

MARYLAND DIVISION OF LABOR AND INDUSTRY
MARYLAND FACE PROGRAM
CASE:94022
DATE:

To:Project Officer, State FACE Project, Division of Safety Research, NIOSH,
CDC

From:Maryland FACE Program, Division of Labor and Industry

Subject:Master electrician electrocuted while installing fluorescent lighting
at a commercial establishment--Maryland.

SUMMARY

A 35-year-old male master electrician was electrocuted while stripping insulation from the energized conductors of a metal-clad (MC) cable. The victim was working alone installing wiring in an emergency egress hallway of a commercial establishment and apparently was unaware that the cable was energized with 277 volts. No personal protective equipment was in use while the electrician was working with the live wires. The victim was unobserved during the event, but was believed to be standing on the ground with the cable in one hand and a wire stripper in the other hand. He was found in the poorly illuminated hall by the employee of another subcontractor who came to the victim's work area to borrow a tool. Upon finding the victim on the floor the worker kicked the foot of the victim to see if he was awake and then noticed the arcing at the victim's chest where he was clutching the cable and the wire stripper. The worker hollered to others to deenergize the power and call 911 to activate the emergency medical services. Another worker at the scene shut off the power to the building, came to the aid of the victim, and found him pulseless. No one on the scene knew CPR. Within five minutes the police responded and the officer initiated CPR. The fire department medic unit arrived several minutes later and continued CPR until transporting the victim to the hospital where he was pronounced dead 70 minutes later.

The Maryland FACE Investigator concluded that to prevent similar occurrences employers should:

**develop, implement, and enforce a lockout/tagout program for electrical circuits or equipment in accordance with the requirements of 29 CFR 1926.417.*

**ensure that employees do not work alone in situations where a "buddy system" could prevent injury through greater attention to the safety requirements of a job.*

**develop a specific job site safety plan and ensure that care is taken to update the plan when job specifications are changed.*

INTRODUCTION

On May 12, 1994, a 31-year-old master electrician died after being electrocuted by a 277 volt line on which he was working. Several hours after the event the supervisor for MOSH Operations contacted the Maryland FACE

Investigator to report a fatality. On June 7, 1994 an interview with the employer was conducted by the Maryland FACE Investigator. Other interviews were conducted with the Maryland Occupational Safety and Health Inspectors who responded to the scene. Validation of the master electrician licensure status of the decedent was made with the state board of professional licensure. Photographs of the scene were requested and reviewed. The Medical Examiner's report, the police report, and the Maryland Occupational Safety and Health Inspector's narrative report were reviewed during the investigation.

The employer was an electrical contractor with twenty employees, twelve of whom held the same job title as the victim -- field foreman. The contractor had been in business for two and one-half years. The victim was the sole employee of the electrical contractor on the site the day of the fatality and the lead foreman when several employees had been at the site during the three month job. The employer had been involved with the project from the preparation for demolition through the completion of remodelling. Safety considerations were considered during the planning and design phase of this job.

The company had a designated Field Manager/Safety Director who reported to the company owner and spent approximately 50% of his time on safety duties, including visits to each job-site at least two times per week. The employer had a written safety program that included safety rules, safe work procedures for specific settings, and a lockout/tagout program. Enforcement of the safety policies included "writing up" a notice to be placed in the file of an employee not following safe work procedures. There were also required bi-weekly safety meetings conducted by the field foremen to discuss safety and other job related topics. The field foreman was vested with responsibility for on-site job safety. The company is explicit in its commitment to safety and loss prevention, but also clear about employees' responsibility to work safely.

Training for employees was provided on-the-job and reinforced by company safety manuals, scheduled safety meetings and printed materials. Through on-the-job training and close supervision by a field foreman new employees were checked on how well they performed expected tasks before they were permitted to work alone. Working on energized conductors was not allowed by company policy and no employee had previously been found in violation of this rule. The company had never experienced a fatality and had no recorded injuries during the previous year.

A minimum requirement for the position of field foreman was the status of journeyman electrician, which requires at least two years of apprenticeship. Licensure as a master electrician is granted to those who pass certification tests at the county and state level. To sit for the exam an individual must have seven years of experience under the supervision of a master electrician.

The victim was a master electrician who had been working as an electrician for at least twelve years, five of which were spent operating his own business. The victim had been with the employer four months at the time of the incident. The victim had worked with a senior field foreman during his first several weeks with the company and had demonstrated sufficient skills to work alone as a field foreman.

INVESTIGATION

The employer had provided electrical contracting services to the general

contractor on a commercial establishment remodelling job from the initial phases of planning the demolition and providing temporary power through completion of the project. The victim had been the field foreman on the site for the three month duration of the job and supervised up to three employees.

On the day of the incident the victim was working alone on the installation of fluorescent lighting and emergency exit lights that had been added to the original job specifications. The victim was in the process of adding a light fixture to a circuit that provided power to other lighting fixtures in the building. The victim was using no special PPE, but was wearing suitable work clothing, including work boots.

