The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Electrician Electrocuted in Indiana

FACE 87-68

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. The purpose of the FACE program is to identify and rank factors that influence the risk of fatal injuries for selected employees.

On July 29, 1987, an electrician was electrocuted when he contacted a 110 volt conductor while he was installing a heating/air conditioning duct system.

Contacts/Activities:

Officials of the Occupational Safety and Health Administration (OSHA) for the State of Indiana notified the Division of Safety Research of this fatality and requested technical assistance. This case has been included in the FACE Project. On September 16, 1987, the DSR research team (a research industrial hygienist and a safety specialist) conducted a site visit, photographed the site, interviewed comparison workers, the employer of the victim, and a surrogate for the victim.

Overview of Employer's Safety Program:

The employer is a small heating/air conditioning company which employs eight workers (all licensed electricians). The majority of the employer's business involves the installation of heating and air conditioning systems.

The company has no written safety program. Safety concerns (among other issues relevant to each job) are discussed briefly between the employer and the employees prior to each job. New employees receive a brief job orientation by the employer, on-the-job training, and training in heating/air conditioning service and installation by a private training company.

Synopsis of Events:

On July 29, 1987, a heating/air conditioning system installer (the victim) and two co-workers (an installer and a service technician) were installing a furnace in a single story cottage. Two employees were doing work in the furnace room inside the cottage while the victim was in a 30 inch high crawl space under the cottage installing a flexible galvanized duct system below the cottage floor. The ground under the cottage was damp. After approximately three hours of work at the site, the victim crawled about 30 feet farther into the crawl space (where the vertical clearance tapered from 30 inches to

approximately 18 inches). The victim was now working almost directly below the two co-workers who were inside the cottage. The co-workers were raising a trouble light that had been passed through a hole in the floor into the crawl space. When the light caught on something the two co-workers called and asked the victim to dislodge it. After a few minutes, they called down and asked the victim if he had freed the light. He replied, “Wait a minute, it’s tight down here.” A few seconds passed, then they heard a “thud” on the underside of the floor.

The co-workers called to the victim several times but received no response. One of the co-workers (an installer) entered the crawl space and crawled to the victim who was lying face down. He made an attempt to drag the unresponsive victim out of the crawl space; however, when he touched the victim he felt a mild electric shock. The installer instructed the other co-worker (service technician) to open the main electric service disconnect at the outside fuse box. After the main power switch was turned off, the installer began dragging the victim out while the service technician ran to a nearby cottage and called the local emergency medical service (EMS). It is estimated that the victim was in contact with electrical current, for approximately three minutes. When the EMS arrived (17 minutes from the time the call was received) both co-workers were performing cardiopulmonary resuscitation (CPR) on the victim. CPR was continued by EMS personnel during the ten minute trip to a local hospital. Resuscitation efforts were continued at the hospital, but were unsuccessful. The victim was pronounced dead one hour after arrival.

NOTE: At the time this report was written the exact source of the electric current had not been determined. Several unguarded electrical connections and junction boxes were present in the immediate area surrounding the victim. Any of these could have provided the electric current that resulted in this fatality.

Cause of Death:

The autopsy report listed the cause of death as asphyxiation due to aspiration of gastric contents. This apparently resulted from prolonged contact with electrical energy.

Recommendations/Discussion

Recommendation #1: Employers should develop and implement a comprehensive safety program that addresses both the recognition of workplace hazards and the procedures to follow in the presence of those hazards.

Discussion: OSHA 1926.21(b)(2) states that “The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.” A comprehensive safety program should include hazard recognition and the procedures to follow in the presence of those hazards (i.e., de-energize electrical circuits and utilize electrical energy testing equipment prior to the commencement of work).

Recommendation #2: Residential wiring should satisfy the requirements of the National Electric Code.

Discussion: The residential wiring in the cottage crawl space was substandard. The 110 volt cable contained numerous cracks in the lead sheathing, junction boxes were not covered, and connections were unguarded. The electrical system in the residence should be inspected and modified to satisfy the applicable requirements of the National Electric Code. The existence of proper wiring in this incident would have greatly reduced the risk of serious injury. It is recognized that the National Electric Code is not retroactive; however, residential electrical systems should be evaluated prior to beginning work to determine if a safe electrical system has been maintained.

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Last Reviewed: November 18, 2015