



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Electrician Electrocuted after Contacting an Energized 480-volt Bus Bar in South Carolina

FACE 90-22

SUMMARY

An electrician was electrocuted when he and a co-worker attempted to perform electrical maintenance in a main service disconnect breaker panel at a South Carolina hotel. This incident occurred as an indirect result of Hurricane Hugo, which caused extensive damage to the beachfront hotel. The victim was part of a crew that had been contracted to make repairs throughout the hotel. The victim and a co-worker had been assigned to clear a ground fault that repeatedly tripped a 400-amp breaker in the main service disconnect breaker panel. Initially, the victim switched the main breaker to the off position. The victim and his co-worker then removed the panel covers from the breaker panel. As the co-worker turned away from the victim to lay one of the panel covers on the floor, the victim, for unknown reasons, switched the breaker back to the on position. When the co-worker turned around, he observed the victim in contact with the bus bar and a conductor. The victim died approximately 1 hour later as a result of his contact with the energized electrical conductor. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers should:

- **develop, implement, and enforce a comprehensive safety program which includes worker training in recognizing and avoiding hazards, especially electrical hazards**
- **de-energize electrical systems prior to any work being performed on them, implement lockout/tagout procedures, and test the system to verify that it has been de-energized before working on the system.**

INTRODUCTION

On January 17, 1990, officials of the South Carolina Occupational Safety and Health Administration notified the Division of Safety Research (DSR) that a 30-year-old male electrician was electrocuted on January 8, 1990, when he inadvertently touched an energized 480-volt bus bar in a main service disconnect breaker panel. Technical assistance was requested by the South Carolina Occupational Safety and Health Administration, and on January 30, 1990, a safety specialist traveled to the incident site to conduct an investigation. The safety specialist reviewed the incident with a company representative, the victim's co-worker, and a private electrical consultant. Photographs of the incident site and a police report regarding the incident were obtained during the investigation.

The employer in this incident is an employee leasing company that has been in business for 7 months. The company provides workers to perform maintenance, janitorial, and small construction jobs. The company, which employs 2,000 employees (i.e., carpenters, electricians, plumbers, and laborers), has no written safety program or safety director. The foreman is responsible for jobsite safety. The victim in this incident, who had worked for this employer for 7 months, was a licensed electrician with 6 years of experience.

INVESTIGATION

On Friday September 22, 1989, Hurricane Hugo battered the coast of South Carolina causing considerable property damage. A 9-story beachfront hotel sustained extensive damage during the hurricane. An employee leasing firm was contracted to make carpentry, masonry, plumbing, and electrical repairs to the hotel.

On the day of the incident, a crew of fifteen contract employees were performing various tasks throughout the hotel. The victim and a co-worker had been assigned the task of identifying and eliminating a ground fault that repeatedly tripped a circuit breaker in the main service disconnect breaker panel. The two employees proceeded to the maintenance room where the main breaker panel was located. The main breaker panel contained six separate circuits (three 480-volt and three 277-volt circuits) with accompanying breaker switches. The problem was determined to be a 400-amp breaker in one of the 480-volt circuits.

The two employees switched all of the breakers, including the main breaker, to the off position, and then removed the breaker panel covers. The next phase was to check the continuity of the conductors leading to a branch circuit panel located in another room. As the co-worker turned away from the victim to place one of the panel covers on the floor, he heard what sounded like the click of a breaker being switched on/off. He then heard a spitting sound and turned around to see the victim's right hand in contact with a conductor and his left hand in contact with a bus bar (Figure 2). The co-worker kicked the victim causing him to fall and break contact.

The foreman, who had been on his way to the maintenance room to check on the workers' progress, heard the commotion and immediately rushed to the area. After realizing what had happened, the foreman instructed another worker to call the local police, fire, and emergency medical service (EMS) departments. Approximately 2 minutes after the incident, the victim stopped breathing and the foreman began cardiopulmonary resuscitation (CPR), continuing it until the police arrived. The police arrived approximately 4 minutes after the incident and continued CPR. The EMS arrived 55 minutes after being called, provided advanced cardiac life support, and transported the victim to the hospital where he was pronounced dead approximately 1 hour later.

Note: For unknown reasons, the victim switched the main breaker from the off position to the on position and then inadvertently contacted the energized bus bar, which remains energized even though the other breakers were switched off. A subsequent investigation by a local electrical consultant confirmed that the main breaker switch had been in the on position at the time of the incident.

CAUSE OF DEATH

The medical examiner's office reported the cause of death as electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should develop, implement, and enforce a comprehensive safety program which includes worker training in recognizing and avoiding hazards, especially electrical hazards.

Discussion: In this incident the victim switched the main breaker from an on position to an off position, removed a panel box cover, and for unknown reasons switched the main breaker back to the on position. This procedure exposed an energized bus bar, which the victim contacted. Employers should evaluate the tasks performed by workers; identify all potential hazards; and then develop, implement, and enforce a comprehensive safety program addressing these issues as required by OSHA standard 1926.21. (1) This safety program should include, but not be limited to, worker training in electrical hazard recognition.

Recommendation #2: An electrical system should be de-energized, and tested to verify that it has been de-energized, prior to any work being performed on it.

Discussion: The breaker panel was not de-energized before the repair work was attempted. The circuitry may have been left energized in order not to inconvenience the other repair workers. A job of this type should be scheduled at a time (a weekend or before or after hours) when the incoming power could be de-energized without disrupting operations. Employers should develop specific job procedures for tasks that are performed by employees, including de-energizing electrical circuits before beginning to work on them, and verifying that the system has been de-energized. These procedures should detail the various safety hazards associated with each task. Once these specific procedures have been developed, employers should ensure that they are implemented and enforced by a qualified person at each jobsite. Additionally, when employees need to work away from the control point (i.e., the breaker panel in this incident), lockout and tagout procedures should be implemented (2).

REFERENCES

- (1) Office of the Federal Register: Code of Federal Regulations, Labor 29 Part 1926. p.20. July 1, 1989.
- (2) Federal Register: Part IV, Department of Labor, 29 CFR Part 1910. pp. 36644-36696. September 1, 1989.

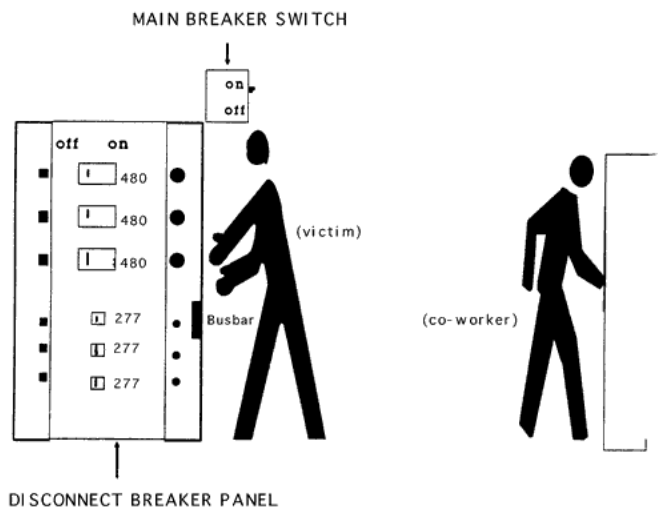


Figure. Main Service Disconnect Breaker Panel 480/277-Volt

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