

May 27, 2004

Nebraska FACE Investigation NE 2004-02

SUBJECT:

Worker Electrocuted In Bucket Truck

SUMMARY:

A 27-year-old Spanish-speaking masonry laborer was killed when he contacted an overhead electrical line. The victim, along with a co-worker, had raised a bucket truck's personnel platform approximately 30 feet in the air. They were attempting to maneuver the personnel platform above and across some electrical wires in an attempt to clear ice and snow from a building's roof and gutters. When it was determined they could not safely reach it from the current position, the co-worker started to lower the bucket. The victim, for unknown reasons, contacted one of the overhead electrical lines with his left hand. The shock caused him to arch his back and fall outside the bucket, hanging by his harness and lanyard. The co-worker yelled at the victim but got no response. He used his cell phone to call 911 for help, then lowered the victim to the ground. Emergency personnel responded almost immediately and provided emergency care. The victim was transported to a local hospital where he was pronounced dead a short time later.

The Nebraska Workforce Development, Department of Labor's Investigator concluded that to help prevent future similar occurrences, employers should:

- establish a formal, written electrical safety training program to include, but not limited to, work around overhead lines.
- provide safety training to employees in a language they understand and comprehend.
- provide employees the appropriate equipment and training necessary to do their job safely.
- ensure that each job site is surveyed by a competent person prior to commencing work.

PROGRAM OBJECTIVE:

The goal of the Fatality Assessment and Control Evaluation (FACE) workplace investigation is to prevent future work-related deaths or injuries, by a study of the working environment, the worker, the task the worker was performing, the tools the worker was using, and the role of management in controlling how these factors interact.

This report is generated and distributed **solely** for the purpose of providing current, relevant education to employers, their employees and the community on methods to prevent occupational fatalities and injuries.

INTRODUCTION:

On February 7, 2004, at approximately 9:25 a.m., a 27-year-old masonry laborer died after he accidentally made contact with an overhead un-insulated 12,500 volt fused lateral distribution line while in the bucket of a high reach truck. The Nebraska Department of Labor received notice of the fatality the same day through local news media. The Nebraska FACE Investigator met with the investigating OSHA Compliance Officer (COSHA), company officials and local investigating law enforcement personnel on February 9th, 10th & 11th, 2004. The mishap site was visited on February 9th & 11th, 2004.

The victim's employer is a masonry restoration company, doing work on both residential and commercial buildings (SIC Code 1745). The company has been in business since February 1, 1978. At the time of the mishap the company employed 2 supervisors and 6 laborer and office employees. This number increases when the weather improves. The company had hired a private safety consultant a few days before the incident but had not yet used his services. The employer had no previous history of employee fatalities.

Note: This same bucket truck was involved in another occupational fatality on July 1, 2001. A self-employed 48-year-old male painter had subcontracted to paint a sorority house. While parked in a driveway between two sorority houses at approximately 3:30 p.m. he raised the boom and made contact with a 7,600 volt overhead electrical line. He was thrown from the personnel platform and died instantly from his injuries.

INVESTIGATION:

Personnel:

Victim: The victim was a 27-year-old Hispanic male. He had been employed by this company for two and a half years as a "laborer/caulker". His work hours varied depending on weather, construction schedules, etc. Normally, due to winter weather, he would have been laid off prior to the incident, but was called back to do this particular job. He was due to start a new job at a fast food establishment in three days. He was born in the United States and spoke English, although somewhat broken.

Co-worker: The co-worker, a 41-year-old Hispanic male has worked for this company over 20 years as a laborer/caulker. He has a state driver's license but no commercial driver's license (CDL). He can speak English though somewhat broken.

Supervisor: The supervisor, a non-Hispanic male, has worked for the company for 3 years. During interviews he denied any formal training concerning the bucket truck, but admitted he had worked out of it with both the victim and the co-worker. He also denied being a supervisor, but the owner stated he had been one for a long time.

Training: The company has a Safety & Health Program manual written in English. Each employee received and signed for their own copy during initial training. Training was conducted

in English. Spanish was also spoken by the victim and other employees in the workplace. During interviews, the owner stated that it was hard getting the Hispanic workers into safety programs due to the language barriers.

Lock-out/Tag-out (LOTO) Program: The company safety manual contained a statement referencing LOTO, but they do not own any equipment that requires written procedures.

Personal Protective Equipment Program: The company safety manual does contain scaffold safety along with fall protection procedures. Each employee is issued their own harness and instructed in its use and care.

