



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Electric Company Lineman Electrocuted in Indiana

FACE 86-03

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Project, which is focusing primarily upon selected electrical-related and confined space-related fatalities. By scientifically collecting data from a sample of fatal accidents, it will be possible to identify and rank factors that influence the risk of fatal injuries for selected employees.

On September 26, 1985, a 35-year-old electric company lineman was electrocuted while installing a guy wire to a utility pole.

Contacts/Activities:

Officials of the Indiana Occupational Safety and Health Administration (IOSHA) notified DSR of this fatality and requested technical assistance. This case has been included in the FACE Project. On October 9 and 10, 1985, a safety specialist conducted a site visit, interviewed comparison workers and the next of kin, and met with an employer representative. The incident was discussed with the IOSHA compliance officer and the vendor of the aerial truck. Photographs were taken of the accident site.

Overview of Employer's Safety Program:

The electric company (a rural electric cooperative) employs 46 people and supplies electricity to 16,000 customers within a 2000 square mile area. The company's incident and severity rates are higher than the "electric services" industry rate. The company has an improving safety record.

The employer has developed and distributed a comprehensive safety manual to each employee. However, since responsibility for the safety program has not been established, the safety function is not managed. All linemen must complete a five year apprenticeship program. The program provides new employees an opportunity to identify, evaluate, and control hazards associated with electricity.

Synopsis of Events:

A four-man crew (a foreman, a groundman, a lineman, and the victim – a lineman) was installing a conductor between two adjacent poles. The span between the two poles was 341 feet. The potential voltage was 7200 volts to ground. Truck mounted aerial buckets were used by the victim and the foreman to work on their respective poles.

The pole on which the victim was to attach the conductor supported a three-phase power system. This three-phase power system was located in the immediate vicinity of the victim's work area and ran perpendicular to the conductor being installed by the victim and the foreman. During this construction activity all conductors between the two poles were de-energized and the bottom phase of the three-phase power system was covered with an insulated rubber line hose. After the victim connected the conductor to the pole he energized the lines and lowered the aerial bucket to the ground. The victim was then to connect a guy wire from the pole to a ground anchor. After attaching the guy wire to the ground anchor, the victim attached the guy wire to the outside of the aerial bucket and raised himself into position to attach the guy wire to the pole. At the time of the incident the victim was not wearing insulated gloves or sleeves although both were present in the aerial bucket.

Witnesses stated that as the victim maneuvered the bucket into position, the front section of the aerial boom contacted an energized conductor. The groundman, cleaning excessive dirt from around the ground anchor, heard an arc, looked up, and asked the victim if he were all right. The victim stated that he was fine. The groundman looked up a second time, could not see the victim in the aerial bucket, and immediately summoned the foreman. Upon hearing the groundman, the foreman looked up and saw the end of the boom "in or near" an energized conductor. He could not see the victim in the aerial bucket and assumed that the victim's truck was energized. The foreman instructed the lineman working with him to open the circuits and to park their truck parallel to the victim's truck. Once this was accomplished, the foreman jumped from his truck to the victim's truck and proceeded to lower the bucket. At this time the local ambulance was called. The victim was removed from the bucket and placed on the ground where CPR was administered by co-workers until the ambulance arrived. The victim was transported to a local hospital where he was pronounced dead on arrival.

The pathologist report indicates that burns present on the victim's back are compatible with an entrance wound. Burns on the victim's hands indicate that the fingers were wrapped around an object. Apparently, the victim's back contacted a live conductor (possibly an exposed hot clamp connected to the bottom phase) while grasping the guy wire in his hands. The current flowed through him down the guy wire to ground causing his electrocution.

Cause of Death:

Accidental Electrocution

Recommendations/Discussion:

Recommendation #1: Employees working from aerial trucks should position their truck so that they are not required to work through power lines to perform the work task.

Discussion: The victim's truck was parked on a macadam road opposite the working area of the utility pole. To attach the guy wire to the pole the victim (standing in the bucket) had to pass under the primary line and elevate the boom. The truck could have been parked in an open field facing the work area.

Recommendation #2: Employees working with energized conductors should wear required personal protective equipment.

Discussion: OSHA standards require employees to wear protective equipment when working around electrical hazards (1910.132). These standards identify specific types of insulated protective equipment to be worn by electrical workers (1910.137). Protective equipment includes insulating gloves, blankets, hoods, line hose, and sleeves. Had the victim been wearing insulated gloves, he may not have been electrocuted. Rubber gloves and sleeves were found inside the aerial

bucket. As part of this accident investigation, several power companies were asked if operators of aerial buckets had dexterity problems while wearing insulated gloves. The three companies surveyed reported their workers had no problems operating an aerial bucket while wearing insulated gloves.

Recommendation #3: Employees should recognize all possible phase-to-phase or phase-to-ground contact.

Discussion: Apparently, the victim's back contacted an exposed hot line clamp that was connected to the bottom phase of the main line. Either the victim was not aware of the location of the hot line clamp or he did not recognize the danger associated with the hot line clamp when working with energized conductors. Employees working around power lines should be continually reminded of the dangers associated with any potential phase-to-phase or phase-to-ground contact.

Recommendation #4: All exposed conductors, clamps, etc. should be covered with rubber hoses, boots, or blankets.

Discussion: Although the bottom phase of the three-phase power system had been covered with a rubber line hose by the victim, exposed live conductors such as a hot clamp connected to the bottom phase were very close to the victim's work area. All exposed conductors in contact distance within a work area must be covered to eliminate the occurrence of an accident.

Recommendation #5: The procedure for the installation of guy wires to utility poles should be further evaluated.

Discussion: Attaching the guy wire to the ground anchor before attachment to the pole established a direct path to ground and a hazard because of the close proximity of live conductors. Connecting the guy wire to the pole prior to connecting it to the ground would eliminate a potential path to ground. Additionally, it may be beneficial to connect guy wires while power is disconnected or before construction, maintenance, or repair is begun (a procedure similar to that used for a new pole).

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