

MIFACE INVESTIGATION #06MI185

Subject: Truck Driver Electrocuted When Raised Long-Bed Dump Trailer Contacted 4,800-Volt Overhead Power Line

Summary

On October 27, 2006, a 53-year-old male truck driver was electrocuted when the raised long-bed dump trailer of the truck he was driving contacted an energized 4,800-volt overhead line. The decedent had delivered several loads of sugar beets to a local processing facility. Prior to re-entering the wet beet field for another load, he wanted to dump the tare weight (dirt, sugar beet parts) from the dump trailer bed. According to known past work practices on the farm, while inside the tractor cab, he activated the dump trailer to rise. The event was unwitnessed. A probable incident scenario was developed during the



Figure 1. Extended trailer bed touching power lines (lines enhanced for clarity)

interview of the decedent's employer, who was the farm owner. The farm owner suggested that the decedent would have wanted to ensure that the tare weight was leaving the dump trailer. While the trailer was rising, he exited the truck cab and walked along the side the truck trailer body to take a look at the exiting tare. Sometime during this activity, the top of the trailer bed contacted the overhead line (Figure 1). It is unknown if the decedent was aware of the contact. A second truck driver whose truck was being loaded with sugar beets nearby in the same field noticed a flash of light and saw the truck on fire. The farm owner, who was also the employer of the decedent, was operating the beet harvester and loading this truck. The truck driver and his passenger, a paramedic, immediately ran to the decedent and began CPR. Emergency response arrived and transported the decedent to a local hospital where he was declared dead.

RECOMMENDATIONS

- Farm employers should conduct a field survey prior to fieldwork to determine any hazards at work locations, (such as overhead power lines), determine the work tasks to be performed, and identify safe areas to perform the work away from the hazard.
- Employers should talk with the electrical power company to gather safety information to develop and implement safe work procedures if the lines cannot be de-energized and thus necessary to perform fieldwork near the energized overhead electrical lines.

Key Words: Agriculture,
Electrocution, Power line, Dump
Truck

- Farm owners and truck owner/operators should consider installing high voltage proximity alarms on truck trailer dump beds in case of inadvertent operation of machinery near overhead power lines and train employees in electrical principles and proximity alarm use and limitations.
- Employers, truck owner/operators, and truck leasing companies should measure the raised dump trailer height of each of their trucks and post this height prominently in the cab compartment.
- Employers should establish emergency procedures for fellow workers to follow in case of an electrocution and train the workers in these procedures.

INTRODUCTION

On October 27, 2006, a 53-year-old male truck driver was electrocuted when the raised dump trailer of the truck he was driving contacted an energized 4,800-volt overhead line. MIFACE personnel were notified of this incident by a newspaper clipping. MIFACE contacted the employer (farm owner) who agreed to a February 2, 2007, site visit. Pictures used in this report are courtesy of the responding police department. MIFACE has modified the pictures to remove identifiers.

The farm owner, who was the decedent's employer, planted a total of 1200 acres of crops and harvested 300 acres of sugar beets. He had been a sugar beet farmer for over 50 years. He had one family member that he considered to be a regular employee. He hired four truck drivers (including the decedent) on a contract basis to haul sugar beets to the local processing facility during the sugar beet harvest. The farm owner operated the sugar beet harvester.

The decedent had been contracted by the farm owner for the last 15 years to transport the harvested sugar beets to the processing facility. The decedent was not a truck driver by occupation; he was a volunteer fireman and worked full-time for the county as an hourly employee.

INVESTIGATION

The farm owner had leased the truck the decedent was driving from a neighbor for use during the sugar beet harvest. The decedent had driven this truck the previous year. The dump trailer bed was 30 feet in length. The controls to raise and lower the dump trailer were located inside of the truck cab. The ground was fairly level according to the farm owner and appears so in the police pictures.

