

FACE 90-02

Tree Trimmer Crew Leader Dies When He Contacts Energized Powerline in Puerto Rico

SUMMARY

A tree trimming crew was en route to a jobsite when they noticed that trees had fallen over a 4,000-volt powerline in front of a radio tower. The damage had been caused by Hurricane Hugo. Since all the powerlines in the area had been de-energized, the crew leader decided to clear the area in front of the radio tower. The crew cut and pruned the trees to clear the area, and upon finishing, returned to the truck while the crew leader made a final inspection of the work area. Crew members heard their leader cry out and ran to the worksite, where they found him lying on his back. No vital signs could be detected. Investigation revealed that although the powerlines had been de-energized, a gas station was using a portable gas-powered electric generator to supply electrical power to the gas pumps. Since the main circuit breaker at the gas station had not been opened, electrical current from the generator flowed back through the transformer and energized the powerline at the work area. When the victim contacted the powerline, his body provided a path to ground and he was electrocuted. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers and employees must:

- ensure that workers assigned the task of clearing debris from downed powerlines identify and treat all downed powerlines and any debris in contact with these lines as energized, unless these lines have been tested and grounded on both sides of the work area by qualified workers
- institute a comprehensive electrical safety program for both company workers and members of the general public regarding the hazards of feedback electrical energy from portable electric generators
- in addition, state and local governments should consider legislation that would require electrical disconnect devices to be present at all locations where portable electric generators are used.

INTRODUCTION

On September 29, 1989, Commonwealth of Puerto Rico officials notified Division of Safety Research (DSR), of a 35-year-old male tree trimmer crew leader who was electrocuted when he backed into a fallen powerline while inspecting an area after the completion of a trimming job. Technical assistance was requested by Commonwealth officials and 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 and his staff, the Secretary of Health, representatives of the Medical Examiner's office, and power company officials to obtain information concerning the circumstances surrounding the incident. Videotape and photographic documentation of hurricane damage to the electrical transmission and distribution system was taken. 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 existence 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. Classroom and on-the-job training for all workers is provided. All workers receive periodic retraining. Workers that perform line work are certified in cardiopulmonary resuscitation (CPR).

INVESTIGATION

A tree trimming crew was assigned the task of clearing fallen trees in an area where a 4000-volt powerline had been knocked down during Hurricane Hugo. The men arrived at the site and began to prune and cut the trees away from the downed line. Upon finishing the job, the crew gathered their tools and returned to the truck. The crew leader inspected the jobsite to ensure that all work had been completed, and returned to the truck to contact his supervisor for further instructions. Upon receiving new work orders, the crew began to travel to the next worksite when the crew leader noticed that trees had fallen over the same 4000-volt powerline in front of a radio tower. Since all the powerlines in the area had been de-energized, the crew leader decided to clear the area in front of the radio tower before traveling to the assigned worksite. The crew cut and pruned the trees and cleared the area in front of the radio tower. Upon finishing, the crew gathered their tools and returned to the truck while the crew leader gave the area a final inspection.

Crew members heard their leader cry out and ran to the worksite, where they found him lying on his back. When vital signs could not be detected, crew members initiated CPR and continued CPR while they transported the crew leader to the hospital. The victim was pronounced dead on arrival at the hospital.

Investigation by power company officials revealed that the lines had been de-energized a day prior to the incident when power company linemen had opened the breaker for the line on an emergency generator which was in use to supply power to the city's public works department. However, on the day of the incident, a gas station between the public works department and the worksite was using a portable gas-powered electric generator to supply electrical power to the gas pumps. Since the main circuit breaker at the gas station had not been opened, electrical current from the portable generator flowed back

through the transformer and energized the powerline at the work area. When the victim contacted the powerline, his body provided a path to ground and he was electrocuted. The medical examiner's report identified an entrance wound in the lower left back region, which indicated where the victim contacted the line (Figure). Tests performed on the powerline by power company workers indicated that the powerline contacted by the victim carried 2400 volts.

CAUSE OF DEATH

The medical examiner listed electrocution as the cause of death.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Workers assigned the task of clearing debris from downed power lines should be instructed to inspect their worksite to identify all downed powerlines prior to the start of work. These powerlines and any debris in contact with these powerlines should be treated as energized until these lines are tested and grounded on both sides of the work area by qualified workers to control the hazard of feedback electrical energy.

