

DATE: January 6, 1994

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Program
Minnesota Department of Health

SUBJECT: MN FACE Investigation 93MN06201
Heavy Construction Equipment Mechanic Dies From Electrocution

SUMMARY

A 33-year-old male heavy construction equipment field mechanic (victim), repairing a tractor at a residential construction site, was struck and electrocuted by a severed overhead power line. Two other mechanics were in the process of repairing a drive sprocket of an excavator parked 150 feet away from the tractor. The tractor, the excavator, and a tank truck were parked on the curb-side of a residential roadway, beneath a three-phase 8000V power line. To remove the damaged sprocket, it was necessary to swing the excavator boom 180 degrees and use it to raise one excavator track. Despite one mechanic serving as a spotter, the excavator boom hit and severed the power line as it was swung. The line fell across the tank truck, and knocked the victim off of the tractor to the ground. He was electrocuted when it came to rest on top of him. MN FACE investigators concluded that, in order to prevent similar occurrences, the following guidelines should be followed:

- > identify and evaluate workplace hazards, including job hazard analysis as an ongoing part of each construction phase; and
- > maintain safe minimum working clearances from energized overhead power lines when operating a boomed vehicle.

INTRODUCTION

MN FACE was notified of an October 13, 1993 occupational electrocution on October 14, 1993. A site investigation of the incident was conducted on October 14, 1993, in conjunction with MN OSHA. Employer, electric utility personnel, and witness interviews were completed by October 25, 1993. The county coroner's office was contacted and releasable information was taken; a county sheriff's report of the incident was requested and received.

The victim had been employed by a construction equipment sales and service company for 13 years, the last 4 as a field service mechanic. The company provided employees various types of safety training, including classroom and on-the-job. The most experienced mechanics worked in the field.

INVESTIGATION

The incident occurred at a residential construction site which was in its earth-moving (dirt work) stages; construction workers had been on site ten days. The victim had been assigned to repair the tractor after the construction contractor had contacted the service company. He had been on site for three days. At the time of the incident, he and a coworker were just completing replacement of the tractor's transmission oil. He was standing on the tractor's tracks, on its west side.

An excavator had been parked at the site earlier that day by a sewer and street-work contractor who anticipated beginning work the next day. It was parked approximately 150 feet south of the tractor. The excavator had a 26' 3" boom and 7'10" stick; the bucket had not yet arrived at the site. According to manufacturer's data, when fully extended without the bucket, the boom and stick could reach an approximate height of 32 feet. A 1500-gallon diesel fuel tank truck was parked between the tractor and excavator. All three pieces of equipment were parked beneath a 30-foot high, three-phase, 8000V power line that ran parallel to the residential roadway. The excavator's tracks were parallel to the overhead lines and its boom initially faced to the south. See Figure 1.

Two mechanics employed by the sewer and street-work contractor had been assigned to remove and repair a drive sprocket on one of the excavator's tracks. The mechanics intended to use the excavator's boom to raise the track by pushing down against the ground with the tip of the boom. This would relieve the track of the machine's weight and allow the sprocket to be removed. To perform the lift, the excavator had to be "walked" (moved) a short distance north and the boom swung from south to north. The mechanics decided to swing the boom around to the west because of the residential road and a light pole to the east of the machine. To swing to the west, it was necessary to raise the excavator boom to clear a grove of trees adjacent to the excavator. While one mechanic acted as an observer, the other raised the boom above the trees and swung it westward. As the boom was being swung, its tip contacted the 8000V field phase of the overhead power line and severed it. The phase fell across the tank truck and the tractor, knocking the victim from it. He fell from the tractor with the energized line across him, completing a path to ground.

