The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Utility Lineman Electrocuted in Ohio

FACE 90-40

SUMMARY

A 29-year-old utility lineman was electrocuted when he simultaneously contacted both sides of a fused powerline jumper. One end of the jumper was attached to the powerline, the other was attached to a recently installed pole-mounted transformer. The jumper served as a temporary connection between a powerline phase and a transformer that allowed electrical service to be provided through the transformer. The week before the incident, the victim had moved the outside phases of a three-phase, 2400-volt powerline to temporary insulators at the center of the cross arm at the top of a utility pole. This work was done to ease tree trimming operations around these lines. On the day of the incident, the victim was working from an aerial bucket moving the two outer powerline phases back to their permanent positions at each end of the crossarm. Two workers on the ground were using a hemp rope the victim had tied to the powerline phase to position the powerline on the insulator. When the powerline was in position, the victim told the workers on the ground to hold it in position while he secured tied it to the insulator. One of the co-workers then noticed one of the victim's leather gloves smoking and that the victim was slumped over in the bucket. The truck stalled, preventing the workers on the ground from using the truck-mounted controls to lower the aerial bucket. One of the workers ran to a nearby farmhouse to summon the emergency medical squad (EMS). The second worker notified the company of the incident from the truck radio. After alerting the company, the second worker climbed the pole, de-energized the new transformer, entered the aerial bucket and initiated cardiopulmonary resuscitation (CPR). As the first worker was returning from the farmhouse, a tree trimming crew arrived at the site in another aerial bucket truck. The first worker and a member of the tree trimming crew used the tree trimmers' aerial bucket truck to remove the victim

from his bucket and lower him to the ground. The EMS transported the victim to the hospital where he was pronounced dead by the attending physician. The investigation revealed that one end of a temporary fused jumper was connected to the powerline on which the victim was working. The other end of the jumper was connected to the new pole-mounted transformer. This jumper had been pulled in two. It is assumed that the jumper pulled apart as it was being attached to the insulator. While attempting to prevent the separation the victim contacted both sides of the jumper simultaneously. This action allowed current to pass across the victim's chest and caused his electrocution. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers should:

- **ensure that a comprehensive safety program which includes specific written procedures for all work near energized powerlines is designed, developed and implemented**
- **ensure that workers follow established safe work procedures.**

INTRODUCTION

On August 20, 1990, a 29-year-old utility lineman was electrocuted when he simultaneously contacted both ends of a temporary fused powerline jumper. On September 17, 1990, officials of the state Bureau of Worker's Compensation, Division of Safety and Hygiene, notified the Division of Safety Research of the incident and requested technical assistance. On September 28, 1990, two occupational safety and health specialists traveled to the incident site to conduct an investigation. The DSR investigators reviewed the incident with the company superintendent, the state highway patrol, and the university police. Photographs, diagrams of the incident site, and police and coroner's reports with the death certificate were obtained.

The employer is an electrical contractor that has been in operation for 54 years. The company employs 13 workers, seven of which are powerline workers. The company has no written safety policy, safety program, safe work procedures or safety officer. Several unwritten standard operating procedures exist, such as using rubber linemen's gloves while working on energized powerlines. Training is provided on the job. The victim had worked for this employer for eight years.

INVESTIGATION

The company had been contracted by a state university to upgrade a portion of the existing electrical system on university property. This upgrade consisted of replacing pole-mounted transformers containing polychlorinated biphenyls (PCBs). In addition to this task, the line crew was moving powerline phases on the pole-top crossarms to facilitate a tree trimming contractor's operations in the area. The week before the incident, the victim had moved two outside phases of a three-phase 2,400-volt powerline on a pole-top crossarm. The two phases were attached to temporary insulators near the center of the crossarm to provide clearance for tree trimmers who were cutting limbs from around the powerlines. The crew then installed a new transformer on the pole to service a nearby farmhouse. Electric power was provided to the transformer by a temporary fused jumper attached between the new transformer and the powerline phase conductor nearest to the farmhouse. The old transformer was de-energized, but was not removed from the pole.

On the day of the incident, tree trimming operations had been completed and the victim was returning the two outside phases to their permanent positions at the outer ends of the crossarm. Two co-workers on the ground were assisting the victim in moving each phase by either pulling on, or leaving slack in, a length of hemp rope the victim had tied to the powerline. At this time, the victim was wearing only leather gloves. Unwritten company standard operating procedures required the use of rubber linemen's gloves during work on energized powerlines. The victim had re-attached one of the phases to its permanent insulator and had tied the hemp rope on the second phase to be moved. A temporary fused jumper was attached to this phase in the bucket area. The victim told his co-workers on the ground to leave slack in the rope to allow the phase to rest against its permanent insulator. The victim then told his co-workers he had reattached the powerline to the insulator. Upon looking up at the victim, the first co-worker noticed that one of the victim's gloves was smoking. He called to the victim but received no answer. The second co-worker jumped onto the back of the aerial bucket truck to lower the aerial bucket using the truck-mounted controls. However, the truck stalled, disabling the controls. While the second co-worker tried to re-start the truck, the first ran 50 feet to the farmhouse to ask the residents to call the emergency medical service (EMS). When the first co-worker returned to the truck, he saw the second co-worker preparing to climb the pole. After the second co-worker climbed the utility pole and de-energized the new transformer, he entered the aerial bucket and initiated cardiopulmonary resuscitation (CPR) on the victim.

The first co-worker was trying to re-start the truck when a tree trimming crew arrived at the site in another aerial bucket truck. The first co-worker and a tree trimmer, assisted by the second co-worker, transferred the victim into the tree trimmers' aerial bucket and lowered the victim to the ground. The EMS arrived within minutes and transported the victim to the hospital where he was pronounced dead by the attending physician.

An investigation of the incident by university police revealed that the temporary fused jumper had pulled apart. Electrical burns on the victim's hands suggest the victim simultaneously contacted both ends of the jumper while trying to prevent the separation or re-establish the connection. This allowed electrical current to flow across the victim's chest, causing his electrocution.

CAUSE OF DEATH

The county coroner listed electrocution as the cause of death.

RECOMMENDATIONS/DISCUSSION:

Recommendation #1: Employers should ensure that a comprehensive safety program is designed, developed and implemented. This safety program should include specific written procedures for all work to be performed on or near energized high voltage powerlines.

Discussion: Employers should design, develop and implement a comprehensive safety program which includes specific written procedures for tasks such as the temporary relocation of powerlines. These procedures should include, but not be limited to:

1. worker training

2. electrical hazard recognition

3. proper use and maintenance of personal protective equipment

4. supervisory job site surveys prior to the start of work

5. first aid and cardiopulmonary resuscitation (CPR) certification training.

Recommendation #2: Employers should ensure that workers follow established safe work procedures.

Discussion: Employers should continually stress the importance of adherence to safe work procedures and conduct periodic, random safety inspections to ensure that these procedures are being followed.

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