

FACE 90-03

Lineman Dies When He Contacts Energized PowerLine in Puerto Rico

SUMMARY

A line crew, assigned the task of restoring power to secondary service lines at night, determined that a switch had to be opened on a pole-mounted transformer to de-energize the line on which repairs were to be made. The powerline repairs were needed as a result of damage caused by Hurricane Hugo. A co-worker lifted a hot stick to open the switch. As the victim walked toward the co-worker, his right arm contacted a powerline that was dangling from the pole. He fell backward and landed on his back on top of the powerline. The dangling phase was aluminum, while all other phases attached to the pole were copper. A guy wire anchor was buried in the ground approximately 20 feet from the pole, but no guy wire was attached. It is assumed that the victim either did not see the wire because of the darkness or thought that it was a guy wire (because of its color) and believed, therefore, that it was not energized. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers and employees must:

- treat all powerlines as energized unless verified de-energized
- perform a site inspection prior to the start of work to identify any potential hazards present at the jobsite
- provide and utilize adequate lighting while performing line work at night
- ensure that all conductors in a given system are constructed of the same material to eliminate confusion.

INTRODUCTION

On September 29, 1989, Commonwealth of Puerto Rico officials notified the Division of Safety Research (DSR) that a 38-year-old male lineman was electrocuted when he contacted, then fell upon, a downed 4800-volt powerline in a wooded area. During the week of October 2-6, 1989, a DSR research team (two occupational safety and health specialists, a safety engineer, and an epidemiologist) conducted an investigation, and met with the Commonwealth Epidemiologist, the Secretary of Health, representatives of the Medical Examiner's office, and electric power company officials to obtain information concerning the circumstances surrounding the incident. Videotapes and photographs were taken to document storm damage to the electrical transmission and distribution system. This investigation was one of five separate investigations (90-02 through 90-06) conducted by DSR staff. All five of the investigations involved workers who were

electrocuted while restoring electrical power to the island of Puerto Rico as a result of damage caused by Hurricane Hugo (1).

The employer is a major utility company with more than 10,500 employees. The company has been in operation for the past 41 years. The company has a comprehensive safety program with written policies and procedures for all routine operations. The corporate safety staff consists of a supervisor of industrial safety, six safety engineers, and seven safety advisors. Apprentice linemen undergo a 6-month training program during which they spend half of each day in the classroom and the other half-day on the job. At the end of this 6-month period, apprentices are classified as first, second, or third (highest) class linemen, depending on their level of competence. Classroom as well as on-the-job training is also provided for workers in other occupations. All workers receive periodic retraining. Workers who perform line work are certified in cardiopulmonary resuscitation (CPR).

INVESTIGATION

The crew was assigned the task of restoring power to secondary service lines as a result of damage caused by Hurricane Hugo. Upon arriving at the worksite on the evening of the incident, the crew determined that a switch had to be opened on a pole-mounted transformer to de-energize the line on which repairs were to be made. The transformer was mounted on a pole that was located in a heavily wooded area, 150 feet from the roadside worksite. The victim and a co-worker removed a telescoping hot stick from the truck and walked to the utility pole to open the switch. When they arrived at the pole, the co-worker lifted the hot stick to open the switch. The victim, who was the senior lineman, decided that he should open the switch. As the victim walked toward the co-worker, his right arm contacted a powerline that was dangling from the pole. He fell backward and landed on his back on top of the powerline. The co-worker used a piece of wood to pull the powerline away from the victim, and then began CPR. The victim was transported to the hospital by co-workers where he was pronounced dead on arrival.

Examination of the incident site revealed that six 4800-volt phases were attached to the crossarm above the transformer, three phases on each side of the pole. On one side, however, the middle phase was dangling down from the crossarm to the ground. The phases on both sides of the pole were connected by wire jumpers. The dangling phase was aluminum, while all other phases attached to the pole were copper. A guy wire anchor was buried in the ground approximately 20 feet from the pole, but no guy wire was attached (Figure). It is assumed that the victim either did not see the wire because of the darkness or thought that it was a guy wire because of its color (and therefore not energized).

CAUSE OF DEATH

The medical examiner listed the cause of death as accidental electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: All powerlines should be treated as energized unless verified de-energized.

Discussion: Linemen must be instructed to treat all powerlines as energized unless they personally verify that the lines have been de-energized. Lines should be de-energized by establishing a visible open point between the load and supply sides of the lines, and installing proper grounds on the lines. These grounds should be installed within sight of the worker whenever possible. Because of the threat of feedback electrical energy (especially during power outages), a powerline should be grounded on both sides of the work area to be considered de-energized.

