

## **MO FACE Investigation #94MO110**

### **SUBJECT:**

*Service Technician Electrocuted While Repairing Air Conditioning Unit*

### **SUMMARY:**

On June 17, 1994, a 33-year-old service technician was electrocuted by 220 volts A.C. while repairing a central air condenser unit located outside a residence. The victim had repaired a leak in the condenser coil and was preparing to check for electrical faults. He was kneeling on moist ground in front of the open side of the unit and was in contact with the case on the side of his abdomen. Later testing of the unit revealed that the compressor unit had an internal short, subsequently electrifying the case. The ground wire to the casing had been removed by the victim, and when the compressor shorted out, the victim provided the path-to-ground and suffered a fatal electrical shock.

The MO FACE Investigator concluded that in order to prevent similar occurrences, employers should:

- **require that all electrical equipment be de-energized before any repairs are performed;**
- **provide employees with education and training in the recognition and avoidance of electrical hazards;**
- **ensure that electrical equipment is installed to meet the manufacturer's specifications, and ensure that equipment is restored to the manufacturer's specifications before any work is begun.**

## **INTRODUCTION:**

A 33-year-old service technician for a heating, air conditioning, and refrigeration supply and service company was electrocuted by 220 volts A.C. while repairing an air conditioner condenser unit. The company had been in business for 32 years and has four employees, two of which were technicians. The victim had been employed by this company for five years and three months. The company owner was also the safety officer and enforced safety on the job by routine performance appraisals. The employer did not have written safety rules and procedures. The workers did receive training in on the job, in the class room, and during lunch-box safety meetings.

The Missouri FACE Investigator was notified of the incident on June 20, 1994, and interviewed the employer on July 21, 1994. Records obtained for this investigation include the death certificate, police report, and ambulance run sheet.

## **INVESTIGATION:**

The victim was one of two technicians assigned work orders to repair various pieces of heating, ventilation, air conditioning and refrigeration equipment. On the day prior to the incident, the company received a call to repair an air conditioner unit at a rental home. On the day of the incident the victim arrived at the incident site at approximately 9:30 a.m. He checked out the air conditioner and found a leak in the freon condenser coil. The access panels to the unit were removed and the leak was repaired. The victim then instructed the tenants to turn the thermostat to cool to start the air conditioner. The victim then returned to the unit and began to determine why the compressor was not functioning. The cover plate to the electrical controls was removed. The screw holding the cover plate on also held the casing ground wire. When the victim removed this wire he left the unit ungrounded. It is believed that the victim was getting ready to check the electrical controls of the unit with a continuity tester. He was kneeling on the ground with no insulating pad, and was leaning against the unit when he received the electrical shock. The contact point was on his left side, and there were exit wounds on his knee.

A meter serviceman from the electricity provider in the area was servicing a home about a half block away. He also had a work order to pull the meter and disconnect the electricity at the incident site. The meter serviceman arrived at the incident site and walked around to the back of the house. He noticed the victim leaning against the AC unit and said hello. Because the serviceman was there on a disconnect order, he thought it was strange that there was someone working on the AC unit.

When the victim did not speak, the serviceman nudged the victim. He noticed the lack of color of the victim and thought he may have suffered a heat stroke. The serviceman then removed the victim from the unit and laid him on his back. Noticing the victim was not breathing, he ran to the door of the house to have the tenants call for emergency assistance. The tenants would not answer the door or respond to his requests for assistance. He then ran to his service truck and radioed the emergency to his dispatcher. The dispatcher in turn contacted 911. The serviceman returned to the victim and started CPR. He maintained CPR until emergency crews arrived.

In an interview with the meter serviceman he reported that he heard what sounded like a gun shot in the area of the incident site shortly before arriving. After finding the victim had been electrocuted, he indicated that what he may of heard was the sound of the AC unit grounding out. There was also a burn mark on the upper left corner of the unit that was thought to be the point of contact. This area is where the victim had repaired the freon leak, not a point of ground fault.