This was the second day of the harvest season. The farm owner and the truck drivers had not worked the prior evening, because the fields were too wet. In the farm owner's estimation, the conditions for harvesting the sugar beets were the worst in his recollection because of the amount of rain received over the last several months and the resulting muddy field conditions. The MIFACE investigation revealed that for a nearby city weather station, rain precipitation for July was 3.15 inches, August had 3.5 inches, September had 2.33 inches, and October had 4.82 inches prior to the day of the incident.

The farm owner stated that the decedent knew about the overhead line danger – the farm owner and the decedent discussed the overhead line danger, because this was the only field they would be working in that had overhead power lines. The overhead line support poles were 14 feet away from the road. The poles supported two overhead electrical wires, one of which was energized with 4,800 volts. The other wire was the system neutral.

On the day of the incident, the decedent had taken several loads of sugar beets to the sugar beet processing facility. The dump bed had built up some tare weight (soil and other sugar beet debris) and needed to be completely emptied. So as to not potentially contaminate the field with the debris, and due to the wet field conditions, the decedent chose to dump the trailer at the edge of the field on the north side of the road.

He drove the truck to his selected location and while in the cab, activated the hydraulics to raise the truck bed. It is unknown if he exited the cab to check on whether he could safely activate the trailer. The event was unwitnessed. Three possible incident scenarios developed were: (a) he was standing/walking by the truck, (b) jumping from or exiting the truck cab, or (c) trying to reenter the cab to halt the rise of the dump body. The farm owner suggested that the decedent exited the cab and walked along the side of the dump trailer as it was rising to check the progress of unloading the tare. It is unknown if the decedent was aware of the impending contact of the dump trailer with the one of the two overhead lines, therefore, his actions just prior to dump bed contact are also unknown.



Figure 2. Evidence on the tires of electrical current seeking ground

The farm owner was operating the sugar beet harvester and loading a second truck in another area of the same field in which the decedent had entered with his truck. The driver of the second truck saw a “flash of bright light” and then stated he looked over at decedent's truck and saw fire coming from underneath the truck and the decedent lying on the ground (Figure 2-arrows indicate tire burn). The farm owner, the truck driver and his passenger, a paramedic, ran to victim and began to perform CPR. The decedent was positioned on the ground 5-10 feet from the tractor, on the driver's side. His orientation on the ground is unknown. Since the event was unwitnessed, it is unknown if he was in the truck and attempted to jump clear or if he was outside of the truck when the

electrocution occurred. After the trailer bed contact with the electrical wire, it is unknown how long the electrical current flowed before the main fuse opened and the electrical current from the overhead line was terminated.

The farm owner could not recall who called 911. Emergency response arrived, and decedent was transported to a local hospital where he was declared dead.

The electrical power supplier was notified and arrived on scene approximately 45 minutes later. When the supplier determined the lines were not energized, the truck trailer was lowered. The energy supplier representative on the scene told the police chief that the wet ground conditions would have allowed the voltage to travel and be lethal approximately 10 feet from the tractor/trailer.

It is not known if the decedent was in direct contact with the truck or if he was a casualty of “step” voltage or “step” potential. “Step” voltage or “step” potential is produced when a piece of equipment touches an energized power line, the current flows through the equipment and into the ground, radiating out from the area like ripples in a pool of water. When a person stands with his/her feet in two different voltage level areas, their legs provide another path through which current can flow.

CAUSE OF DEATH

The cause of death as listed on the death certificate was electrocution. The decedent had electrical burns on his right anterior chest, left posterior shoulder, abdomen, right knee and both feet. Toxicology was negative for alcohol and other screened drugs,

RECOMMENDATIONS/DISCUSSION

- Farm employers should conduct a field survey prior to fieldwork to determine any hazardous work locations, (such as overhead power lines), determine the work tasks to be performed, and identify safe areas to perform the work away from the hazard.

