The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Electric Company Employee Electrocuted in Ohio

FACE 86-04

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 August 19, 1985, a power line trouble-shooter was electrocuted while attempting to open a pole-mounted, ground-level air switch on a three-phase, 69 kV power line.

Contacts/Activities:

Officials of the Industrial Commission of Ohio notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE Project. On October 18, 1985, a safety specialist met with employer representatives and discussed the incident with the OSHA compliance officer and the safety consultant for the Industrial Commission of Ohio. Co-worker and next-of-kin interviews were precluded in this case.

Overview of Employer's Safety Program:

The employer is an electric power company serving a 9000-square-mile area that includes two states and employs approximately 7500 people. A written safety policy has been developed and implemented. A safety professional is present at each branch office and a contact for safety-related issues is provided at corporate headquarters. The company promotes safety through the use of periodic job safety analysis, safety meetings, and monthly training sessions. Training in CPR and defensive driving are also provided.

Synopsis of Events:

The three-phase, 69 kV transmission line involved in the incident connects two divisions of the company. This line is approximately 28 miles long and serves three company substations and five customer stations. Because access to an air switch (approximately at the midpoint of the line) was difficult, it had been removed from service. A new switch was relocated the week before the accident. The relocated air switch was installed on a more accessible pole at ground level

(approximately eight-tenths of a mile north of its previous location). Each of the individual phases were controlled by a separate pole-mounted air switch assembly, located with each phase at the top of the pole. The middle phase of the three-phase, 69 kV transmission line was attached to the side of the pole opposite the other two phases. The three pole-mounted air switch assemblies were bonded together and connected to a common ground wire that ran down the pole to a ground rod at the base of the pole. The handle of the new air switch was also connected to this common ground. Company standards state that pole-mounted air switch assemblies should not be grounded, and that the air switch handles should be grounded independently. The foreman of the crew involved in the relocation of the air switch had misinterpreted the air switch blueprint. A vertical line that represented the center line on the pole was present on the blueprint. The foreman thought that this vertical line represented the ground wire and used the ground wire as a common ground for the air switch assemblies.

On the day prior to the incident, the victim closed the new air switch and opened a switch controlling a customer tap at the old location. This switching was performed so that work might be completed on the customer tap. The next day when work was completed on the customer tap, the victim closed the switch at the customer tap, then proceeded to the relocated air switch location. When the victim grabbed the handle of the relocated air switch, he was electrocuted.

Evidence present at the site indicated that a “flashover” arc occurred between the middle phase of the transmission line and its pole-mounted air switch assembly. This contact caused a fault current to flow down the common ground wire on the pole. At an undetermined point in time the common ground wire burned off at the ground rod at the base of the pole. This broken connection interrupted the path to ground for the current. The victim supplied a path to ground when he grabbed the handle. (Since the incident, the company recommends the use of rubber lineman’s gloves and overshoes when operating pole-mounted switches and is studying the feasibility of placing ground mats at the base of poles with air switches. Additionally, the company has developed a form to assist personnel inspecting newly installed air switches.)

Cause of Death:

The deputy coroner ruled electrocution as the cause of death.

Recommendations/Discussion:

Recommendation #1: Employers should have qualified personnel inspect new installations prior to entering them into service. This will assure adherence to company and manufacturer’s standards.

Discussion: Prior to entering newly installed air switches or other systems into service, an inspection should be conducted by engineering personnel or other qualified personnel to assure compliance with company and manufacturer’s standards. These inspections should identify and immediately correct any hazardous conditions present. Had this installation been inspected, the improper technique used to ground the pole-mounted air switch assemblies could have been identified and corrected. If the air switch handle had been independently grounded, the risk of fatal injury would have been greatly reduced.

Recommendation #2: Employers should assure that personnel involved in the installation of air switches, or any other pole assemblies, fully understand the blueprints from which they are working.

Discussion: Training should be implemented for all personnel involved in the interpretation of mechanical drawings or blueprints. This training should stress the proper identification of symbols used in mechanical drawings and blueprints. Additionally, engineering might review any mechanical drawing or blueprint to be used and label or identify any vague portion to diminish the chance of misinterpretation. Had the blueprint in this incident been interpreted correctly this incident would have been prevented.

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Last Reviewed: November 18, 2015