



The National Institute for Occupational Safety and Health (NIOSH)



Electrician Dies Working on Energized Electrical Circuit in New Jersey

New Jersey Case Report: 90NJ006 (formerly NJ9004)

SUMMARY

A two-man crew of electricians was installing new wiring through an existing conduit in a department store ceiling. While using a personnel lift to work overhead, one of the workers made contact with an energized 277 volt electrical circuit. He was electrocuted and fell out of the lift. FACE investigators concluded that in order to prevent future similar occurrences employers and employees must:

- deenergize all electrical circuits whenever any chance of making contact exists;
- utilize fall protection whenever a chance of a serious fall exists.

INTRODUCTION

The FACE team of the New Jersey Department of Health was informed on May 2, 1990 of the fatality by an OSHA area safety supervisor. The OSHA compliance officer visited the site immediately and the FACE team conducted an on-site investigation on May 3, 1990. Photographs were taken. Information about the co-worker's statements was taken from the OSHA file and other inspection reports. Investigations were also conducted by the local police department, county prosecutor's office and the county electrical inspector, all on the day of the fatality.

The employer is an electrical contractor who has been in business for 40 years. The contractor employs 12 workers, 11 of whom are electricians or electrical helpers. The employer was cited by OSHA in 1989 because of the fatal electrocution of another employee. A written safety policy exists and the company has a classroom and videotapes on safe work practices. According to the OSHA safety specialist, the employer puts a great emphasis on safety education.

After the 1989 fatality, employees were required to sign a statement acknowledging that "de-energizing electrical circuits is required when work is performed and should be tagged or locked out". It was signed by all electrical workers including the victim and his co-worker. The victim had worked for the company for 5 years and had learned his trade through on-the-job training.

INVESTIGATION

The company was contracted to install extra wiring in the store. Some of the previous work had been done by the victim. The victim and his co-worker were using a spare wire to pull two new wires through an existing ceiling conduit. They were not aware that an existing 277 volt line had been spliced and had a potential of 277 volts to ground. It is unclear what

sequence of events lead to the fatal contact with the energized circuit since the co-worker's reports have been inconsistent. According to the electrical inspector, they had tested only the spare line to be sure it was not energized. Other statements indicated that the two workers did not test any lines, presumably because they thought that since the wires were all intact there could not be exposure to electricity. The wires became stalled as they were being fed through the junction box. The force of threading the new wires through the box may have dislodged the protective connector over the splice, or the victim may have pulled the wires toward him and slightly out of the box in order to facilitate threading the wires through the box and, inadvertently, knocked off the protective cap. The co-worker says that before he left the area he observed the open junction box with the protective wire nut on the spliced circuit.

The two electricians took turns working in the personnel lift to reach the conduit in the 22 feet high ceiling. The victim was in the lift, elevated to working height, when he made contact with the energized circuit, either by touching it with his hand or a pair of pliers. He was electrocuted with 277 volts, lost consciousness and fell out of the lift to the floor, a distance of approximately 16 feet (the approximate height of the lift platform). In order to enter the lift it is necessary to stoop & step under the guardrail on the side of entrance. A worker using the lift is protected from a fall by the guardrail on four sides and midrail on three sides. On the entry side a chain, the two ends of which must be fastened, substitutes for the midrail. The victim did not fasten the two ends of the chain. When he lost consciousness he became limp and fell out of the lift.

The store manager heard a thump & reached the victim first. He found him on the floor unconscious with blood under his head and in respiratory distress. Emergency services were summoned and a store customer who is a paramedic started CPR in less than a minute after the incident. She was joined by a policeman who arrived first at the scene.

Paramedics arrived about 15 minutes after being called, followed by the local rescue squad. The employee was transported to the local emergency room where he died.

The electrical inspector's report noted that an open junction box with several circuits passing through it was directly above the lift on which the victim had been working. Energized conductors were hanging out of the box with no splice connector installed. A connector was found laying on the lift platform. The spliced conductors were energized and had a potential of 277 volts to ground. The building steel, metal conduits and boxes, flexible metal conduit and the personnel lift were tested and found to be properly grounded. No electrical code violations were noted.

CAUSE OF DEATH

The medical examiner's report listed the cause of death as electrocution.

RECOMMENDATIONS/DISCUSSIONS

Recommendation #1: Electrical circuits should not be repaired or accessed unless de-energized, de-energization personally verified, the circuit locked out and tagged out.

Discussion: 29 CFR 1926.416(a) ensures that an employee will not work in an area of an energized source of electricity. Although the workers did not expect to encounter exposure to an energized circuit, the possibility of doing so always exists. All circuits in the area should have been de energized. Although they had not done so previously, when the crew realized the circuit had been spliced, at that point, they should have deenergized the line.

Recommendation #2: All accessible fall protection must be utilized whenever the potential for a serious fall exists.

Discussion: Although the guard rails and midrails provide protection against a fall out of the lift, full protection was not ensured because the two parts of the chain at midrail height on the entrance side were not attached. The OSHA compliance officer determined that this was in violation of 29 CFR 1926.451(e)(10)

Recommendation #3: Improved fall protection would be provided if the manufacturer enclosed the lift bucket with a wire mesh to a height of the guard rails. An enclosed entrance door would be necessary, as a substitute to the chain that is now present.

Discussion: If the bucket was enclosed with a protective mesh it would have prevented the victim from falling out when he became unconscious and lost his ability to stand upright.

Recommendations #4: All electrical workers should be trained and certified in basic CPR.

Discussion: Because of the hazard of electrical work, all electricians and electrical workers should become proficient in CPR. In the event of sudden cessation of heart or respiratory function, emergency procedures must be initiated immediately. Valuable time is lost in waiting for emergency services. In this situation, although emergency resuscitation was begun quickly, it did not alter the fatal outcome.

REFERENCES

1. 29 CFR 1926.416 (a) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.
2. 29 CFR 1926.451(e)(10) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register

FATAL ACCIDENT CIRCUMSTANCES AND EPIDEMIOLOGY (FACE) PROJECT

Staff members of the FACE project of the New Jersey Department of Health, Occupational Health Service, perform FACE investigation when there is a work-related fatal fall or electrocution reported. The goal of these investigations is to prevent fatal work injuries in the future by studying: the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

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