TO:Director, Occupational Health Surveillance Program,
Massachusetts Department of Public Health

FROM:Massachusetts Fatality Assessment and Control
Evaluation (MA FACE) Program

SUBJECT:Massachusetts Carpentry Foreman Dies When Metal
Ladder Contacts Overhead Public Utility Powerline
MA-93-03

DATE:February 3, 1994

SUMMARY

A 29 year old male carpentry foreman (the victim) was electrocuted when the metal ladder he was moving contacted an overhead powerline. Prior to the incident, the victim and two co-workers had been preparing the facade of a three story multi-family dwelling for a fresh coat of paint. As the crew of three were completing their day's work, the victim and a co-worker were moving a 40 foot aluminum extension ladder which had been positioned against the front of the residence. As the duo moved the ladder to a vertical position, it contacted the overhead powerline located about 24 feet above ground level and directly over their position. Electrical current passed through the ladder and victim to the ground, electrocuting the victim and shocking the co-worker. The Massachusetts FACE Program Investigator concluded that to prevent future similar occurrences, employers should:

- eliminate the use of conductive ladders in proximity to energized electrical conductors;
- make arrangements with local utility companies to de-energize or cover powerlines with insulating line hoses or blankets when work is to be performed in proximity to overhead powerlines;
- develop and implement a comprehensive safety program that includes training worker to identify and avoid jobsite electrical hazards;
- conduct routine jobsite surveys to identify electrical hazards and implement appropriate control measures.

Additionally, ladder manufacturers and government agencies should:

- explore the feasibility of manufacturing aluminum ladders with non-conductive links or extensions.

INTRODUCTION

On April 1, 1993, the MA FACE program learned through its news clipping service that on March 25, 1993, a 28 year old male carpentry foreman (victim) was electrocuted when an aluminum ladder he was moving contacted an overhead public utility powerline. An investigation was immediately initiated. On April 7, 1993, the MA FACE Program Field Investigator reviewed the incident with the employer and visited and photographed the incident site. The death certificate, police report, multiple photographs and newspaper clippings were obtained during the investigation.

The employer in this incident was a small general contracting company that had been in business seven years. The company employed a total of three workers, two of whom were laborers. The company had no formal written safety or training program. The victim had worked for the employer two years and two months.

INVESTIGATION

The company had been contracted to complete exterior renovation of a three story multi-family residence. Having vinyl sided the sides and rear portion of the building the previous fall, the crew had returned to strip and re-paint the front. The crew was nearing completion of their first day on the jobsite when the incident occurred.

That morning, three workers (including the victim) and the company owner arrived at the residence to prepare the building facade for re-painting. A 40 foot long aluminum extension ladder had been extended and positioned on the front of the building in order to scrape the upper portions of the facade in preparation for re-painting. A public utility three phase overhead powerline system, 2,400 volts to ground, 4,160 phase to phase, was located approximately eight feet from the residence. The powerline was located approximately 24 feet above ground level. At the time of the incident, the crew had completed the day's work and were in the process of cleaning up the jobsite and work materials.

During the clean-up, the victim and a co-worker were moving the ladder to store it behind the building for overnight safe keeping. As they were moving the ladder away from the house, the victim maintained a firm grasp upon it with both hands while the co-worker held the ladder with one hand and the ladder extension rope with the other. It then contacted the overhead powerline.

The co-workers and a tenant of the building who witnessed the incident could not be interviewed to substantiate the exact sequence of events. The police reported that the current knocked the co-worker to the ground who immediately got up, knocked the victim away from the energized ladder, and administered initial first aid until emergency medical services arrived. The employer however, maintained that both men were being electrocuted until a second co-worker pushed the men from the energized ladder breaking contact. This scenario is consistent with the injuries sustained by the

shocked co-worker who was taken to the local hospital and treated for internal and external injuries from the electrical current.

Emergency medical services arrived within minutes and transported the workers to the regional hospital. The victim was pronounced dead from his injuries approximately one hour following the incident.