Recommendation #2: A site inspection should be performed prior to the start of work to identify any potential hazards present at the worksite.

Discussion: A jobsite inspection should be performed prior to the start of work to identify any potential safety hazards present at the jobsite. In this instance, had the workers determined the origin point of the dangling phase, they would have discovered that the phase was attached by wire jumper to a phase on the other side of the pole and, therefore, was energized. Had the dangling phase been treated as an energized conductor, this fatality would have been prevented.

Recommendation #3: Adequate lighting should be provided and utilized while performing line work at night.

Discussion: Adequate lighting for the entire work area should be provided and utilized when performing line work at night. In this instance, in which it was impossible to use spotlights from the truck, hand-held lanterns could have provided adequate illumination. Adequate illumination would have made the dangling phase readily visible and may have assisted in identifying the dangling phase as an energized conductor.

Recommendation #4: To eliminate confusion, all conductors in a given system should be constructed of the same material.

Discussion: Although the rest of the current-carrying conductors in the electrical system were copper, the conductor that was dangling from the crossarm to the ground was aluminum. The guy wires used to stabilize power poles in the system are also aluminum. For this reason, the victim may have mistaken the dangling, current-carrying conductor for a guy wire. This confusion may have been compounded by the fact that a guy wire anchor was in place in the ground 20 feet from the power pole without a guy wire attached. To avoid confusion and to aid in the identification of current-carrying and non-current-carrying conductors, the material from which these conductors are constructed should remain consistent throughout an electrical system.

References

1. Morbidity and Mortality Weekly Report October 27, 1989/Vol. 38/No. 42/ Update: Work-Related Electrocutions Associated with Hurricane Hugo, Puerto Rico.

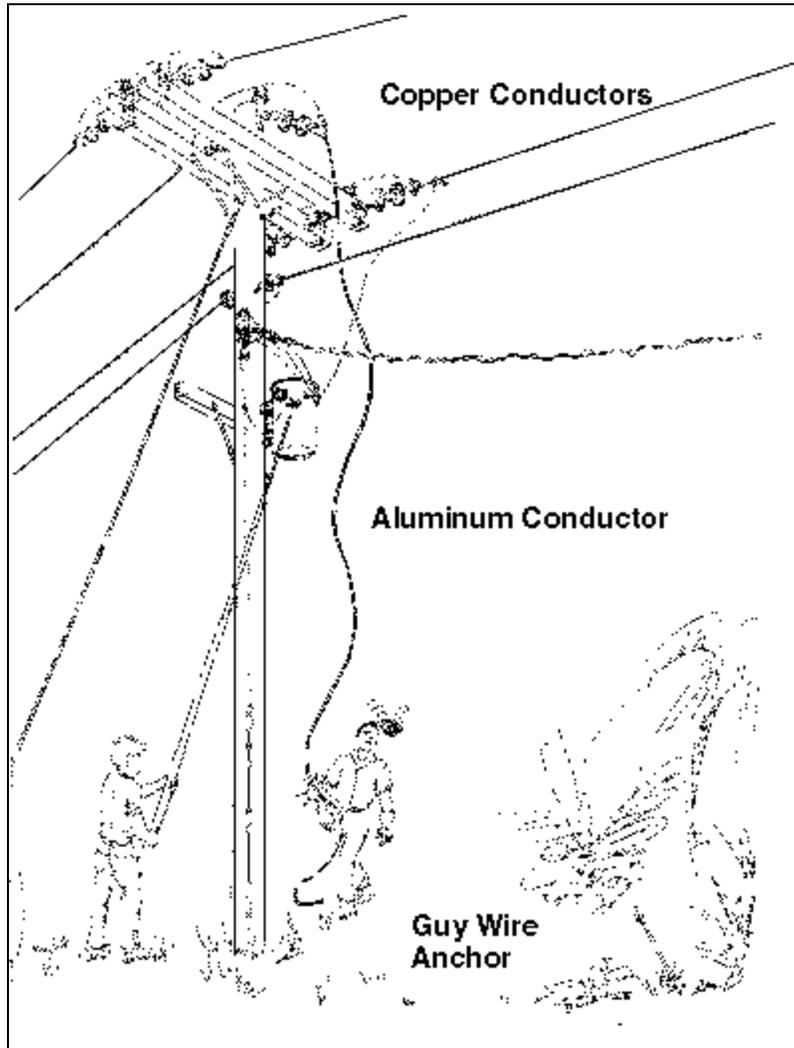


Figure.