

Chief Lineman Electrocuted After Contacting 4,200 Volts While Repairing A Downed Power Line

November 15, 1993

SUMMARY

On March 6, 1993, a 47 year-old male power company chief lineman was electrocuted after making contact with 4,200 volts from an energized power line. The incident occurred when the victim was preparing to splice a length of copper wire to a power line that had broken during a storm. Although the line was thought to have been de-energized, feedback energy was present in the line from an energized transformer bank. The lineman was electrocuted after taking hold of the hanging line to begin the repair. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- ***Employers and employees must insure that personal protective equipment such as insulating gloves are consistently used.***
- ***All electrical lines and conductors should be tested to ensure that they are de-energized prior to working on or near them.***
- ***Employers should ensure that established company safety procedures are followed at all times.***

INTRODUCTION

On March 8, 1993, NJDOH FACE personnel were provided with a newspaper article of a work-related electrocution that occurred two days before. After contacting the local area OSHA office, FACE investigators learned that the OSHA compliance officer was scheduled to meet with power company officials that day and arranged to participate in a joint investigation. During the site visit, power company representatives re-enacted the incident to find the source of the feedback energy. FACE investigators also interviewed witnesses and photographed the scene.

Completion of this FACE investigation was delayed until the medical examiner's report was issued and all other related investigations were finished. On August 20, 1993, FACE investigators met with the power company safety officer to discuss the case and complete the data collection forms. The safety officer also provided copies of the power company's investigation report and safety procedures. Additional information on the incident was obtained from the OSHA compliance officer and the police report.

The employer was a large electrical utility company that has been in operation for 80 years. The company employed a total of 3,400 workers, including 545 linemen and 60 chief linemen. The company employed a full-time safety officer and provides an extensive job and safety employee training program. The deceased was a 47 year-old male who had been working for the company for over 29 years. He had been a journeyman lineman for five years and worked as a chief lineman for about 18 months.

INVESTIGATION

The incident occurred alongside a roadway in a lightly populated residential area. On Friday, March 5, 1993 a violent storm swept through the area and heavily damaged power lines throughout the region. That evening, the local power utility company went into emergency storm operation and dispatched work crews to repair the damage caused by the storm. Early the next morning, a 7,200 volt primary overhead power line running alongside the roadway broke, starting a fire in a tree and causing a power outage in the area. At 11:30 a.m. the power company dispatched a repair crew to the site. The crew arrived to find the power line hanging down from a tree near the road. The cutout (fuse) that fed the downed line was also blown.

This line was part of a three phase primary system that supplied power to a nearby municipal complex and residential neighborhood. The power flow started upline at a series of cutout boxes and supplied a large transformer that serviced a library. After supplying two smaller lines to a traffic light and house service, the power moved to a second large transformer that serviced an ice skating rink. One phase of the system was eliminated at this point, leaving two lines to service the residential neighborhood downline. The break occurred in one of these two phases. (The phases are illustrated in the attached diagram. Phase #3 is the line that ended at the transformer, Phase #2 is the broken line that the victim contacted, and Phase #1 is the line leading to the residences).

A five man work crew was at the site at the time of the incident. The victim, who was the chief lineman, was in charge of the crew. After arriving, the victim saw that the cutout feeding the downed line (Phase #2) was blown and decided to disconnect the second line leading to the residences (Phase #1) at an adjacent cutout box. These cutouts were located upline as part of the three phase system that fed the transformers. The victim apparently noted that Phase #3 ended shortly down line from the cutouts and elected to keep this line in operation to maintain power to a traffic signal and a house service. As the victim watched, a lineman working from a bucket truck disconnected Phase #1. The victim then reminded the lineman that although the lines had been de-energized, rubber sleeves and gloves would be required since the lines were not grounded. While the remaining men directed traffic on the road, the victim went to the truck and got a roll of copper wire and a tool to splice the break. Shortly before 1:30 p.m., the victim, who was wearing leather gloves, walked up to the power line and grabbed the hanging end with his right hand. He immediately stiffened and fell backwards against the pavement.

One co-worker, who was directing traffic, went to the victim and saw that he was still in contact with the line. He used a wooden traffic control flag to knock the wire clear of the victim. A second co-worker alerted a policeman who called for an ambulance and paramedics. The officer started CPR and called for a med-evac helicopter as other police officers arrived. While the police were working on the victim, the remaining lineman tested the power line and found that it was energized. They then barricaded the line to protect the rescue workers. The victim was transported by helicopter to the regional trauma center where he was pronounced dead at 2:39 p.m.

On March 8, 1993, the power company re-enacted the circumstances of the accident with federal OSHA. It was found that the line had been energized by feedback energy from two power transformers upline from the accident scene. Although two of the three phases had been disconnected, power passed through the energized third phase and energized the transformers at the library and skating rink. This power was backed onto the disconnected lines, energizing them with 4,200 volts.

CAUSE OF DEATH

The county medical examiner determined the cause of death as acute cardiac failure due to electrocution.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers and employees must insure that personal protective equipment such as insulating gloves are consistently used.

Discussion: It is not known why the victim did not use rubber insulating gloves and sleeves before taking the wire, especially after instructing another worker to wear them. The failure to wear the gloves, especially by a chief lineman, may indicate a complacency or a lack of understanding of why this personal protective equipment is necessary. It is recommended that management should re-affirm the necessity of following established safety procedures with all supervisors and workers. The use of this equipment is also required by the OSHA standard 29 CFR 1926.950 (c)(1)(i).

Recommendation #2: All electrical lines and conductors should be tested to ensure that they are de-energized prior to working on or near them.

Discussion: Although electrical test equipment was available, the circuits were not tested until after the incident occurred. Before any work is done on or near electrical systems, all components of the system that may be contacted should be tested to ensure that they are de-energized. Testing the circuits would have indicated that they were energized and prevented the fatality.

Recommendation #3: Employers should ensure that established company safety procedures are followed at all times.

Discussion: In this incident, the victim violated several established company safety policies. The company's written operating procedures require that all high voltage circuits should be considered live and must be tested before they can be accepted as de-energized. Strict enforcement of company policies with regard to these procedures must be maintained by the field supervisors. The company is planning to conduct regularly scheduled employee training and refresher training to reinforce their policies.

REFERENCES

Code of Federal Regulations 29 CFR 1926 (Construction Industry), 1991 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC, pg 312.

ATTACHMENTS

[NIOSH ALERT: Preventing Electrocutions by Undetected Feedback Energy Present in Powerlines.](#)

US Department of Health and Human Services (NIOSH) Publication #88-104, 1988. NIOSH Publications Dissemination, Cincinnati OH (513) 533-8287.

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