#### **CAUSE OF DEATH:**

Electrocution

#### **RECOMMENDATIONS AND DISCUSSION:**

**Recommendation #1:**      **Employers should require that all electrical equipment be de-energized before any repairs are performed.**

**Discussion:**              Before performing maintenance on electrical equipment, the unit should be de-energized. When troubleshooting requires equipment to be energized for diagnostic tests, the employee should be electrically isolated or insulated from it.

In this incident the victim had his knee down on moist ground and his abdomen was in contact with the unit casing. The employer did provide and enforce the use of cardboard sheets to put on the ground for insulation. The victim did not use any cardboard as an insulator.

**Recommendation #2:**      **Employers should ensure that electrical equipment be installed to meet the manufacture's**

**specifications, and ensure that equipment is restored to the manufacture's specifications before any work is begun.**

**Discussion:** According to the employer, the mechanical grounding was installed incorrectly. The manufacturer-specified grounding point for this unit was located on the back of the AC starter box, though some electrical installers find it more convenient to ground the unit from the AC starter box cover screw. Unfortunately, when the AC starter box cover is removed, the mechanical grounding for the unit is also removed and leaves the technician at risk of being electrocuted.

When equipment is found to be incorrectly installed it should be immediately restored to manufacturers specifications before beginning any repair.

**Recommendation #3: Employers should provide employees with education and training in the recognition and avoidance of electrical hazards.**

**Discussion:** In this incident, the worker did receive training and education in hazard recognition, but did not take necessary precautions to properly ground the equipment, isolate himself from the equipment, and insulate himself from the ground. This recommendation emphasizes compliance with 29 CFR 1926.21 (b)(2), which requires the employer to "instruct each employee in the recognition and avoidance of unsafe conditions."

The Missouri Department of Health, in co-operation with the National Institute for Occupational Safety and Health (**NIOSH**), is conducting a research project on work-related fatalities in Missouri. The goal of this project, known as the Missouri Occupational Fatality Assessment and Control Evaluation (**MO FACE**), is to show a measurable reduction in traumatic occupational fatalities in the State of Missouri. This goal will be met by identifying causal and risk factors that contribute to work-related fatalities. Identifying these factors will enable more effective intervention strategies to be developed and implemented by employers and employees. This project does not determine fault or legal liability associated with a fatal incident or with current regulations. All **MO FACE** data will be reported to **NIOSH** for trend analysis on a national basis. This will help **NIOSH** provide employers with effective recommendations for injury prevention. All personal/company identifiers are removed from all reports sent to **NIOSH** to protect the confidentiality of those who voluntarily participate with the program.

**SIGNATURES:**

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**Chief Investigator**

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**Daryl Roberts**  
**Chief**  
**Bureau of Environmental Epidemiology**

## **DISSEMINATION LIST**

National Institute for Occupational Safety and Health	NIOSH
Alaska State Department of Health and Social Services	AK FACE Program
California State Public Health Foundation	CA FACE Program
Colorado State Department of Health	CO FACE Program
Georgia State Department of Health	GA FACE Program
Iowa State Department of Public Health	IA FACE Program
Indiana State Department of Health	IN FACE Program
Kentucky State Department of Health	KY FACE Program
Massachusetts State Department of Health	MA FACE Program
Maryland State Department of Health	MD FACE Program
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Missouri Department of Health, Office of Injury Control	
Missouri Department of Labor and Industrial Relations	
Missouri Department of Public Safety	
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Missouri Head Injury Advisory Council	
Missouri Hospital Association	
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Missouri Sheriff's Association	
Missouri Southern State College	
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North Central Missouri Safety Council	
OSHA Area Office, Kansas City, MO	
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Safety and Health Council of Western Missouri & Kansas	
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Shelter Insurance Companies	
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St. Louis City Medical Examiner Office	
St. Louis County Department of Community Health	
St. Louis County Medical Examiner Office	
The Educational Center on Family Violence	
University of Missouri, Agricultural Engineering	