MIFACE INVESTIGATION: #02MI119

SUBJECT: Inside Wireman Electrician Electrocuted Working on Exterior Light Pole

Summary

On September 9, 2002 a 41 year-old journeyman electrician was electrocuted while he was working on an exterior light pole (Figure 1). He and his partner were replacing non-functioning lights on two-light light poles. One of the new lights installed did not work. His partner was at the top of the pole in an aerial work basket checking the ballast. The victim was kneeling on damp grass at the base of the light pole so he could open the handhole to inspect the wiring and fuses. He was not wearing or using any protective equipment. The wires were energized and carried 277 volts of electricity. Although exactly what occurred is not known, it is possible that the plastic cover over the fuse inside the pole was broken, and when he reached into the handhole to extract the wires, he made contact with the electricity. It is also possible that he extracted the wires from the handhole, and as he attempted to untwist the plastic cover over a fuse, it broke in his hands. However it happened, he made contact with the electricity. When his partner realized what had happened, he descended immediately and severed the victim's contact with a wooden board. Emergency medical care was given at the site. He was pronounced dead at the hospital.

Figure 1 Light pole involved

RECOMMENDATIONS

- Employers should ensure that a responsible person such as a supervisor/manager periodically monitors workers who are assigned to remote locations.
- Do not work on energized faulty or damaged equipment.
- Ensure that appropriate safety equipment is available and that workers use it.
- Disconnect and lock out electrical lines from their energy source before working on them.
- Periodically reinforce training of supervisors and workers regarding the hazards associated with specific work assignments and work practices.

Keywords: Electrocution, Remote Work, Exterior Light Pole

INTRODUCTION

On September 9, 2002 a 41-year old journeyman electrician was electrocuted while he was working on an exterior light pole. On September 9, 2002, MIFACE investigators were informed by the Michigan Occupational Safety and Health Act (MIOSHA) personnel who had received a report on their 24 hour-a-day hotline that a work-related fatal injury had occurred on that same day. On October 22, 2002, the MIFACE researcher interviewed the president of the company that employed the electrician. He described the events on the day of the fatality as they had been told to him by the electrician's partner. During the course of writing the report, the autopsy results and the MIOSHA citations were obtained. The light pole diagram was given to the researcher by the employer. The photos were taken by the researcher.

The company for whom the electrician worked conducted electrical construction and maintenance. It had approximately 25 employees, 20 of whom had the same job title as the victim, inside wireman. The company had been in business for 50 years. The workers employed by the company were journeymen electricians and were hired through the local union hall. One of the company's maintenance contracts involved maintaining the exterior lights at a large campus-like facility. The electricians were given their work assignments by the owners of the facility.

The victim had worked as a journeyman electrician with the designation of inside wireman for 12 years. He was 41 years old. He had been working for this company for three months. He had not received specific training from his employer for the task he was doing at the time of the incident. He had been working at the facility site for two days. His shift started at 7:00 a.m. The time of the incident and the time recorded for his death were the same, 12:50 p.m. This employer had never had a fatality occur.

The MIOSHA investigation resulted in two serious citations being issued to the company: one citation for failing to insure that all live parts of electrical equipment operating at 50 volts or more were properly guarded against accidental contact, and one for failing to provide employees with protective equipment to guard against electrical shock hazards.

Figure 2. Handhole

INVESTIGATION

On Monday, September 9, 2002, a 41 year-old journeyman electrician and his partner were replacing non-functioning lights on two-light exterior light poles. One of the new lights they had just installed did not work. His partner was at the top of the pole in an aerial work basket checking the ballast. The victim had opened the handhole of the light pole to access the wiring and fuses. They had not locked out the electricity to the light pole, so the wires were energized. The area where they would have locked out the electricity was approximately a block away.