Hazard Communication Program: Although there was no written program, interviewed employees were familiar with the requirements of the program, Material Safety Data Sheets (MSDS) and their function. Copies of all required Material Safety Data Sheets (MSDS) are located on the job site and in the office.

There are Monday morning “tool box talks”, on-site safety meetings, and also twice monthly safety meetings in the office. Most of the training was not documented, but the “tool box talk” meetings do have an employee signature area on the bottom of the sheet. Copies were provided to the investigator and showed the following dates of training, subject matter and whether or not the co-worker and/or victim or both attended:

08/27/01	Overhead Powerlines	co-worker
04/22/02	Distractions	co-worker, victim
06/02/02	National Safety Month	co-worker, victim
07/22/02	Cranes and Power Lines	co-worker
09/02/02	OSHA Top 10	co-worker, victim
09/09/02	Fall Protection	co-worker, victim
10/28/02	What to do when someone is injured	co-worker, victim
08/04/03	Electrical Safety	victim
11/03/03	Fall Protection	co-worker, victim

Equipment: The truck in use was a 1979 Chevrolet C70 12-ton truck, equipped with an Elliot brand hydraulically operated boom. There was a metal operator’s platform attached to the boom end with mounted controls. The boom and platform were manufactured in accordance with ANSI standard A92.2, *Vehicle Mounted Elevating & Rotating Devices*, 1969 edition. This standard covers both insulated and non-insulated booms. Neither the boom or the platform are insulated.

The company owner bought the truck new in 1979. It is taken annually for a federally mandated inspection/certification of the boom, which was last performed May 20, 2003. Records at the business performing the check showed no major problems with the boom during the last inspection. This inspection is to certify it as a “standard boom”, not one used near high voltage lines. There were numerous warning stickers located throughout the entire boom and truck surface areas warning the operator to remain clear of electrical lines.

The company did not have established written procedures for operation of the bucket truck. Upon initial hire, each employee was given training on the bucket truck by the company owner, first verbally, then hands-on.

ANALYSIS/SYNOPSIS:

Several days previous to the incident, the region had received over 20 inches of snow, more than had fallen at any one time in the past 30 years. The temperatures remained in the single digits for several days, not allowing the snow and ice to fully melt. The snow would slowly melt during the day, then freeze solid again during the evening hours. This caused the guttering along building roofs to fill completely with ice and snow, causing an “ice dam” which would not allow the melted water to properly drain. This caused further melting to run inside the building and down interior walls, causing major structural damage.

The building at the incident site is a three story sorority house with driveways on both the south and north sides. The personnel in charge contracted with the victim’s company to remove the snow and ice from the building’s roof and gutters, as it was causing internal damage and had allowed ice to form over some windows, thereby not allowing them to be opened in case of an emergency.

Two days prior to the incident, a supervisor and the boom operator went to the site to conduct a quick survey of the areas needing attention, which was mainly the north side of the building. They had been told by the company owner that there were electrical lines present.

On the day of the incident, the boom operator and victim assembled their equipment at the company’s shop. They were told by the boss to “be careful”, then drove together in the boom truck to the job site. The job site was located on a university campus street where several sorority houses are located on both sides of the main street.

At the incident location, there is another sorority house on the north side, which had a driveway that runs parallel to the north driveway of the job site house. These two driveways are separated by a short concrete barrier which was covered by accumulated snow. There are no overhead wires on the south side.

There is a power pole located at the east end of the two driveways, directly in the middle, with two mounted transformers. From here the drop down electrical service line runs to the sorority house, where it is mounted about midway on the second story. There is also a communications cable running underneath the service line. There is a new dormitory being constructed directly east of the job site. The local electrical company had installed a 3-phase 12,500-volt temporary fused lateral conductor distribution line service to the new building. These lines run directly overhead of both driveways for their entire length. There are four electrical wires on this system, three that are hot and one that is a static/shield wire that carries no current. The southernmost line along with the two northern-most lines were hot. All four of these lines are un-insulated, which give them a much smaller appearance than the normal service insulated lines. They are 5/16” diameter while the service loop line is 3/4” diameter.

Because of the inability to raise the boom from the adjacent driveway, the workers elected to use the far north driveway. This would also allow them to extend all the truck’s outriggers for greater stability. Due to the north driveway’s greater width, they were able to park the truck at an angle, allowing the center pivot of the boom to not be directly under the overhead lines. Once the outriggers were deployed, they donned their harnesses and lanyards and climbed onto the boom’s platform.

