



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



32-Year-Old Electrician Electrocuted in Georgia

FACE 87-43

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 August 12, 1986, a 32-year-old electrician was electrocuted while attempting to replace a socket on an energized fluorescent light fixture. It is assumed that his hand contacted an energized, single strand wire on the secondary side of the ballast (530 volts).

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the State of Georgia notified DSR of this fatality and requested technical assistance. This case has been included in the FACE Project. A DSR researcher conducted an evaluation of this incident and conducted interviews with the safety director, the physician, and the personnel director of the company, union representatives, a surrogate for the victim, and two comparison workers. Discussions were also held with the OSHA compliance officer. The safety director of the company, an electrician, a union representative, and the DSR researcher visited and photographed the accident site. Due to the time interval between the accident and the evaluation, additional photographs taken immediately after the accident were obtained from the OSHA compliance officer.

Overview of Employer's Safety Program:

The automotive assembly plant has been in operation for 59 years and employs approximately 3000 workers. This plant is part of a 76-year-old publicly held company. The company has a corporate safety and health headquarters that administers an extensive safety and health program.

The assembly plant is staffed with two full-time safety professionals who are responsible for safety and health at the plant and provide related training. The company's corporate safety and health program provides training and resource materials to the local safety staff.

Varying levels of worker training are required according to the job applicant's experience and demonstrated proficiency with the required tasks of the job. Plant policy dictates that incoming electricians be hired at the journeyman level or enter apprenticeship training programs. Plant safety personnel appear to be conscientious and the employer is working to provide

a safe work environment.

Synopsis of Events:

At approximately 1:45 a.m., on August 12, 1986, two journeymen electricians were directed by the maintenance foreman to replace bulbs and make necessary electrical repairs to fluorescent light fixtures in an automobile spray paint booth. The spray booth is 50 feet long. The six foot long fixtures are mounted end to end on the ceiling to provide lighting for the full length of the spray booth. Several of the fixtures needed new sockets and ballasts. Replacement of these sockets and ballasts required the workers to climb on top of the spray booth and work from above the lighting fixtures. The top of the spray booth was congested with pipes and ducts that obstructed visibility and restricted work space and movement. The pipes and ducts made it difficult to assume a balanced, comfortable, or stable posture when working on the roof of the spray booth. Inadequate lighting above the spray booth required the use of flashlights.

The electricians decided to start at opposite ends of the spray booth. There were no witnesses to the accident, but the electrician who was working at the other end of the spray booth stated that he was momentarily distracted when he saw a flash of light, "similar to a cigarette lighter." He continued to work for approximately five minutes and then climbed down and walked to the other end of the booth to retrieve some wire from a tool cart. While cutting wire at the tool cart he smelled a burning odor. He called to the other electrician on the roof of the spray booth, but received no reply. He then climbed up the ladder where he found the victim in contact with a single strand wire from the secondary side of the ballast on one of the fluorescent lights. Needle nose wire strippers were stuck in the left side of his chest. (It is assumed that the victim was stripping insulation from an improperly grounded 530 volt energized single strand wire on the secondary side of the ballast when he contacted the exposed wire.) The electricians were aware that they were working on energized fixtures. However, the breakers within the control panel were not labeled and the lock used for lockout/tagout was inoperable.

Cause of Death:

The cause of death was accidental electrocution.

Recommendations/Discussion:

Recommendation #1: A readily accessible and properly labeled means of disconnecting energy to electrical circuits must be provided and utilized.

Discussion: The panel containing the circuit breakers to de-energize the fluorescent light fixtures was not labeled and co-workers stated that locating a disconnecting means and de-energizing a circuit often required more time than the actual completion of the task. Article 110-22 of the National Electrical Code requires, "Breaker panels or other means for disconnecting electrical energy should be legibly marked, checked for their correctness, and constantly updated to indicate the corresponding fixtures or appliances that can be de-energized by the breaker, unless the disconnecting means is located and arranged so that the purpose is evident." A clearly labeled panel would have provided the electricians with the proper means for disconnecting the power. Since the accident, a readily accessible system of disconnects has been installed.

Recommendation #2: Employers should assure that workers receive training in safe work procedures to accomplish their assigned tasks.

Discussion: The ballasts should not have been replaced or otherwise accessed while the light fixtures were energized. The circuit(s) for the fluorescent light fixtures should have been de energized prior to the start of work. Once a circuit is de-energized, it should be tested to verify that it has been de-energized.

Recommendation #3: Circuits that are de-energized should have a means (i.e., lockout, tagout) to assure that these circuits are not inadvertently energized.

Discussion: At the time of the accident, the lock provided to lock out the circuit was inoperable, and the workers did not take any steps to assure that the circuits they were working on were de-energized. Lockout/tagout procedures were not used.

Recommendation #4: Adequate illumination should be provided for all work areas to assure worker safety.

Discussion: At the time of the accident inadequate lighting required the use of flashlights and limited the visibility of the electricians. The congestion caused by the pipes and ducts in the work area further hindered the electricians in the safe performance of their tasks. Since the accident, additional lighting on independent circuits has been installed above the spray booth to provide an adequate level of illumination.

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