The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

# Apprentice Lineman Electrocuted

FACE 88-03

## 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 November 4, 1987, a 30-year-old male apprentice lineman working as a member of a power line construction crew was electrocuted while installing a new length of overhead distribution conductor.

## Contacts/Activities:

City police officials notified DSR concerning this fatality and requested technical assistance. During November 4-5, 1987, a DSR research team conducted a site evaluation, interviewed company officials and co-workers, and photographed the incident site.

## Overview of Employer's Safety Program:

The victim was employed by a large power line construction company with more than 350 employees. The company has been in operation for 66 years and has a formal safety program. Both classroom and on-the-job training are provided to employees. The victim had been employed by the company for 2½ months but had not attended the formal company training program.

## Synopsis of Events:

On the day of the incident, the victim was part of a five-man crew stringing a new circuit conductor beneath an existing 12,000-volt, 3-phase overhead electrical service. The crossbars for suspending the new circuit were mounted 5 feet below the energized conductors. This circuit was to be approximately 2,400 feet in length, supported by power poles at 200-foot intervals. The new conductor was being supported on crossbars mounted on the existing power poles. Due to the hilly, wooded terrain and two turns in the system, it was impossible to see from one end of the pull area to the other.

At the time of the incident, the victim was working at a trailer-mounted line tensioner. The victim was leaning over the side of the tensioner trailer and a co-worker was at the rear of the trailer. The new conductor was being pulled from the tensioner by a pulling rig located at the other end of the run. A “loop” developed in the new conductor between the tensioner and the nearest pole because of insufficient tension on the line. A second loop of cable occurred on the spool when the cable struck the trailer axle, which prevented it from feeding properly from the spool. Tension on the new conductor increased as the pulling unit continued to operate. This caused the loosely-strung new conductor to raise by several feet between the supporting crossbraces. The new conductor contacted an existing energized conductor which was sagging approximately 10 feet below the elevation of the crossbrace mountings for the new conductor. Current flowed through the new conductor and energized the tensioner trailer. The victim was electrocuted when his body provided a path to ground from the trailer. The co-worker was apparently struck on the foot by the second loop of the energized new conductor.

A supervisor standing several feet away from the trailer heard the co-worker cry out, and turned in time to see him fall backward down a steep embankment. The supervisor notified the operator of the pulling unit, via radio, to stop pulling operations. The supervisor ran to the victim lying on the ground near the trailer and began cardiopulmonary resuscitation (CPR). He continued CPR until advanced cardiac life support (ACLS) procedures were administered by rescue squad personnel. The victim was transported to a local hospital where he was pronounced dead. The co-worker received serious burns to the left foot.

## Cause of Death:

The medical examiner reported that the victim had electrical burns on his stomach and right arm. Electrocution was cited as the cause of death.

## Recommendations/Discussion

**Recommendation #1: The employer should perform a job hazard analysis of each project prior to initiating work, and communicate hazard information and control measures during work crew safety meetings.**

**Discussion:** Each project differs in the scope of work to be accomplished, the makeup of the work crews, the physical layout of the job site, and the equipment required to perform the work. This uniqueness creates differing situations for exposure to job hazards. Therefore, the hazards associated with each work effort must be analyzed so that appropriate control measures can be planned and implemented. A serious safety hazard which existed at this job site, the potential that the new conductor being pulled would contact an existing energized conductor, was not recognized and, therefore, not controlled. Two factors combined to increase the potential: 1) a lack of communication during the line stringing operation, and 2) the sagging condition of existing energized conductors. These factors should have been identified prior to the initiation of work. Corrective measures to prevent the hazardous contact might then have been adopted and communicated to the crew.

**Recommendation #2: Where new conductors are being installed near existing energized conductors, the employer should install guards, as necessary, to prevent inadvertent contact between new conductors and existing energized conductors.**

**Discussion:** A system of guards, such as an inverted “U”-shaped configuration composed of utility poles erected between the two levels of conductors, could minimize the chance of contact during installation of the new conductors.

**Recommendation #3: All equipment used in line-stringing operations should be grounded when work is being performed in proximity to energized power lines.**

**Discussion:** Although work was being performed in proximity to existing energized power lines, neither the tensioner trailer nor the truck to which it was attached was grounded. Grounding of the units could help prevent electrocutions should inadvertent contact with energized conductors occur.

**Recommendation #4: The feasibility of incorporating electrical isolation into the design of the tensioner trailer should be studied.**

**Discussion:** In this incident, the new conductor made contact with conductive parts of the trailer as it exited the spool. This allowed the trailer to become energized when the new conductor contacted an energized conductor. If the new conductor and spool were electrically isolated from the body of the tensioner, inadvertent energization of the trailer and truck would be less likely, thereby enhancing worker safety.

**Recommendation #5: The employer should train all employees in the identification, recognition, and control of electrical hazards prior to assigning them work on energized systems.**

**Discussion:** Although the employer does provide formal classroom training to employees who work with or near energized electrical equipment and systems, the victim had been employed for 2½ months as an apprentice lineman without benefit of this formal training.

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Last Reviewed: November 18, 2015