The operator stated that they discussed the overhead lines, and he believed they were electrical. They first attempted to go under the overhead lines and over the service line to access the roof,

but decided it would place them too close to both sets of electrical lines. They then raised the boom straight up alongside and above the overhead lines. As they surveyed the situation, they decided again that they would not be able to access the roof from the current position without making contact with the lines. The operator stated he knew they were too close to the lines. They decided that they would lower the boom and call the owner for further instruction.

Both the operator and victim were facing east. As the operator started to lower the boom, the victim jokingly told him that the sun felt good on his face and to not lower the boom. The operator stated that as he started to lower the boom he heard a “sizzle” and turned towards the victim. He observed the victim holding the northernmost uninsulated line with his left hand and his right arm dangling at his side. The victim arched his back and fell over the backside of the platform, hanging by his lanyard and harness. The operator yelled at the victim but did not receive a response nor could he tell if the victim was breathing. He used his cell phone to call 911. The 911 operator, after determining that he could safely lower the boom, instructed him to do so. The operator lowered the boom enough so the victim’s feet were touching the ground.

City rescue and law enforcement personnel responded immediately. They stated the victim was hanging a few inches from the ground when they arrived. He was pulseless and apneic. They cut him down through his harness and began resuscitative efforts. He was placed inside of an ambulance where CPR was continued.

The local electrical company representatives, along with the victim’s boss were notified and responded to the site. The electrical company verified that there were no wires down. During an interview with the operator and owner, both knew that the owning electrical company would, if called, come and “gutter” the electrical lines by placing insulating material over them. The owner stated he didn’t know why they hadn’t called this time, as the electrical company had performed this service for them before several times.

The victim was transported to a local hospital where several support treatments were performed. Medications, defibrillation and cardiac ultrasound were utilized without success. He was pronounced dead at approximately 10:09 a.m.

Before being allowed to move the boom truck, the boom was raised and lowered several feet to ensure it was in operational order, which it was.

An autopsy showed the charge had entered the victim’s left hand and exited through his right hand. Two pairs of gloves were being worn, but neither were insulated for electricity and had severe burn marks. Although the electrical lines had in-line fuses, these did not blow because the line “saw” the extra load as something similar to a person turning on an electric oven.

CAUSE OF DEATH:

According to the death certificate, the cause of death was: Electrocution

RECOMMENDATIONS/DISCUSSION:

- **Recommendation #1: Establish a formal, written electrical safety training program to include, but not limited to, work around overhead electrical lines.**

Discussion: Adequate training in the recognition of hazardous energy sources, along with the methods and means to isolate them must be provided to employees. Include in this written training guidelines on how to deal with overhead electrical lines. Actual programs and examples are available through the OSHA web site and numerous commercial sources.

(29 CFR 1910.147(c)(7)(i); 29 CFR 1926.20(b)(1))

- **Recommendation #2: Provide safety training to employees in a language they understand and comprehend.**

Discussion: Where a training requirement exists, employers must provide it in a language that employees understand. Employees need to know how to identify unsafe conditions and the means necessary to report them to the proper personnel/agencies for their correction.

¹From 1997 to 2002, total fatalities in the construction industry rose by slightly more than 1 percent, according to the Bureau of Labor Statistics. During this same period, the number of Hispanic fatalities in the industry shot up by almost 50 percent.

Cultural differences between Hispanic and English speaking workers must be addressed also. Hispanic workers are very loyal and dedicated, thereby contributing to a reluctance of many Latinos to challenge authority. They may agree to do unsafe tasks or not stop co-workers from risky behavior. This cultural aversion to saying “no” may well be one factor behind the high fatality rates for Hispanic workers.

During interviews, the owner stated it was hard to find safety classes for Hispanics. The Nebraska Department of Labor’s 21d OSHA Consultation Program does have a bilingual safety consultant that conducts safety classes in both Spanish and English. A copy of his business card was given to the company owner.

(29 CFR 1910.1200(h))

- **Recommendation #3: Provide employees the appropriate equipment and training necessary to do their job safely.**

Discussion: The bucket truck was not originally designed nor manufactured to be used around energized conductors of any type. The personnel platform is made from tubular and sheet steel, neither of which is grounded/insulated. The boom does not have any type of insulating fuses between it and the personnel platform. During annual certification testing, the boom and platform are not certified as “electrical”, only as a “standard boom”. It is not possible to retrofit this equipment for use around electrical lines.