The employer and the decedent knew that the overhead line was energized. One of the known work procedures was dumping of the tare weight as far away from the plowed field as possible. The field was wet and to minimize entry into the field, the decedent dumped the tar as far away from the plowed field as possible. Unfortunately the location he chose was near the energized overhead lines. Employers should identify areas away from any overhead lines where the task (in this incident, dumping tare weight) can be safely performed. Locating a safe dump area away from the power line would have prevented this incident.

- Employers should talk with the electrical power company to gather safety information to develop and implement safe work procedures if the lines cannot be de-energized and thus necessary to perform fieldwork near the energized overhead electrical lines.

MIFACE recommends that prior to fieldwork where a safe work location cannot be identified away from an overhead energized power line that employers/farmers contact the electrical power company or speak with a MISS DIG representative at 1-800-482-7171 for overhead electric assistance. MISS DIG provides overhead electric line assistance to ensure adequate clearances are maintained. Be sure to allow MISS DIG three full working days to ensure utility companies are notified to provide overhead electric line assistance that may be provided by an electric utility.

If overhead lines must remain energized, and if work must be performed near the energized line, farm employers and truck owner/operators should discuss safe work practices and procedures with the electrical energy supplier for the specific work situation. Employers should then develop and implement safe work procedures for working near the energized overhead electrical lines, train workers who may perform work or operate equipment or machinery near the overhead electrical lines in those safe work procedures, and ensure that the workers comply with those safe work procedures.

Employers should train workers in the developed safe work procedure. In addition, employers should also ensure that training in hazards associated with the operation of equipment in proximity to overhead power lines be conducted and documented. Employers should inform employees that:

- The voltage of a line cannot be determined by “just looking at it.”
- All lines carry voltage that can cause serious injury or death.
- Always assume the lines are energized.
- Power lines may have a protective covering on them – the covering may be intended only to protect metal wires from weather conditions and not to provide protection against electrical shock.

Although not directly applicable, the *NIOSH Alert: Preventing Electrocutions of Crane Operators and Crew Members Working Near Overhead Power Lines*, NIOSH Publication No. 95-108, has useful training information concerning work to be performed in proximity to power lines. The NIOSH document can be found at: <http://0-www.cdc.gov.mill.sjlibrary.org:80/niosh/crane.html>. The NIOSH Alert contains case reports and summarizes safety precautions for operators of boomed vehicles and cranes and ground crews. Techniques to use to minimize potential contact of equipment which could result in electrocution when working near overhead power lines include de-energizing lines, maintaining appropriate distances from energized lines, establishing a safety boundary, using an observer (spotter) to warn the operator of impending contact, and barriers to prevent physical contact with an energized line. In the event that a truck bed is not equipped with a proximity warning device, a spotter should be used to maintain required clearance distances.

Other valuable resources that may assist employers and employees alike may be found at the federal Occupational Safety and Health Administration (OSHA) website. An OSHA Construction e-tool, Electrical Incidents: Contact with Power Lines may be found at:

www.osha.gov/SLTC/etools/construction/electrical_incidents/powerlines.html. A pocket-guide resource that employers may provide employees about working near overhead power lines can be found at:

http://wwwhttp://0-www.cdc.gov.mill1.sjlibrary.org/niosh/face/In-house/full200502.html.osha.gov/Region7/overheadpowerlines/ohpl_card_eng.pdf

- Farm owners and truck owner/operators should consider installing high voltage proximity alarms on truck trailer dump beds in case of inadvertent operation of machinery near overhead power lines and train employees in electrical principles and proximity alarm use and limitations.

In the event of inadvertent operation of machinery near overhead power lines, there are several commercial devices currently available that detect proximity to an energized overhead power line. Electric field sensors are mounted on the protected machine. The sensors are programmed to detect the electric fields that surround an overhead power line at a preset distance from the power line. If the machine position is less than this preset distance, an audible alarm warns the machine operator and other workers in the work area that the machine is “too close”. Proximity device manufacturers stress that personnel using these units must fully understand their operation and limitations and that the detector should not be relied upon as the primary means of line-contact prevention. In the case of crane and other boomed equipment, research has found that when a proximity alarm was installed, the work crew seemed to develop a greater awareness of the danger of power line contact, as there was no record of any kind of injury or failure when these appliances were provided.

