The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Service Technician Electrocuted in North Carolina

FACE 85-48

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 electrically-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 29, 1985, a service technician was electrocuted in the crawl space of a private residence while performing pre-winter maintenance on an oil furnace.

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the State of North Carolina notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE Project. On September 11, 1985, the DSR research team (two safety specialists) conducted a site visit, met with the owner of the company, the assistant county coroner, police detectives, and the OSHA Compliance officer. Photographs taken by police department personnel were examined at the police station. However, photographs of the accident site, co-worker interviews, and the next of kin interview were precluded in this case.

Overview of Employer's Safety Program:

The victim was employed by a firm that installs and services air conditioning and heating systems. The firm employs eleven people and has been in operation for 33 years. The victim was one of four service technicians employed by the firm. The owner of the firm assumed safety responsibilities on a collateral-duty basis. During the interview with the owner, it was learned that the firm had no written safety policy or safety program. Employees of the firm are selected from the graduating classes of two local technical colleges. New employees are trained on-the-job for a period of two to three years by a senior service technician.

Synopsis of Events:

On the day of the incident the victim was to perform pre-winter maintenance on an oil furnace in a private residence. Service technicians receive work orders each morning prior to the start of their shift. Additional work assignments are relayed to the service technicians through a company dispatcher by two-way radios in the service trucks.

The victim arrived at the private residence at approximately 3:00 p.m. The home owner escorted the victim to the back of the residence and pointed out the location of the furnace in the crawl space underneath the house. The owner of the residence then left in his car to run some errands. Upon his return, approximately one and one-half hours later, the home owner noticed the service truck was still in his driveway. The home owner had his oil furnace serviced yearly and the operation usually lasted less than one hour. The home owner became concerned when, after two hours, he heard no noise from underneath the house. He obtained a flashlight from the house, went to the crawl space, and called for the victim. He received no answer and could not see the victim. The home owner then called the firm thinking that one of the victim's co-workers may have picked him up. The owner of the firm arrived at the residence at approximately 6:30 p.m. He entered the crawl space with a flashlight and found the victim on his stomach, leaning on his elbows, in front of the furnace. The assistant county coroner was summoned and pronounced the victim dead at the scene. The victim was then transported to the local hospital by the county rescue squad. Electrical burns were found on the victim's scalp and right elbow.

By order of the assistant county coroner the electric meter was pulled from the house. Once the power to the house was completely disconnected the county electrical inspector, the firm owner, and an electrician from the firm inspected the accident site. A toggle switch attached to a floor joist in front of the furnace was in the off position. With the toggle switch in this position there should not have been power to the furnace. The owner of the firm stated that it was common practice for the service technicians to de-energize a furnace before beginning the maintenance work. From the evidence present at the scene the owner of the firm estimated that twenty minutes of maintenance work had been completed before the victim contacted the energy source. During this initial inspection, the wiring was identified as being "haphazard and confusing." On September 12, 1985, the electric meter was again pulled from the residence and the county electrical inspector and consulting engineers re-entered the crawl space. At this time it was determined that incorrect wiring through the toggle switch that supplied power to the furnace energized the ground lead. This incorrect wiring allowed current to flow to the furnace even though the toggle switch was in the "off" position. The homeowner stated that problems of this sort were never encountered during previous yearly maintenance. The owner of the firm stated that the victim was a very conscientious and meticulous employee. Perhaps the victim performed more thorough maintenance on the furnace than the previous service technicians and in so doing exposed himself to the electrocution hazard.

Cause of Death:

The assistant county coroner and the medical examiner listed the cause of death as accidental electrocution.

Recommendation/Discussion:

Recommendation #1: Employers should alert employees of hazards that they may encounter performing specific tasks and employees should be provided with the means to determine if these hazards are present.

Discussion: The employer should initiate electrical hazard awareness training that would alert employees of the electrical hazards they might encounter in their workplace (i.e., crawl space). Exposed conductors, open junction boxes, faulty wiring, and proper grounding should be discussed. Service employees, such as in this case, are daily exposed to new and unknown hazards in the workplace (i.e., crawlspace). These employees should be trained to recognize all hazards that might be encountered while working in crawl spaces. Once the employees are able to recognize these hazards, they will be able to control them. Employers might also provide employees with instruments that would allow them to detect energized equipment. This would have reduced the risk of serious injury in this incident and should prevent future accidents.

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

Discussion: The residential wiring in this incident was referred to as being “haphazard and confusing” by a member of the inspection team. The improper wiring present in the toggle switch allowed current to flow to the furnace even though the toggle switch was in the “off” position. The electrical system in the residence should be inspected and modified to satisfy the applicable requirements of the National Electrical Code. The existence of proper wiring in this incident would have greatly reduced the risk of serious injury. It is recognized that the National Electrical Code is not retroactive; however, the public should be encouraged to periodically review residential systems to assure that a safe system is maintained.

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Last Reviewed: November 18, 2015