The gloves worn by the victim were not insulated for work near or on electrical lines, but were designed for warmth from the extreme cold temperatures.

If further work entails being in the vicinity of electrical lines a bucket truck that is certified as “electrical” should be utilized.

A formal training program on the safe and proper use of the bucket truck should be established using the operating manuals from the manufacturer. Ensure that a section deals with operation near energized electrical wires. All employees that will either

operate and/or work from the truck should receive this training. Give the training in a language the employees are comfortable with. Do not assume that because the training information has been delivered that the information has been received. Written testing may not work due to language and literacy constraints. Consider a “hands on” training with the instructor demonstrating proper procedures and the students duplicating the lesson.

(29 CFR 1926.20(b)(4))

- **Recommendation #4: Ensure that each job site is surveyed by a competent person prior to commencing work.**

Discussion: By definition, a *competent person* is: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Two days prior to the incident the supervisor and co-worker conducted a site survey to determine the extent of work necessary on the sorority house. At that time, the observation of the overhead electrical lines should have caused a plan of action to be initiated that would somehow remove the employees from the identified hazards. Interviews with the owner, supervisor, co-worker and electrical company personnel revealed that the company had requested help to “gutter” (cover) electrical lines several times before at different job sites.

²State statutes also require that before any operations are to be performed within ten feet of any overhead high voltage conductors, or whenever any equipment in transit can come within four feet of same, the person or persons responsible for the work to be done shall notify the operator of the overhead high voltage conductors and the Commissioner of Labor, on forms prescribed by the Commissioner, not less than forty-eight hours before proceeding with such work.

³Numerous methods to protect the employees at this and other job sites could have been utilized, including:

1. De-energize the power lines. De-energizing and visibly grounding the lines should be the first option considered for protecting workers. By eliminating the source of the electrocution hazard, the danger is eliminated. Only power company personnel can de-energize a power line. This may take time and appropriate pre-planning is necessary.
2. Move the lines beyond a safe working clearance distance. This would reduce the hazard for employees working near the lines. However, like de-energizing the line, only power company personnel can move a power line. Again, pre-planning is necessary.
3. Use barrier protection. A barrier prevents physical contact between the high-reaching equipment, employees and the power lines. Barriers are made from non-conductive material and are not attached to the high-reaching equipment. A common type of barrier is the insulated sleeve which is attached directly to the power line. Again, only power company personnel can install these. Even with insulated sleeves, workers still must not work any closer than the appropriate line clearance distance.

4. Warning lines with flags. Using warning lines with flags is a way to visibly show where a power line's buffer zone is located. This requires the installation of flagged warning lines to the side and below the power lines. The warning line must be made of non-conductive materials. When an equipment operator moves near the power line, the warning line will mark the line clearance distance. The warning lines should not be attached to the utility pole. Placement of the warning lines can be achieved with the use of wooden poles. This system does not allow an employee to work any closer than the appropriate line clearance distance.
5. Use an observer. A designated observer can be assigned to monitor the distance between the high-reaching equipment and the power lines. If the equipment nears the power line's minimum clearance distance, the observer warns the equipment operator. For this to work, the observer must be able to accurately judge the distance between an energized power line and the high-reaching equipment.

This can be difficult for most people. Therefore, when using an observer consider the following:

- * Position the observer with a clear view of the overhead power lines. This will usually be below the line but to one side of the high-reaching equipment for horizontal clearance, and off to one side of the power line and equipment for vertical distance.
 - * Don't give the observer other responsibilities that may create distractions.
 - * For horizontal clearance, mark off on the ground with caution tape or paint the appropriate distance from the power line so that the observer knows the exact location of the line's appropriate clearance distance.
- (29 CFR 1926.32(f)/Neb. Rev. Stat. §§48-436 to 48-442)

ATTACHMENTS:

Attachment 1. Picture #1 side view of incident bucket truck.
Picture #2 personnel platform shortly after incident.

Attachment 2. Picture #3 taken shortly after incident facing east, shows placement of truck in relationship to overhead electrical lines.

REFERENCES:

1. ¹Occupational Hazards magazine, *Construction Safety: Best Practices in Training Hispanic Workers*, James L. Nash, February 18, 2004 edition.
2. ²Nebraska Revised Statute §§48-436 to 48-442, High Voltage Law
3. ³Construction Safety Council, 1995 edition, pg. 15-17, *Power Line Hazard Awareness*.

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