Overhead power lines carry electricity at either low voltage (600 volts or less) or high voltage (more than 600 volts). The greater the voltage, the greater the clearance necessary between any part of the equipment and the power line. Although agricultural employers are exempted from the MIOSHA Construction Safety Standard, Part 1. General Rules, valuable information about clearances required when working near overhead power lines may be useful. Part 1 states that employees not specifically covered by other construction safety standards (Parts 16, 17, 31) shall not be allowed by the employer to work or be closer to energized electrical line, gear, or equipment exposed to contact than the minimum clearance prescribed in Table 1. Table 1 is reproduced below.

<i>Table 1</i>	
VOLTAGE	MINIMUM EMPLOYEE CLEARANCE
To 50 kv	10 ft.
Over 50 kv	10 ft. + .4 inch per kv

- Employers, truck owner/operators, and truck leasing companies should measure the raised dump trailer height (RDH) of each of their trucks and post this height prominently in the cab compartment.

The farm owner indicated to the MIFACE researchers that he did not know the height of the raised trailer at full extension. MIFACE encourages all employers, companies and individuals who own, lease and/or drive tractor/trailer combinations, including standard dump trucks, to determine the height of their truck trailers at full extension and post the height prominently in the cab compartment. The posting could be in the form of a dashboard safety sticker. For example, a sticker stating:

<i>LOOK UP AND LIVE!</i>
DO YOU SEE OVERHEAD LINES?
KNOW YOUR RDH?
This Truck's <u>RAISED DUMP HEIGHT</u> is _____ Feet _____ Inches (RDH measured from ground to full extension)
LOOK UP FOR WIRES – FIND A SAFE PLACE TO MAINTAIN CLEARANCE – THEN DUMP

- Employers should establish emergency procedures for coworkers to follow in case of an electrocution and train the workers in these procedures.

As described in the report, standing/walking near equipment that has come in contact with a power line can prove fatal because of “step” voltage or “step” potential. It is equally dangerous for any workers or other bystanders who walk or run into the area during a rescue attempt. In this incident, three additional individuals could have been killed while attempting to rescue the decedent. Their first reaction was to help the decedent. But if the line's electricity had not been tripped, 4,800 volts of electricity could have still been radiating outward from the tractor/trailer in the wet, muddy soil. When the three individuals entered this area, they too could have been electrocuted or received a serious electrical shock. Employers should ensure that the tragedy is not compounded by the Good Samaritan acts of other workers by establishing emergency procedures for response to electrocution incidents and training fellow workers in these procedures.

REFERENCES

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Labor and Economic Growth (DLEG) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Labor and Economic Growth, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- MIOSHA Construction Safety Standard, Part 1. General Rules.
Internet Address: www.michigan.gov/documents/CIS_WSH_part_1_38098_7.pdf
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www.osha.gov/Region7/overheadpowerlines/ohpl_card_eng.pdf
- Contractor Safety Handbook. Caution Work Safely Near Electricity and Natural Gas. Alliant Energy. Internet Address:
www.alliantenergy.com/docs/groups/public/documents/pub/p014809.pdf
- NIOSH FACE. Hispanic Laborer Electrocuted After Boom Truck Contacts Overhead Power Line - North Carolina. NIOSH In-house FACE Report 2005-02 June 10, 2005. Internet Address: [0-www.cdc.gov/mill1.sjlibrary.org/niosh/face/In-house/full200502.html#ref7%23ref7](http://www.cdc.gov/mill1.sjlibrary.org/niosh/face/In-house/full200502.html#ref7%23ref7)

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MIFACE

Investigation Report #06 MI 185

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