



The National Institute for Occupational Safety and Health (NIOSH)

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through safety and health research



Apprentice Lineman Electrocuted while Upgrading a Power Distribution System

FACE 89-26

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 March 6, 1989, a 21-year-old male apprentice lineman was electrocuted when he contacted a 13,700-volt power line while upgrading a power distribution system.

Contacts/Activities:

State OSHA officials notified DSR concerning this fatality and requested technical assistance. On March 23, 1989, a safety engineer and safety specialist interviewed company officials, met with the assistant coroner and the emergency medical service director, and obtained photographs of the incident site.

Overview of Employer's Safety Program:

The victim was employed by a small power line construction company with 18 employees that has been in operation for 11 years. Two other employees are apprentice linemen. Although the company president serves as the company safety officer, the company does not have a formal safety program and relies upon on-the-job training. The company has a set of written safety rules that all employees are required to read and sign to verify that they understand them.

The victim had formerly been employed with the company for 20 months but in late 1987 he left to work for another company as a lineman. He rejoined the company as an apprentice lineman in October 1988.

Synopsis of Events:

The victim was working as part of a four-person crew upgrading a single-phase power distribution system to a three-phase system. The crew consisted of a foreman, the victim (apprentice lineman), a truck driver, and a groundman.

Using a “standoff,” the crew moved the energized, 13,700-volt power line to a position, on the road side of the pole, which was approximately 2 feet away from where they would be working. (A standoff is a wooden arm with an insulator used to position a hot line away from the work area). The first phase (the line closest to the energized line) had been pulled into place, secured, and grounded. At the time of the incident, the crew was working on the second line, which had been pulled off a reel to the pole where it was to be “dead-ended.” (Dead-ended means that the lines ended on insulators attached to a cross-arm.) After the line had been properly sagged, the victim in the bucket of an insulated bucket truck began to secure the line in a dead-end clamp. A 14-foot-long “tail” extended beyond the clamp, probably because this was what had been left on the reel. The groundman was providing tools and equipment as needed. The foreman and truck driver were replacing the empty reel in preparation for stringing the next line.

The groundman heard a “zip” and then heard a part of the clamp hit the ground. He called to the victim, who was still in the bucket, but got no response. After a few attempts to contact the victim with no response, he called the foreman to come over. They lowered the bucket to the ground and found the victim unconscious and not breathing. After removing the victim from the bucket, the groundman and the foreman initiated cardiopulmonary resuscitation (CPR). The foreman instructed the truck driver to call for an ambulance. The truck driver left the site to use a telephone because there was no radio in the truck. He was able to contact the emergency medical service (EMS) about 5 minutes after leaving the site.

Two nurses driving past the site saw the crew giving CPR, stopped, and helped continue CPR until the EMS personnel arrived at the scene. The EMS team transported the victim to a local hospital where he was pronounced dead on arrival.

When removed from the bucket, the victim was wearing only light leather gloves. His insulated rubber gloves and leather overgloves were on the floor of the bucket. The gloves had small burn holes in the palms of the gloves and there were burns on the victim’s palms. Although there were no eyewitnesses, the victim apparently violated company safety policy by removing his insulated gloves and overgloves and placing them in the bucket.

The victim, holding the clamp in his left hand, may have pushed a cable off of the bucket with his right hand. In doing so, he could have come into momentary contact with the energized line, thus completing a circuit to ground from his right hand, across his chest to his left hand. This would account for the burn marks on both hands and the dropped clamp.

Cause of Death:

The emergency room physician listed cause of death as high voltage electrocution.

Recommendations/Discussion

Recommendation #1: The employer needs to enforce employee compliance with established safety rules.

Discussion: The employer has a safety rule requiring that workers wear insulated gloves while working around energized lines. It is also necessary for the employer to be certain that his employees follow these rules. One way of doing this would be to conduct unannounced inspections of the work crews and take progressive disciplinary action when employees are found not using the proper protective equipment. This would inform the employees that the company takes safety seriously and will take action when necessary to be certain that the rules are obeyed. The employer was cited for a violation of 29 CFR 1926.28(a) which makes the employer responsible for requiring the wearing of personal protective equipment when there is exposure to hazardous conditions.

Recommendation #2: The crew should do a hazard survey prior to working on a pole.

Discussion: Each pole may have different potential safety problems that could be identified in a brief discussion between crew members. A line hose was installed on the energized line at the involved pole but was not positioned to prevent contact from being made. A review of the worksite should have shown a potential for contact with the energized line while working in the immediate vicinity. This review might have resulted in the movement of the line hose or installation of

additional line hose on the energized line, thereby preventing the fatal contact. The employer was cited for failure to comply with 29 CFR 1926.416(a)(1) which requires the employer to guard live lines by insulation when an employee must work near them and the power cannot be disconnected.

Recommendation #3: A review of the clamps used in power line installation should be conducted.

Discussion: It appears that the victim may have removed his protective equipment to install some small nuts on the clamping device. Such clamps should be designed to enable workers to easily install them while wearing essential protective gloves and other required personal protective equipment.

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