# Occupational Fatality Report

**Kentucky FACE Program**

Report No. 16KY013 Release Date: 05/24/2017

## Tree Trimmer Electrocuted and Dies While Trimming Tree Away from Power Lines

### CASE SUMMARY

On Monday, April 18, 2016, a 23-year-old male tree trimmer (victim) was strapped into a personal fall arrest harness while trimming trees along a 34.5 kilovolt power line at a height of approximately 25 feet 4 inches from the ground. As he was cutting a limb growing at a 75-degree angle to the ground, it is believed that the limb made contact with the power line as the victim was trimming it, resulting in a fatal electric shock. The victim was found dangling from the tree by his fall arrest system, and was pronounced dead at the scene at 11:00 am.

**Figure 1.** Tree the victim was trimming when he was electrocuted.

**Recommendations for prevention:**

- **Insulating equipment, such as insulating rubber gloves and sleeve combinations, or insulated power line sleeves, should be used when tree trimming work is to be performed within the minimum approach distance (MAD).**
- **Whenever tree limbs within the MAD are to be removed, a second line-clearance tree trimmer should be at ground level to provide verbal assistance from a second vantage point.**
- **Safety hazards identified in risk assessments should be properly abated prior to beginning work.**

## EMPLOYER

The landscaping services company was founded by three brothers in 1928 and had over 30,000 employees globally. The local branch of the company employed 100 employees, including the victim. The full service utility contractor performed various utility related services that included vegetation management, removal of trees, pruning, and clearing right of ways as well as emergency storm cleanup services.

## SAFETY AND TRAINING PROGRAMS

The employer administered ongoing safety training to ensure compliance with OSHA regulations and ANSI standards. Specific worker safety training was provided that addressed the following:

- Line clearance tree trimming operations
- Tree felling
- Chain saw safety and rigging
- Electrical hazards training
- First aid/CPR
- Defensive driving training
- Work zone traffic control

Employees were additionally encouraged to receive certifications in arboriculture and herbicide application. The victim had recently received tree pruner operational safety training from the employer. Despite receiving disciplinary action for several safety violations in 2014, the victim was promoted to the role of substitute foreperson, which allowed him to take over foreman responsibilities in the absence of an onsite foreman.

## VICTIM

The victim was a 23-year-old high school graduate and married father of two. He had been employed with the company since January, 2014. His job title was a “Trimmer A.” The “Trimmer A” status was given by the employer, indicating that he was deemed proficient in duties associated with tree trimming. Despite several instances of employer disciplinary actions for safety-related violations in 2014, he was promoted to the role of substitute foreperson.

## INCIDENT SCENE

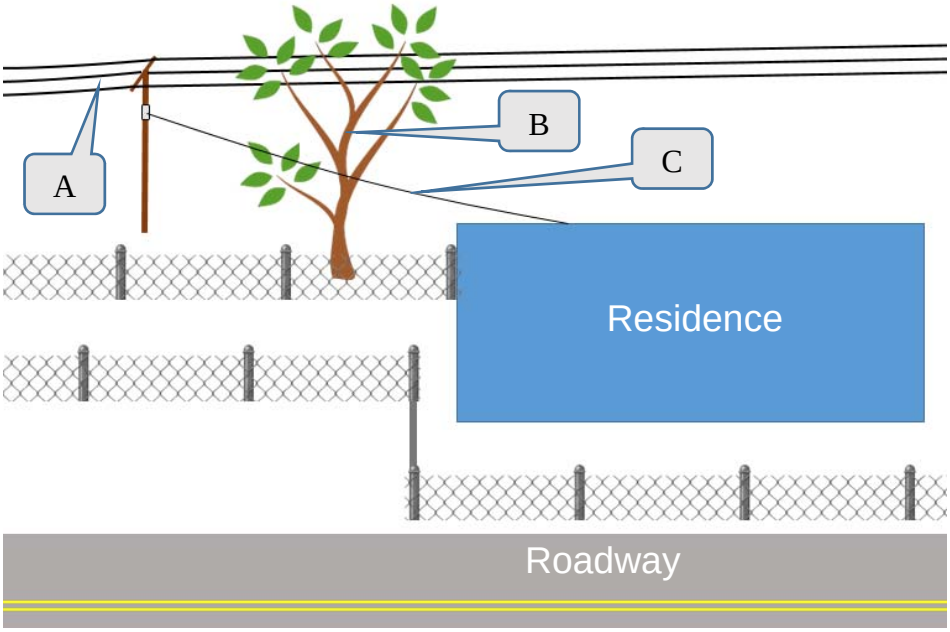


**Figure 2.** Diagram of incident scene (not to scale). Primary power lines (A), tree the victim was trimming (B), and insulated service line (B).

