

**DATE:** September 1, 1992

**FROM:** Fatal Accident Circumstances and Epidemiology (FACE) Project  
Minnesota Department of Health (MN FACE)

**SUBJECT:** MN FACE Investigation MN9206  
Plumber/Construction Worker Electrocuted by Indirect Contact with  
220V Conductor

## **SUMMARY**

A 44-year-old male plumber/construction worker (victim) died when a lag-bolt he was screwing into a wooden house foundation made contact with one side of an indoor 220V clothes dryer line (110VAC) and he was electrocuted. Due to heavy spring rains, the completely constructed, finished house had sunk approximately three inches into fine, silty soil. The victim was positioning wooden posts outside the wooden foundation and using these as supports to jack up the house. Two of the four posts jutted away from the foundation and required straightening. Chains with lag-bolts attached to both ends were placed around the posts and screwed into the foundation to pull the posts straight. While screwing the second lag-bolt of one of these chains into the foundation, the victim made indirect contact with an indoor 220V conductor and was electrocuted. MN FACE investigators concluded that, in order to prevent similar occurrences, the following guidelines should be followed:

- > Job hazard analyses (the process of analyzing, identifying, and controlling potential hazards of each step of an operation) and pre-job surveys should be performed by employers prior to work as a first step in developing and implementing a safety program; and
- > Safe work practices (inquiry and direct observation of electric circuit locations), and personal protective equipment (insulated gloves) should be used when necessary during non-routine, as well as routine, work procedures.

## **INTRODUCTION**

On June 16, 1992, MN FACE personnel were notified by MN OSHA of a work-related electrocution that occurred on June 12, 1992. The county sheriff and coroner were contacted and reports were

requested. A witness to the fatality was also contacted and interviewed via the telephone. A site investigation was conducted on June 24, 1992.

The victim was a sole owner of a small plumbing and heating/construction company. He was a master plumber and employed three others to help out on jobs. The company had no written safety rules and procedures, training, or emergency response procedures. The task of lifting the sunken house was a unique, unusual job for this company. No standard operating procedures existed for this process at the time of the incident. The victim had owned the company for approximately seven years and had been in the plumbing business for nineteen years.

## **INVESTIGATION**

The incident occurred outdoors in an excavation which was approximately 6 feet deep on the southeast side of a private residence. The house had sunk approximately 3 inches during the winter and spring due to the high water table, heavy snow, and heavy spring rain in the area. The fine, silty soil type probably also contributed to the sinking problem. The excavation site was wet at the time of the incident.

The house foundation was 2 x 6-inch treated wood boards, with wiring in the studs. Four, 5 x 6-inch wooden posts (all 5-feet tall) had been installed outside the house foundation as supports for jacks to raise the house. Two of the support posts jutted out slightly from the house; it was necessary to straighten these posts in order to place the jacks properly. To straighten and pull the posts towards the house, a 16-inch length of chain was placed around the posts and attached to the house foundation with 1/2-inch lag-bolts. The lag-bolts were 6 inches long. Electrical power to the house remained on during this procedure. See Figure 1.

The victim had attached one lag-bolt and was in the process of screwing in the other for the second post. He was using a double-insulated impact wrench which was plugged into a ground-faulted outdoor outlet. According to a former partner, the wrench was usually held in such a way that one of his hands was in contact with the socket while he worked. As he screwed in the lag-bolt, it penetrated the insulation of a 220V clothes dryer line, became energized, and he made indirect contact with one 110V line. He completed the circuit to ground and was electrocuted.

CPR was initiated immediately by an employee who was standing next to him and continued by first responders upon their arrival approximately five minutes later. He was pronounced dead on arrival at the hospital emergency room.

## **CAUSE OF DEATH**

The cause of death was electrocution.

## **RECOMMENDATIONS/DISCUSSION**

*Recommendation #1:* Safety programs should be developed and implemented by employers. A first step would be to perform job hazard analyses and pre-job surveys to identify and control hazards.

*Discussion:* This employer had no safety program. Since the primary reason for establishing a safety program is worker protection, a logical first step is identification of potential hazards. One way of identifying hazards is to analyze each step in all operations performed by workers, identify potential hazards that could arise during each step, and develop procedures which effectively control or eliminate each hazard (e.g., job hazard analysis). In this case, an unusual operating procedure (drilling lag-bolts into a wooden house foundation with the electrical power on) was inappropriate for the job being performed. Employers should perform job hazard analysis of all jobs performed by workers, starting with those thought to be most hazardous, and develop and implement controls that protect all workers.

*Recommendation #2:* Employers should encourage the use of safe work practices and personal protective equipment during hazardous procedures. This recommendation is in accordance with CFR 1926.416(a)(1) and CFR 1926.416(a)(3).

*Discussion:* Employers should protect themselves and employees by not allowing proximity to any part of an electric power circuit that could be contacted during the course of the work, unless there is protection against electric shock. It should be ensured by inquiry or direct observation where energized electric circuits are located and that the work will not bring any person, tool, or machine into physical or electrical contact with them. If it is determined that this is not the case, circuits can be deenergized and/or personal protective equipment (insulated gloves, in an instance like this) can be used for protection.

**REFERENCES**

1. NIOSH-Division of Safety Research, FACE Report 89-8, Morgantown, West Virginia, March 15, 1989.
2. Office of the Federal Register, Code of Federal Regulations, Labor, 29 CFR Part 1926.416(a)(1), and 1926.416(a)(3), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., July 1, 1991.