Discussion: Workers should be instructed to conduct an inspection of the entire jobsite prior to the start of work to identify all downed power lines. These lines, and any debris in contact with these lines, should be treated as energized. Because of the ever-present danger of feedback electrical energy, these powerlines should be grounded on both sides of the work area and tested by qualified personnel, even though they have been verified as de-energized (1). These precautions are especially important during restoration operations, when the use of portable electric generators is very likely. If these precautions had been taken in this instance, this fatality might have been prevented.

Recommendation #2: A comprehensive electrical safety education program for both company workers and members of the general public should be instituted.

Discussion: A comprehensive electrical safety program should be instituted to instruct both power company workers and members of the general public of the hazards posed by feedback electrical energy, the use of portable electric generators during power outages, and downed power lines. This information could be distributed to workers at safety meetings. Additionally, a public awareness campaign should be initiated by the power company to alert the general public regarding the hazards to linemen from feedback electrical energy from portable electric generators. At a minimum, this awareness campaign should inform the public to move the main breaker in their home to the "off" position or to pull the main fuse link whenever a portable electric generator is in use. This

public awareness campaign could utilize all forms of media including newspapers, radio and television.

Recommendation #3: To prevent electrocutions from feedback electrical energy, disconnect devices (device which prevent electrical energy from leaving a location) should be present at all locations where portable electric generators are used.

Discussion: Electrical disconnect devices, preferably of the automatic type, should be installed in all locations where portable electrical generators are used. The feasibility of legislation (such as enacted in the State of California (2)) to ensure the use of such devices should be reviewed by state and local governments.

REFERENCES

1. Morbidity and Mortality Weekly Report, October 27, 1989/Vol.38/No. 42 Update: Work-Related Electrocutions Associated with Hurricane Hugo - Puerto Rico.
2. DHHS (NIOSH) Publication 88-104, Request for Assistance in Preventing Electrocutions by Undetected Feedback Electrical Energy Present in Powerlines.
3. State of California Electrical Safety Orders. Section 2940.9 Labor Code Section 142.3 1988 California Labor Code.

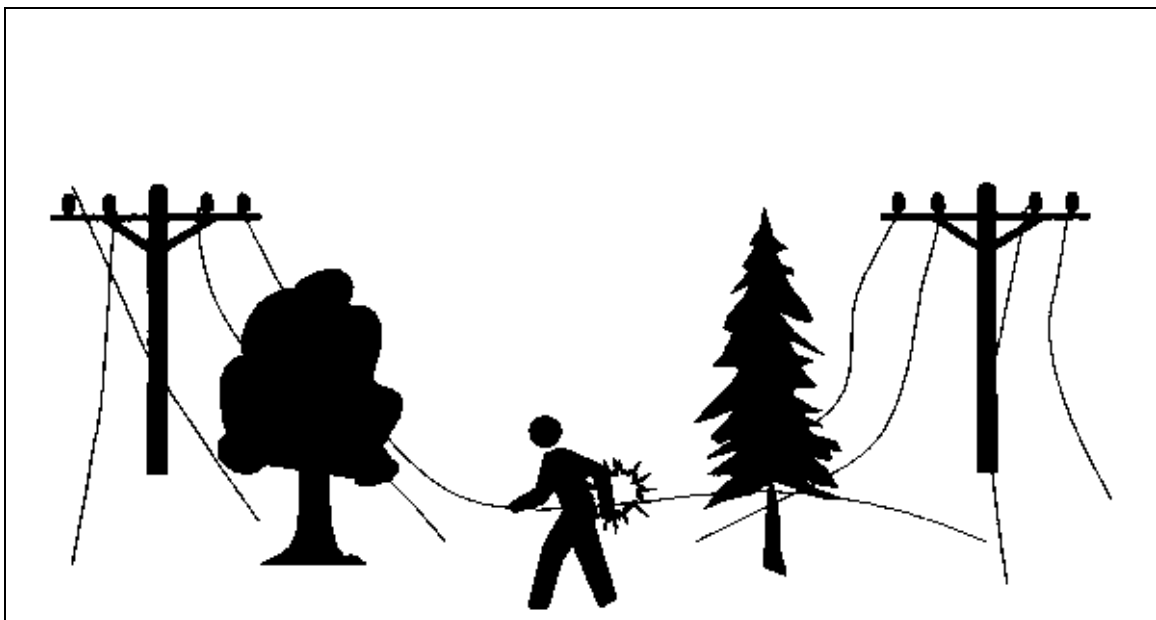


Figure. Tree Trimmer Electrocution