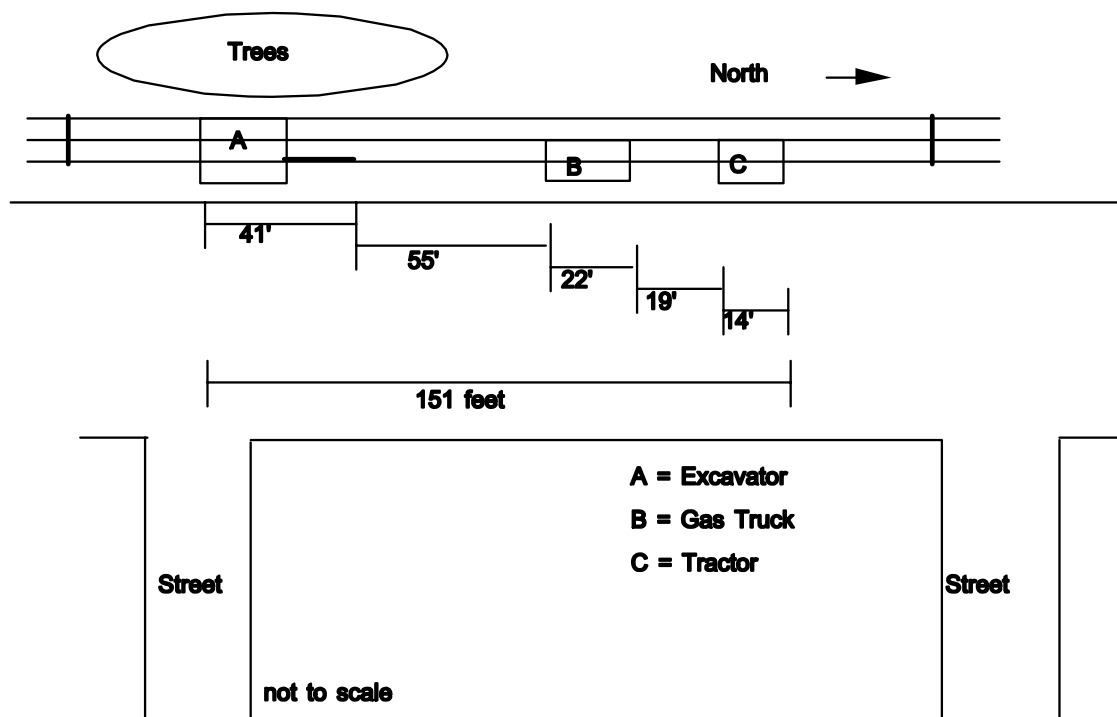


FIGURE 1.

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Residents living across the street from the construction site called 911 and police were on the scene within two minutes. A plastic pole was used to lift the energized wire off of the victim and oxygen and CPR were administered. The victim, however, was pronounced dead at the hospital.

CAUSE OF DEATH

The county coroner's office reported the cause of death as electrocution.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Identify and evaluate workplace hazards, including job hazard analysis as an ongoing part of each construction phase.

Discussion: Job sites should be evaluated prior to the start of any project involving the use of construction machinery to identify the safest areas for the storage of materials, the placement of machinery, and the type and size of machinery to be used. One of the excavator mechanics told MN FACE investigators that swinging the boom around was necessary because of the location of the sprocket requiring repair. In this instance, it may have been possible to park the excavator away from site obstacles in such a way that operation of the boom under the power line was not necessary to perform the repair job on it. Additionally,

traffic on the residential roadway could have been temporarily interrupted to allow the boom to be swung eastward over the road instead of towards the trees.

Recommendation #2: Maintain safe minimum working clearances from energized overhead power lines when operating a boomed vehicle.

Discussion: OSHA regulation 29 CFR 1926.600(a)(6) requires that boomed earth-moving vehicles comply with the requirements of 29 CFR 1926.550(a)(15) when working or being moved in the vicinity of power lines. This standard specifies that the minimum clearance between electric lines rated 50kV or below and any part of the boomed vehicle shall be 10 feet, unless the electrical lines have been "deenergized and visibly grounded" at the point of work. A 10-foot clearance would ensure that the vehicle would not contact and cut the overhead line, as in this incident, or become energized because of the contact. When a 10-foot clearance is difficult to maintain by visual means, a designated person can observe clearance between the lines and the equipment and give timely warning of imminent contact to the operator, or the local utility company should be contacted to deenergize the power line before work starts.

REFERENCES

1. NIOSH-Division of Safety Research, FACE Report 91-21, Morgantown, West Virginia, September 30, 1991.
2. Office of the Federal Register, Code of Federal Regulations, Labor, 29 CFR Part 1926.550(a)(15), and 1926.600(a)(6), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., July 1, 1992.

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