The incident occurred on a rural residential property positioned along a two-lane state highway. Three primary power lines (figure 2A) ran parallel on the back side of the property and provided electricity to local residences along the road. The power line that resulted in the fatal shock registered at 34.5 kilovolts. An insulated service line (figure 2C) originated from a transformer on the utility pole directly to the house. Directly behind the house, the ground sloped down towards a river that was lined with brush to be cleared by the landscaping services company. Near the top of the slope and behind the property's chain link fence was a 48 ½ ft. tall box elder tree with branches that grew in close proximity to the nearby power lines (Figure 2B).


**Figure 3.** Utility pole that ran power lines behind home (A); climbing rope for victim's fall arrest system (B).

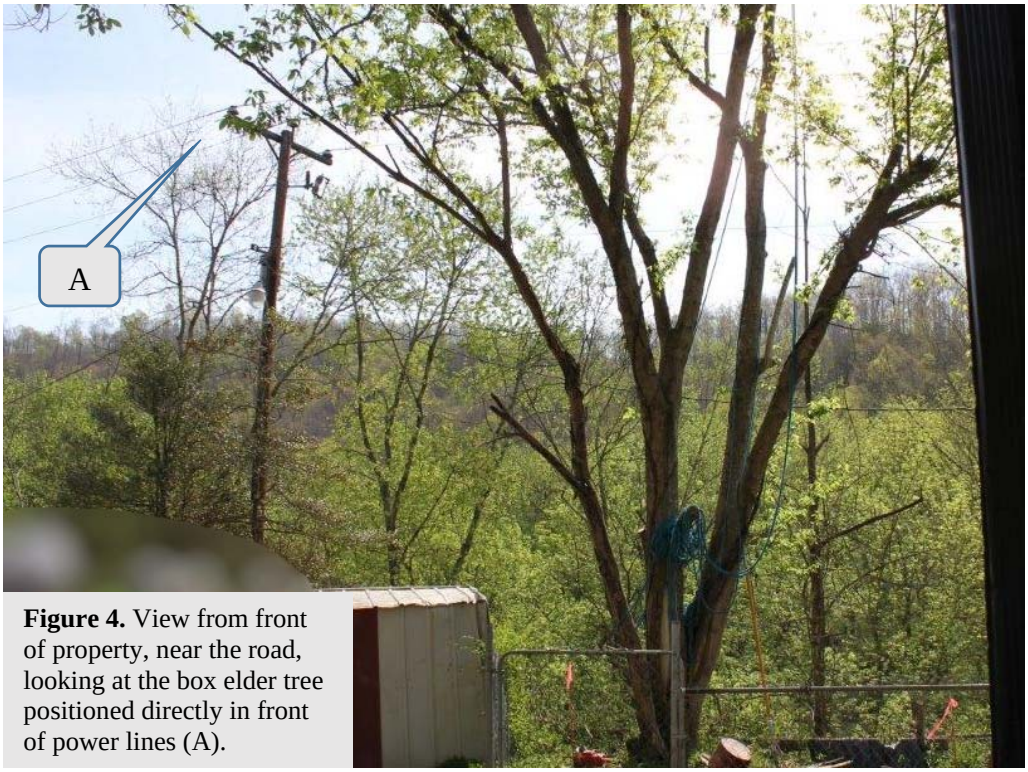


**Figure 4.** View from front of property, near the road, looking at the box elder tree positioned directly in front of power lines (A).

The coworker found the victim suspended in mid-air by his safety harness and rope. His pruner and chain saw were on the ground below him. Also on the ground below was a branch measuring 15 ft. 4 in. with three burned marks: one at 1 ft. 2 in., one at 1 ft. 7 in., and one at 11 ft. from the branch's end.

