

## **Lineman Electrocuted After Falling Against Exposed Conductors in a Ground Level Transformer Box**

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### **SUMMARY**

On August 6, 1992, a 61-year-old male utility company lineman was electrocuted when he apparently fell against the energized secondary conductors in an opened ground level steel transformer box. The victim was the work leader of a three-man crew installing underground electrical service in a newly constructed housing development. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- *All exposed conductors in transformer boxes should be insulated immediately upon opening the boxes.*
- *The ground around the work area should be stable and free of debris.*

### **INTRODUCTION**

On August 10, 1992, NJDOH FACE personnel learned about this work-related electrocution from the county medical examiner. The OSHA compliance officer who investigated this incident on the day of the fatality, returned to the incident site with the FACE investigator on August 10. Information was derived from the OSHA file, employer interview, and medical examiner's report. The victim's co-workers were not available to be interviewed.

The victim's employer was a large utility company that has been in business for sixty years and employs 3,500 people. The company employs a safety staff and employees are trained through a combination of on-the-job training and classroom training with audio-visual assistance and manuals. A line school is held for linemen. A tail board session (an informal meeting to plan and discuss the proposed work) is held at the start of each job and is documented in writing. The deceased, a union member, was an experienced lineman and had been with the company for 37 years. He had been assigned to indoor jobs for the past five to six weeks and this was his first week resuming outdoor work.

### **INVESTIGATION**

The site of the fatality was a new housing development in various stages of construction. The area is supplied with power through underground power lines resulting in no utility poles or power lines above ground. Crews were sent to the area as groups of houses became ready for electrical hook ups. Telephone, cable television, and electrical transformers are located in separate steel boxes. A transformer box, situated about fourteen feet from the curb line, supplies power to six to eight homes (see photos).

The transformer box measured 36 inches long by 32 inches wide by 24 inches high. It was mounted on a fiberglass base ("pad") that had its base two feet underground with an underground side opening for cables. The cover is 18 inches by 18 inches and is locked when not in use. The lock must be broken when opened and replaced with a new lock. Workers wear dielectric gloves when opening the box. Inside the transformer box are two insulated primary conductors supplying 7200 volts of electricity and three non-insulated secondary conductors (called "spades"). The secondary conductors are located on the right side of the box, positioned vertically to each other. The lowest "spade" is a ground, and the others supply 120 volts each. Cables are run underground from a house panel to the box and are bolted to the secondary conductors.

On the day of the incident, the victim was the leader of a three-man crew that consisted of himself, a heavy equipment operator and another lineman. This was the first day the crew was assigned to work at this site. They were assigned to hook up underground service to the completed houses. Two other crews were also working in the neighborhood, each with the same assignment. A trench was dug from the house to the transformer box using a backhoe and finished with hand digging. One service line was already in place and functioning so it was necessary to avoid disturbing it. A lineman worked at the panel box installing cables to the meter on the exterior of the house. The victim planned to bring the new cables from the house through the opening in the fiberglass base and attach them to the secondary conductors in the box. To do so he would have worn dielectric gloves and used an instrument called a "lanyard" to reach down to grasp the cables. Using handtools, he would have bolted the cables to the secondary conductors.

At approximately 1 p.m., the deceased used insulating gloves to open the transformer box, breaking the lock. He then walked across the street to his truck to prepare labels for marking the cables and gather his tools. He was last seen by his co-workers working at the truck. The victim returned to the work site and was next seen on the ground by a worker from another company who yelled to the victim's co-workers. One of his co-workers immediately ran to the victim and pulled him away from the open box by grasping the fabric on his pants. The members of his crew immediately initiated CPR; they called for help and the other two company crews in the vicinity responded immediately. Police arrived quickly, followed by rescue personnel and paramedics who treated the victim at the scene. He was transported to the hospital with CPR in progress and was pronounced dead in the emergency room.

Because there were no witnesses, the events that led to the victim's death can only be suggested. The victim's tools were scattered on the ground in the area in which he was found, indicating that he may have dropped them as he approached the work area. It is likely that he tripped or fell against the secondary conductors in the transformer box. The dirt in the area was soft from recent digging and the area was littered with construction debris; bottles, cans, and pieces of concrete were noted in the area. The primary conductors were insulated but the secondaries were not; before beginning work in the box, linemen cover the secondary conductors with a rubber insulator. Because the victim was not yet ready to begin such work, the conductors were not covered. The amount of electrical voltage the victim received could not be determined. Depending upon how the secondary cables were contacted, he could have received a shock of 120 volts (phase to ground) or 240 volts (phase to phase). Because of the distance of the two thermal injuries, the victim may have received a shock of 120 volts.

## CAUSE OF DEATH

The medical examiner determined that death was caused by electrocution. Superficial thermal injuries were noted on the victim's right upper back and left upper inner arm and anterior axillary fold. No specific entrance or exit sites were noted by the medical examiner.

## RECOMMENDATIONS/DISCUSSIONS

***Recommendation #1: All exposed conductors in transformer boxes should be insulated immediately upon opening the box.***

Discussion: The usual work practice was to insulate the secondaries before working in their proximity. However, leaving them uninsulated for even a short period of time allowed accidental contact with them. Since the lines could not be deenergized because of the continuous construction being done, insulating prevents inadvertent contact. The utility company has already initiated this safety procedure.

***Recommendation #2: The ground around the work area should be stable and free of debris.***

Discussion: It appears that the victim may have fallen into the transformer box, possibly because of tripping over debris. Although the utility company cannot be responsible for work practices of the various construction companies, workers should monitor the immediate area and remove debris which may impair their footing or cause them to trip. They should pay specific attention to areas of newly dug, soft dirt.

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