

Electrician Electrocuted After Contacting 277 Volts While Installing An Overhead Light Fixture

DATE: October 2, 1992

SUMMARY

On March 16, 1992, a 60 year-old male journeyman electrician was electrocuted after he contacted an energized electrical cable carrying 277 volts. The incident occurred in an office building which was being renovated to expand the office space. As he was working from a wooden ladder to install two new fluorescent lighting fixtures in the ceiling, the victim contacted the energized cable while attempting to wire the cable to the fixture. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- *Employers and employees should ensure that all electrical circuits are de-energized and thoroughly tested before working on them.*
- *Employers should develop, implement, and enforce a written safety training program that addresses the procedures to be followed before work is performed on energized circuits.*
- *Employers should develop, implement, and enforce an electrical lock-out, tag-out procedure.*

INTRODUCTION

On March 16, 1992, NJDOH FACE personnel were notified by the area OSHA safety supervisor of a work-related electrocution that occurred earlier that day. After contacting the employer and the owner of the building where the incident occurred, FACE investigators visited the site on March 30, 1992 to examine and photograph the scene and interview the site owner. Additional information was obtained from the OSHA compliance officer, witness statements, and the police and medical examiner's reports.

The victim was a 60 year old journeyman electrician who had been hired from the union hall and had worked for the employer for less than a week. The employer was an electrical sub-contractor who employed about 50 workers, three of which were working at the company's field office near the site of the incident. The employer was under contract with the site owner for over five years and was responsible for maintaining the building's electrical systems. The employer did not have an electrical training or safety program, explaining that the workers were hired from the trade union halls and were certified by the union as trained journeymen or apprentices. As part of the contract with the site owner, the employer was required to follow all the site owner's safety rules, including the enforcement of a lock-out tag-out procedure.

INVESTIGATION

The incident occurred at a large modern office complex located in a suburban area. A part of the building's second floor was being renovated to enlarge some of the private offices, a job which required repositioning the partition walls and moving some of the overhead fluorescent light fixtures. The employees in the offices were moved out prior to the renovation and the area was isolated by hanging plastic sheets between the construction and office areas.

Three employees of the electrical contractor were at the site on the morning of the incident; the foreman, a journeyman electrician (the victim), and an apprentice electrician. At 7:15 a.m., the foreman gave the victim a set of blueprints and explained the job to him. He was told to install new 2 by 2 foot fluorescent lighting fixtures in two private offices that were being expanded. To do this, he was instructed to install a fixture tail (electrical cable) to one fixture and connect it to the existing lights with a jumper cable. He was also told to reconnect the power on a second bank of lights in an adjacent open area that had been disconnected the week earlier. The foreman did not instruct the victim to de-energize the circuit breakers.

The two electricians then went to the job site. After setting up an 8 foot wooden stepladder, the victim began installing the new fixtures in the corner office. At some point, the victim asked the apprentice "What's up there?". The apprentice replied, "there's a hot switch leg and another fixture tail to be tied into the new fixtures", to which the victim said "Okay". The switch leg was an energized 277 volt electrical cable that had previously been connected to a wall switch in a partition wall. After the partition was moved, the cable was left hanging from a junction box in the ceiling. The fixture tail was an electrical cable from another light fixture that had not yet been connected and was de-energized. While working on the fixtures, the victim hung his tool belt on the pipes above the suspended ceiling and placed a voltmeter on a ceiling panel near the cables.

No one witnessed the incident. At about 9:30 a.m., after a coffee break, the victim resumed work on wiring the fixtures and was last seen working on an electrical cable while standing on the 4th rung of the ladder. He contacted the 277 volts apparently while stripping the insulation from the switch leg wires with a wire cutter. The electric shock burned the victim's left hand and knocked him from the ladder. The apprentice, who was working at another end of the room, and several office workers heard the victim fall and went to his aid. The apprentice checked the victim for a pulse and found none. An office employee then started cardio-pulmonary resuscitation, which was continued after the company nurse arrived. The police and paramedics arrived soon after, and the victim was transported to the local hospital where he was pronounced dead at 10:36 a.m.

It is not known why the victim was working on the energized switch leg. The apprentice thought that the victim grabbed the wrong cable and failed to test both the black and white wires after removing the wire nuts. The foreman later stated that there was no reason for the circuits to be energized and that they always test every circuit beforehand. Although the contractor had access to the breaker box, they did not de-energize the circuits in that area. It was noted by OSHA that the second bank of lights adjacent to the accident site was de-energized by taping off the wall switch.

CAUSE OF DEATH

The county medical examiner attributed the cause of death to electrocution. The medical examiner's report stated that there were third degree burns on the first three fingers of the victim's left hand. No other electrical burns were found.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers and employees should ensure that all electrical circuits are de-energized and thoroughly tested before working on them.

Discussion: Although the circumstances of this incident are not fully known, it appears that the victim contacted a circuit he may have thought was de-energized. It is also possible that he either neglected to test or did not fully test the circuit before working on it. To prevent incidents such as this, the employer should ensure that all circuits are de-energized at the breaker box before working on them. All circuits should also be thoroughly tested to confirm that they are de-energized. It may be useful to do this with a "touchless" voltage detector (such as a tic-tracer) which senses a circuit's electric field without making direct contact with the wires.

Recommendation #2: Employers should develop, implement, and enforce a written safety training program that addresses the procedures to be followed before work is performed on energized circuits.

Discussion: In reviewing this case, there appeared to be some confusion regarding company procedures. Although he did not instruct the victim to de-energize the circuits, the foreman was quoted by OSHA to say that "there was no reason why (the victim) couldn't have turned the circuit breaker off". It was also not clear why the victim asked the apprentice "what's up there?" after receiving instructions from his supervisor. In addition, the victim did not properly follow the stated company procedure of testing all circuits before working on them. To prevent this, it is recommended that a written safety training program should be implemented that includes worker training in company safety procedures as well as recognizing and avoiding electrical hazards. Daily inspections of the work area should also be done by a supervisor to ensure compliance with the safety procedures.

Recommendation #3: Employers should develop, implement, and enforce an electrical lock-out, tag-out procedure.

Discussion: In this situation, the employer's lock-out, tag-out procedure was limited to de-energizing a nearby circuit by taping off a wall switch. It is recommended that the employer should immediately implement an effective electrical lock-out, tag-out procedure that includes de-energizing and locking all circuits at the breaker box. The employer should also inform the site owners of this procedure so that neighboring employees know not to disturb the locked circuits. The locking out and tagging of electrical controls is required by the OSHA standard 29 CFR 1926.417(b).

REFERENCES

Code of Federal Regulations 29 CFR 1926, 1991 edition. US Government Printing Office, Office of the Federal Register, Washington DC, pg. 162

To contact [New Jersey State FACE program personnel](#) regarding State-based FACE reports, please use information listed on the Contact Sheet on the NIOSH FACE web site. Please contact [In-house FACE program personnel](#) regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.