The work being completed by the electrical subcontractor and other special trades contractors on the day of the fatality was required to be completed before the end of the day to be ready for an inspection of the facility by the fire marshall. The victim had arrived at the site earlier in the morning, but had left to pick up the required lights from a distributor because they had been back-ordered by the electrical contractor's own warehouse. When the victim returned with the necessary fixtures the general contractor asked about the status of an emergency light elsewhere in the building that did not appear to be charging because the indicator light was not illuminated. The victim closed the circuit at the service panel to verify that the light was charging.

This light was on the same circuit to which the victim intended to add the new fixtures.

The victim was standing on a dry concrete floor inside the doorway to the emergency exit hallway which measured 4 feet wide by 30 feet long. The work location of the victim was visually isolated from other people working at the site that day and 163 feet from the circuit breaker cabinet. The circuit breaker cabinet was capable of being locked-out/tagged-out because it was equipped with a locking door to which the foreman was holding one of two keys--the other key was taped to the inside of the door of the circuit breaker box.

The victim was in the process of stripping insulation from the three conductors of the metal-clad (MC) cable which entered the hallway from an opening in the wall above the doorway. The only tool being used at the time was a wire-stripper with insulated handles. Because the victim was working unobserved by others, the exact sequence of events which caused his death remains unknown. However, while the victim was stripping the insulation he must have contacted the energized conductor and some part of the cable, or his surroundings, to complete the path to ground. It is known that the victim had energized the circuit earlier that morning to demonstrate that other lighting fixtures on the line were functional. After the demonstration the circuit may not have been locked out/tagged out to prevent an unintentional contact with electrical energy.

A co-worker found the victim laying on his back and observed electrical arcing and sparks at the victim's chest where he was clutching the wire-stripper in one hand and the cable in the other hand. He hollered to others to shut off the power and call 911 because the electrician was being electrocuted. He also hollered for anyone who knew CPR, but no one was able to respond. Another worker at the site turned off the power to all circuits and came to the aid of the victim, removed the cable from his hands and felt for a pulse, but found none. A police officer responded to the scene within five minutes and initiated CPR when he found the victim had neither pulse nor respirations.

Fire department emergency medical services personnel responded about two

minutes later and relieved the officer. The victim was transported to a local hospital where he was pronounced dead on arrival 70 minutes after the incident occurred.

CAUSE OF DEATH

The Office of the Chief Medical Examiner listed the cause of death as electrocution. The victim had electrical burns on his chest and both hands.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: The employer should develop, implement, and enforce a lockout/tagout program for electrical circuits or equipment in accordance with the requirements of 29 CFR 1926.417.

Discussion: A lockout/tagout program requires that equipment and circuits be deenergized and locked out and/or tagged out to prevent reenergization while an employee is potentially exposed to electrical or mechanical energy. The regulation also requires that the equipment or circuits to which employees will be exposed be tested by a qualified person¹ for deenergization.

The employer in this case had implemented a lockout/tagout program, which should have prevented this fatality. The exact reasons the program did not work are unknown, but may have been an oversight as opposed to a deliberate act. Although the victim had previously closed the breaker and energized the circuit to demonstrate the functioning of another light, he may have forgotten, or not realized, that the conductor was energized as he began working on it.

The necessity of increased supervision for employees with regard to safety policies, especially for new hires regardless of their prior experience, may be an important addition to any safe work procedure implemented by an employer.

Recommendation #2: The employer should ensure that employees do not work alone in situations where a "buddy system" could prevent injury through greater attention to the safety requirements of a job.

Discussion: Previously the victim had been accompanied by one or more co-workers while on this job site. The victim was working under a time constraint due to a planned inspection of the building by the fire marshall. Deadlines are an unavoidable part of doing business, but the distraction of competing demands must be anticipated and adequate support for safe work practices should be ensured.

Recommendation #3: The employer should develop a specific job site safety plan and ensure that care is taken to update the plan when job specifications are changed.

¹ A "qualified person" is defined in 29 CFR 1926.449 as; "One familiar with the construction and operation of the equipment and the hazards involved".

Discussion: The specifications for the job were altered and the victim was performing an installation that differed from original job specifications. Additionally, the work was being done under the pressure of an inspection deadline and was hampered by a supply problem. The presence of, and adherence to, a specific job safety plan would provide continuing guidance on safe work procedures.

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Fatality Assessment and Control Evaluation

The Maryland Division of Labor and Industry administers the Fatality Assessment and Control Evaluation (FACE) Program under a cooperative agreement with the National Institute for Occupational Safety and Health, Division of Safety Research (NIOSH/DSR). The Maryland FACE Program performs investigations of selected occupational fatalities, prepares summary reports, and engages in prevention activities. The goal of our program is to prevent fatal work injuries in the future by studying the the working environment, the worker, the task being performed, the tools employed, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

NIOSH/DSR developed the FACE research protocol in the early 1980s and continues to perform FACE investigations. To increase the research and prevention activities of NIOSH/DSR, states across the nation have been invited to participate in the State FACE Project. Maryland and the fourteen states listed below currently participate in the State Based FACE Project: Alaska, California, Colorado, Georgia, Iowa, Indiana, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

Additional information regarding this report or the Maryland FACE Program is available from:

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