The exterior lights at this facility were set low in the ground for aesthetic reasons, so the handhole was close to the ground (Diagram 1). The handhole was also small, making it difficult to see inside and access the wires and fuses (Figure 2). The author of this report has not been able to find any guidelines or standard practices that would govern the size of light pole handholes or their placement in the light pole relative to the ground. The victim was a large man, over 300 pounds and over 6 feet tall, which made it yet more difficult for him to access the handhole. He knelt on the damp grass to access the opening. He was not wearing or using any type of protective equipment such as non-conductive gloves or a non-conductive mat. There was no ground fault circuit interrupter (GFCI), because GFCI's such as would be found in a residential setting are seldom used in a commercial setting. The type of GFCI used in a commercial application would not have prevented the fatality. That type of GFCI would be installed to prevent equipment damage, not prevent injury.

His partner was above him in the aerial work basket and did not directly see what happened. Based on what he did see and hear, he believed the following occurred. After removing the wires from the handhole, the victim tried to remove the plastic cover over a fuse on one of the wires. As he attempted to open it, it broke in his hands causing him to contact 277 volts of electricity. Over time, plastic may become brittle as a result of heat and environmental conditions. It is also possible that the plastic fuse cover was broken inside the light pole, and that when he reached into the handhole to extract the wires, he contacted the electricity at that time. The burns on his hands indicated that the electricity entered one hand and exited the other. His partner descended immediately and severed the victim's contact with a wooden board. Emergency medical care was given at the site. The time of the incident and the time recorded for his death were the same, 12:50 p.m. He was transported to the hospital where he was pronounced dead.

The autopsy report stated there was a measurable level of a non-active cannabis (i.e., marijuana, hashish or hash oil) metabolite in the deceased's blood. Whether or not the deceased had recently used cannabis and was under its effects at the time of the incident cannot be known, because the non-active metabolite remains at measurable levels in the blood for several days to weeks following a single cannabis exposure. The autopsy report stated that the quantity of delta–9 THC, the active ingredient in cannabis, could not be analyzed due to the presence of an interfering substance.

CAUSE OF DEATH

The cause of death as stated on the death certificate was electrocution. The injuries were described as 1/2" burn on the hypothenar area of right hand, 1/4" burn on anterior surface of right fifth finger, and multiple burns on hypothenar area of left hand extending to the anterior surface of the left fifth finger.

No alcohol was detected in the blood screen. Cannabinoids were detected in the urine. No drugs were detected in the serum screen.

RECOMMENDATIONS/DISCUSSION

- Employers should ensure that a responsible person such as a supervisor/manager periodically monitors workers who are assigned to remote locations.

Even though the facility personnel provided the workers with their daily job assignments, the employer continued to have primary responsibility for their work and how it was conducted. The facility person knew what work needed to be done and assumed that the workers would conduct the work appropriately.

- Do not work on energized faulty or damaged equipment.

It appears the fuse holder was damaged or had become brittle, so that it was either broken inside the light pole or broke in his hands as he tried to open it. Over time, plastic-based items lose their elasticity and become brittle, particularly those exposed to the elements. Injuries and fatalities are seldom if ever caused by one factor, but rather by the contribution of several factors. In this case, it is suspected that a faulty fuse holder contributed to the fatality.

- Ensure that appropriate safety equipment is available and that workers use it.

Appropriate personal protective equipment should be readily available and its uses and limitations fully known and accepted by the workers. Workers should use it as appropriate. The worker used no personal protective equipment such as rubber gloves or a non-conducting mat. The proximity of the handhole to the ground exacerbated the hazards of the situation.

- Disconnect and lock out electrical lines from their energy source before working on them.

The workers had not locked out the electricity to the light pole on which they were working. They did not need the lines to be energized to check the fuses. The circuit was located approximately a block away. Workers who perform hazardous tasks can develop a cavalier attitude over time. The company's electrical permit and lockout procedures should be stressed and strictly enforced regardless of the voltages involved. Safety training should stress that all voltages are potentially lethal.

- Periodically reinforce training of supervisors and workers regarding the hazards associated with specific work assignments and safe work practices.

A review of the specific hazards of the tasks the workers would be expected to perform and periodical monitoring of the workers would provide the employer with some confidence that the work assigned was being conducted in an appropriate manner. Even though the victim was a journeyman electrician, it is possible that his knowledge of how to perform the task was not adequate. Also, as mentioned above, workers who perform hazardous tasks may develop a cavalier attitude over time. Workers' attitudes and motivations impact their work practices as well as their knowledge of how to do the work.

