



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Supervisor Dies Following Electrical Fire

FACE 89-09

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations 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.

On November 24, 1988, a 45-year-old male hydroelectric supervisor died as a result of massive burns sustained in an electrical fire on October 16, 1988.

Contacts/Activities:

State officials notified DSR of this fatality and requested technical assistance. On January 4, 1989, a research safety specialist and an occupational health nurse met with company officials, and visited and photographed the incident site.

Overview of Employer's Safety Program:

The employer is a large textile firm with 800 employees which has been in existence for 107 years. In addition to the textile operation, the company owns and operates two hydroelectric plants as well as the water treatment and wastewater treatment plants for a small town which was initially built to support the mill. The company has a detailed safety program, with safety meetings held on both a weekly and monthly basis. The victim had been employed by the company for 28 years, initially serving as an apprentice and later as the only journeyman hydroelectric supervisor in the company.

Synopsis of Events:

As hydroelectric supervisor, the victim served as supervisor and maintenance foreman for two hydroelectric plants and more than 8 miles of high voltage power lines serving both the textile plant and the community. He was also responsible for a small municipal water treatment plant, a sewer plant, and several homes and other buildings owned by the company.

On the day of the incident the victim and an apprentice went to one of the hydroelectric plants to calibrate an analog meter which monitored the level of voltage being generated. Because this level fluctuates with the power usage of the textile mill, this task was always performed on Sunday when the mill was closed. Both workers were wearing "dress-type" clothing,

instead of their normal work clothing.

A 100-to-1 step down unit reduced the generated voltage (3280 volts) to 32.8 volts at the analog meter. A digital meter, located at a utility company substation outside the hydroelectric plant, was showing the nominal 32.8 volts, (indicating that the desired 3280 volts was being generated); however, the analog meter in the plant was showing 32.2 to 32.3 volts.

Before adjusting the analog meter, the victim decided to check the actual voltage being supplied to the meter to verify that it was 32.8 volts as indicated by the digital meter. To perform this task the victim and his co-worker climbed up to the next level of the plant and entered the high voltage area directly above the analog meter. This area is designated "off limits" to all personnel when the plant is operating.

The victim had a large, high capacity volt-ohmmeter in his service truck, located outside the hydroelectric plant. However, because the supply leads he was planning on testing were conducting only approximately 32 volts he decided to use a small pocket-size volt-ohmmeter he had with him. This unit was designed for use on residential 120- and 240-volt circuits.

While the apprentice was holding the small volt-ohmmeter in his hands, the victim extended the leads into the high voltage area in an attempt to take a reading. In doing so he inadvertently contacted a high (3280 volts) voltage line. The volt-ohmmeter, which had no overload protection (fuses), immediately overheated, burning the apprentice's hands. The apprentice dropped the unit onto exposed high voltage buss bars (metal conductors), creating a short circuit and an electrical fire. This fire ignited the clothing of both workers.

The hydroelectric plant operator, a paramedic, observed the entire incident. He immediately extinguished the clothing fire and summoned help via two-way radio. The local rescue squad was on the scene approximately 5 minutes after the incident, and both men were promptly transported to a local medical center. About 1 1/2 hours later the men were transported to a burn center.

The victim, who had been wearing polyester clothing, suffered third degree burns over 40 percent of his body, and burns to the respiratory system. The apprentice, who had been wearing cotton/polyester blend clothing, sustained second and third degree burns over 28 percent of his body.

The victim survived for 5 weeks before dying as a result of infection.

Cause of Death:

The coroner's autopsy report for this incident has not been completed at this time, but death is presumed to be due to an infection subsequent to severe electrical burns.

Recommendations/Discussion:

Recommendation #1: Electrical test instruments should be adequate to deal with any current which may be encountered during their use.

Discussion: While the test instrument used in this case was adequate for the anticipated voltage (32.8 volts), it was inadequate for the high voltage (3280 volts) encountered. The improper use of this instrument in an area where voltage was present which exceeded its capacity, was the primary factor which caused the injurious electrical fire.

Recommendation #2: Appropriate personal protective equipment should be used when working near known hazards.

Discussion: The victim was working in the immediate vicinity of known high voltage lines without using personal protective equipment of any type. While insulated gloves would not have prevented this particular incident, they could have prevented electrocution if the victims' hand contacted the energized high voltage lines. The clothing worn by both men was inappropriate for the work being performed. When the fire occurred, the polyester clothing readily burned and melted, resulting in severe burn injuries to both workers.

Recommendation #3: Work areas containing high voltage lines should be prominently marked, with signs indicating the voltage present.

Discussion: The workers in this case were working on very low voltage equipment. While it is relatively certain that the victim knew that high voltage was present in the area, a prominent sign, indicating the presence of 3280 volts, might have reminded the victim of this hazard, possibly preventing this incident.

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