

Recommendation #3: The employer should develop a safety program designed to recognize and control hazards.

Discussion: The ever-present danger of overhead power lines appears obvious; however, contact with overhead power lines and the subsequent occupational electrocutions continue. OSHA Standard 1926.21 (b) (2) states that “the employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.” The tasks performed by

workers should be evaluated and the associated hazards identified. A safety program should then be developed that addresses the control of these hazards. Although, this company had standard safe work practices, these were not followed. If these practices had been followed it would have decreased the probability of a death occurring.

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