CAUSE OF DEATH

The medical examiner listed the cause of death as cardiac arrest due to electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers should eliminate the use of conductive ladders in proximity to energized electrical conductors.

Discussion: OSHA Standard 29 CFR 1926.951 (c) (1) states that " portable metal ladders shall not be used for electrical work or where they may contact electrical conductors. "Ladders made of non-conductive materials, e.g., fiberglass or wood, should be substituted for work near energized electrical conductors.

Recommendation #2:Employers should make arrangements with local utility companies to de-energize or cover powerlines with insulating line hose blankets when work is to be performed in proximity to overhead powerlines.

Discussion: Energized overhead powerlines in proximity to a work area constitute a safety hazard. Extra caution must be exercised when working near energized powerlines. A safe distance between powerlines and ladders, tools, scaffolds, and work materials should be maintained at all times. The powerline in this incident was within 10 feet of the residence. When this type of situation occurs, overhead powerlines should be de-energized or covered with insulating material.

Recommendation #3:Employers should develop and implement a comprehensive safety program that includes training worker to identify and avoid jobsite electrical hazards.

Discussion: Despite the well known danger of overhead powerlines, occupational electrocutions continue to occur. OSHA Standard 29 CFR 1926.21 (b) (2) states that " The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposures to illness or injury. " Employers should provide employees with adequate training to ensure that they can recognize potential hazardous exposures. Safety programs should include detailed safety procedures (specific

for all tasks and job categories) needed to prevent worker exposure to hazards. For these procedures to be effective, they must be clearly communicated and fully understood by the affected employees and supervisors. The NIOSH Alert entitled " Request for Assistance in Preventing Electrocutions of Workers Using Portable Metal Ladders Near Overhead Powerlines " summarizes recommendations pertaining to work being performed in proximity to energized conductors.

Recommendation #4:Employers should conduct routine jobsite surveys to identify electrical hazards and implement appropriate control measures

Discussion: Before beginning work at any site, designated and trained personnel should evaluate the site to identify potential electrical hazards and ensure appropriate control measures are implemented. In this incident, a job site survey would have identified the high voltage overhead powerline in proximity to the facade of the building where work was being performed. Control measures including use of a non-conductive ladder and/or having the utility company de-energize or cover the powerline with insulating hoses or blankets may have prevented this fatality.

Recommendation #5:Ladder manufacturers and government agencies should explore the feasibility of manufacturing aluminum ladders with non-conductive links or extensions.

Discussion: The use of non-conductive links or extensions in the manufacture of aluminum ladders could protect workers in the event of an inadvertent contact with an electrical conductor. Incident data from the U.S. Consumer Product Safety Commission suggests that approximately 42% of ladder contact with powerlines occurs within the top three feet of the ladder. Due to the costliness of fiberglass ladders, consideration should be given to manufacturing ladders in which the top few feet are made of non-conductive materials. Another possibility is to consider the placement of a fiberglass link in the side rails of new aluminum ladders. The link would provide isolation so electricity does not have a path to ground. As human limitations and behaviors are known to contribute to risk (i.e., the human visual system is limited in it's ability to estimate the clearance distances to powerlines, and warning labels are commonly disregarded), the use of passive safety interventions is warranted.

LIST OF REFERENCES

Office of the Federal Register: Code of Federal Regulations, Labor 29 Part 1926.951 (c) (1) and Labor 29 Part 1926.21 (b) (2)

Bellegarde, Marie L., Human Factors Analysis of Aluminum Ladders/Powerlines Electrocution Hazard, U.S. Consumer Product Safety Commission: pp. 5-9 October 1988

National Institute for Occupational Safety and Health, Request for Assistance in Preventing Electrocutions of Workers Using Portable Metal Ladders Near Overhead Powerlines, DHHS (NIOSH) Publication Number 89-110, July 1989.

Public Health Service/CDC/NIOSH/DSR, FACE-92-27, Painter Electrocuted When Metal Ladder Contacts a Powerline--Virginia