The workers' knowing the safe and correct way to work plus them knowing that the employer expects that the work will be conducted safely and correctly should be emphasized in worker training. Reinforcement of the importance of safe work procedures and the expectation that they would be followed is an important element the prevention of injuries.

REFERENCES

1. Accident Prevention Manual for Business & Industry, Engineering and Technology, 11th Edition, National Safety Council, Chicago, 1997.

2. MIOSHA Standards cited in this report can be found at www.michigan.gov/mioshastandards.The Standards can also be obtained for a fee by writing to the following address: Department of Consumer and Industry Services, MIOSHA Standards Division, P.O. Box 30643, Lansing, MI 48909-8143. MIOSHA phone number is (517) 322-1845.

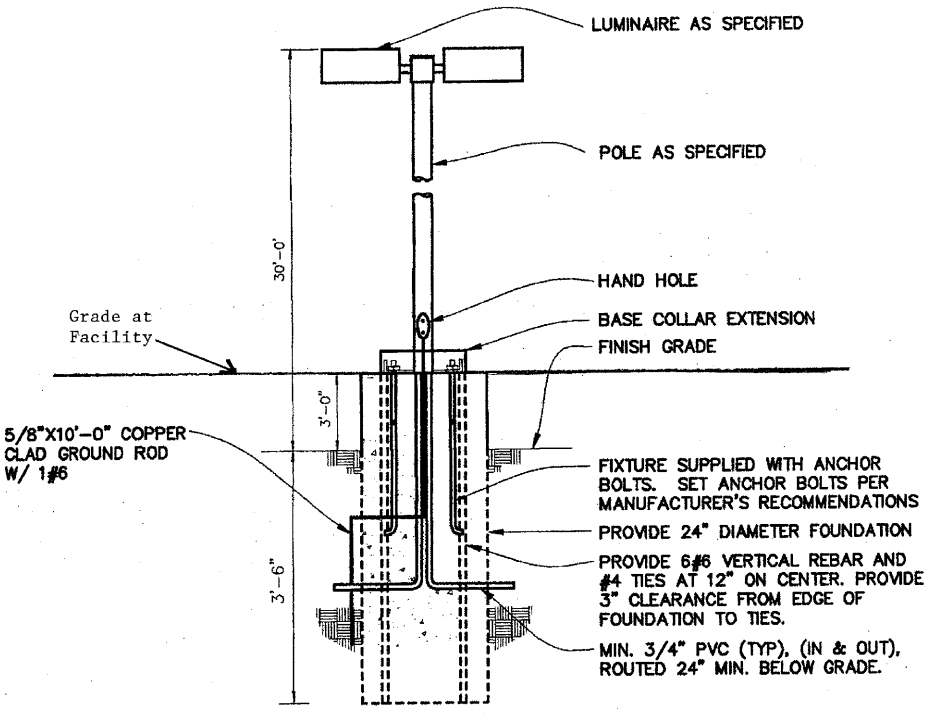
3. Worker Deaths by Electrocution, A Summary of Surveillance findings and Investigative Case Reports, Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease

Control and Prevention, National Institute for Occupational Safety and Health, Division of Safety Research. DHHS (NIOSH) Publication 98-131. http://www.cdc.gov/niosh/elecmono.html

4 NIOSH Alert: Request for assistance in preventing electrocutions due to damaged receptacles and connectors. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Safety Research. DHHS (NIOSH) Publication 87-100. http://www.cdc.gov/niosh/87-100.html

5. NIOSH Alert: Request for assistance in preventing fatalities of workers who contact electrical energy. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Safety Research. DHHS (NIOSH) Publication 87-103. http://www.cdc.gov/niosh/87-103.html

Diagram 1



EXTERIOR POLE BASE DETAIL
NO SCALE

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Please rate the following on a scale of:

Excellent	Good	Fair	Poor
1	2	3	4

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1	2	3	4

Was the report…	**Excellent**	**Good**	**Fair**	**Poor**
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