The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Employee of an Electrical Contracting Firm is Electrocuted in North Carolina

FACE 85-36

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 fatal injuries 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.

Contacts/Activities:

On July 31, 1985, the NIOSH Region III consultant notified DSR of this fatality. DSR set up a meeting with the investigating compliance officer for August 5, 1985. On the evening of August 5, 1985, the DSR research team (a mechanical engineer, an EIS officer, and an engineering consultant) discussed the details of the accident with the compliance officer. The following morning an opening conference was held with the electrical contracting company's owner and safety officer, who provided background information about the company's history, type of work performed, and the company's safety and training programs. Several interviews were held and a site survey was conducted to better understand the events surrounding the accident and the daily activities performed by the victim.

Overview of the Employer's Safety Program:

The employer is an electrical contracting firm that was contracted by the local utility. The electrical contractor employs approximately 150 workers.

The employer's safety program is patterned after the safety program of the utility. An employee is assigned safety responsibility on a collateral-duty basis and promotional literature was periodically distributed. All training is on-the-job.

Synopsis of Events:

On July 30, 1985, the victim was at a townhouse development wiring an energized 7200 – 240/120 volt single-phase, step-down transformer. The employee had been with the company for nine months and had no electrical experience prior to accepting this job. The transformer provides power to a complex of four townhouses. The employee was to perform the

work to provide electrical power to the end townhouse (no. eight) then to townhouses six and seven. The victim was wearing insulated lineman's gloves.

The foreman observed the employee make the two "hot" terminal connections to the transformer spade lugs and then instructed him to make the three neutral connections. (Proper work procedure would require covering the two "hot" terminal connectors with rubber boots or a rubber blanket. This would provide electrical insulation and protect the worker from inadvertent contact.) The foreman then proceeded to the end townhouse to confer with the residential electrician. The employee permanently secured two neutral connections and loosely assembled a third connection. This loose connection would enable an additional neutral terminal connection to be completed after a cable was installed for townhouse five. Terminal connectors were not covered with rubber insulating boots.

The electrocution took place shortly after 9:00 a.m. Photos taken after the accident revealed the trench leading to the townhouses was open and evidence indicated the victim's left foot slipped into the trench, causing him to fall into the transformer. The area was very muddy and slippery at the time of the accident. It was reported that the victim had burn marks on the left side of his stomach and his right forearm, indicating probable contact with a terminal and the transformer box. Ambulance personnel were summoned and they transported the victim to a county hospital where he was pronounced dead.

Recommendations/Discussion:

Recommendation #1: Employees should not perform tasks on or around energized electrical equipment unless adequate work areas are provided.

Discussion: Working on electrical equipment constitutes a hazardous work condition. It is essential that all possible risks be reduced. This will require the use of good housekeeping procedures around the work area. The employee must be provided an adequate area to access equipment being installed. The victim did not have an adequate area on which to stand in front of the transformer, because of the trench. Construction of a 30-inch extension to the concrete transformer pad at the time of installation would provide an adequate work area and would be relatively inexpensive. Additionally, standing on non-conducting, safety grates will provide a structurally safe area from which to work and will serve to electrically insulate personnel working on the transformer. The anti-slip surface will provide safe footing. Safety grates are available in a variety of shapes and sizes and can be leveled by wood or concrete blocks usually found around a construction site.

Recommendation #2: The employee should make use of the available terminal boots and/or rubber blankets to provide electrical insulation while working in close proximity to energized terminals.

Discussion: Rubber insulating boots are for personal protection from energized spade terminals and should be used at all times when direct cable attachment to the spade terminals is not in progress.

Recommendation #3: Employers should hold management and first-line supervisory personnel accountable for job site safety.

Discussion: A foreman witnessed the hazardous condition that resulted in a fatality and did not intervene. Safety responsibilities that require accountability for all levels of supervision should be developed and supervisory personnel should be held accountable for all safety responsibilities. Performance evaluations and other incentives should address safety.

Recommendation #4: Employees should be assigned tasks commensurate with their level of experience, training, and skills.

Discussion: The employee involved in this incident had only nine months' experience. All electrical-related training was on-the-job. On-the-job training should be carefully evaluated to assure that it is complete and reinforces the policies of management (i.e., safety concerns).

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