Sheet Metal Worker Electrocuted After Contacting 277 Volts While Replacing An Overhead Light Fixture

September 26, 1994

SUMMARY

On December 22, 1993, a 27 year-old male sheet metal worker was electrocuted as he was apparently trying to repair an a overhead light fixture. The victim had accidentally damaged the fixture several days earlier while repairing the ventilation ductwork above the light. On the day of the incident, the victim and a co-worker were measuring another area of the plant for new ductwork. After completing the measurements, the victim and co-worker went into the room with the damaged light and set up a small personnel lift. The victim was on the lift apparently trying to remove a nut from an electrical junction box in the ceiling when he contacted 277 volts from the energized circuit. NJDOH FACE investigators concluded that, in order to prevent similar incidents in the future, the following safety guidelines should be followed:

- **Employers should develop and implement a written electrical safety program.**
- **Employers and employees should ensure that all electrical circuits are de-energized and tested before working on or near them.**
- **Employers should develop and implement an electrical lock-out, tag-out procedure for de-energizing circuits.**

INTRODUCTION

On December 27, 1993 NJDOH FACE personnel were notified by a newspaper article of a work-related electrocution. After contacting the employer, FACE investigators visited the incident site on March 2, 1994, to photograph the incident scene and interview the site owner. The employer was interviewed on March 17, 1994. Additional information was obtained from the OSHA compliance officer, written witness statements, and the police and medical examiner's reports.

The employer was a sheet metal contractor and fabricator who installed heating, ventilating, and air conditioning (HVAC) systems. The employer had been in business for 53 years and employed 40 workers. The company had a written safety program and conducted regular safety meetings. The victim was a 27 year-old sheet metal worker who had worked for the company for 10 years. He was hired after graduating from his high school vo-tech program and had completed the company apprenticeship.

INVESTIGATION

The incident occurred at a new pharmaceutical manufacturing plant located in a rural-suburban area. A pharmaceutical company had recently acquired the building and was modifying it for manufacturing. This required building new rooms inside the building and installing a specially designed HVAC system. The sheet metal company had been sub-contracted to design, fabricate, and install the HVAC system. The sheet metal company had been onsite for the past 18 months, and work had progressed to where the plant was nearly completed. In addition to installing the ventilation system, the company also did sheet rock construction at the plant. The sheet metal company did not do any electrical work. Electrical work which was done by a separate electrical sub-contractor.

On December 13, 1993, nine days prior to the incident, the victim and a co-worker went to the pharmaceutical plant to repair a duct that had become loose in a production room. The ducts were located above the ceiling tiles and terminated at filters mounted in the ceiling that supplied the room with filtered air. While repairing the loose duct, the victim apparently stepped on an adjoining light fixture, knocking the fixture from the ceiling and damaging the surrounding sheet rock. The victim called the shop and was told that their electrical contractor would repair the light. Although not instructed to do so, the victim insulated the hanging wires with a wire nut and tape and pushed the wires back into the ceiling. On December 21, 1993, the day before the incident, two employees from the sheet metal company went to the plant to repair the damaged sheetrock ceiling. They saw the wrapped wires but did not touch them.

The incident occurred on Wednesday, December 22, 1993. The victim and a co-worker arrived at the plant at about 7:30 a.m. to measure for new HVAC ductwork and to finish repairs to the damaged ceiling. For most of the morning the victim worked in another area of the plant measuring for the ducts while his co-worker painted the sheetrock that had been repaired the day before. When the victim finished his task, he reported to the pharmaceutical plant manager who was in a meeting. While waiting for the manager, the victim asked his co-worker to bring the personnel lift into the production room where the light was located. At about 11:40 a.m., the victim boarded the lift and raised himself to the wires in the ceiling while the co-worker returned to his tasks in the room. The co-worker then heard the victim groan and turned to see him slumped over in the lift with the wires in his hand. The co-worker used a jacket to knock or separate the victim from the wires and called for help. Plant employees who responded lowered the lift and removed the victim to another room. CPR was started by a plant employee and continued as the police and EMS arrived. The victim was transported to the local hospital where he was pronounced dead.

It is not known exactly why the victim was working with the wires. As a new light fixture was in the room with him, it may be assumed that he was attempting to replace the light on his own. The OSHA investigation concluded that he apparently removed a metal nut holding a metal plate to an electrical (BX) cable. When he tried to force the metal nut over a capped wire, the metal nut cut through the wire's insulation and contacted the energized 277 volt conductor. The power apparently passed into his hand, through his body, and exited though his other hand that was holding the BX cable.

CAUSE OF DEATH

The county medical examiner determined the cause of death to be from electrocution. Burn marks were noted on both hands.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Employers should develop and implement a written electrical safety program.

Discussion: The victim was working far outside his normal job duties and training by trying to fix the light himself. To prevent future incidents, FACE recommends that the company develop, implement, and enforce a written electrical safety program. This program should first clearly state the company policy of not working on any electrical circuits or otherwise attempting to do tasks outside of their job duties. Workers should be trained to recognize potentially dangerous electrical hazards, such as installing ductwork near energized wires.

Recommendation #2: Employers and employees should ensure that all electrical circuits are de-energized and tested before working on or near them.

Discussion: In situations where working near electrical wires is necessary, we recommend that all circuits be de-energized at the breaker box and locked out before employees work near them. These circuits should also be thoroughly tested to confirm that they are de-energized. This can be done with a appropriatly rated voltage detector (such as a tic-tracer) which senses a circuit's electric field without making direct contact with the wires.

Recommendation #3: Employers should develop and implement an electrical lock-out, tag-out procedure for de-energizing circuits.

Discussion: It is also recommended that an effective lock-out, tag-out procedure be used when circuits are de-energized. This procedure will prevent someone inadvertently re-energizing a circuit that an employee may be working on or near. The locking out and tagging of electrical controls may also be required by the federal 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.

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.