## WEATHER

April 18, 2016, had temperatures ranging from 54 to 86 degrees Fahrenheit. The temperature was approximately 63°F with clear skies at the time of the incident. The humidity was 37%, and the wind was calm. Weather was not considered a factor in this incident.[1]

## EQUIPMENT

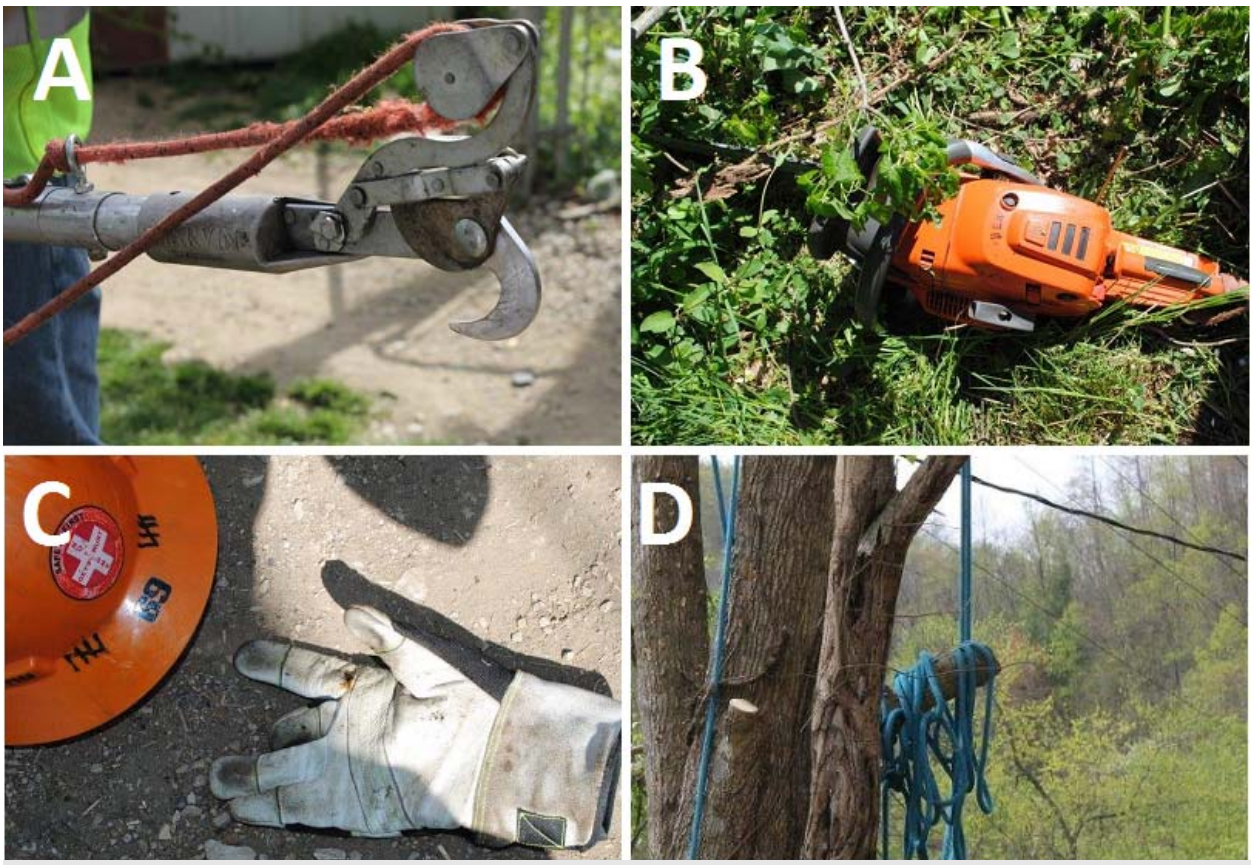


**Figure 5.** Insulated pruner pole (A); chainsaw (B); hard hat and leather work gloves (C); and climbing rope (D).

The following equipment found at the scene was used by the victim: insulated pruner poles (Figure 5A), a chainsaw (Figure 5B), a hardhat and leather gloves with burn marks (Figure 5C), and a climbing rope (Figure 5D). Both gloves had scorch marks indicating where the electrical current entered the victim's body.

## INVESTIGATION

On Monday, April 18, 2016, the Kentucky Fatality Assessment and Control Evaluation (FACE) Program was made aware by the Kentucky Labor Cabinet of a fatal electrocution on a tree-trimming job site. An investigation was subsequently conducted.

At approximately 9:00 am on a spring Monday morning, a two-man crew from a tree-trimming company arrived at a private residence to clear out brush and trim a tree that was positioned next to a power line. Both employees on this crew were line clearance tree trimmers, workers who have received specialized training and are permitted to work within the OSHA mandated minimum approach distance (MAD) of 10 feet from energized power lines. The branches of the tree to be trimmed were growing in close proximity to an adjacent power line. Working not far

down the road was another crew with the same landscaping services company, headed by the general foreman.

Each crew typically consisted of at least three employees, but the foreman for the victim's crew was on vacation, leaving only the two tree trimmers. One of the tree trimmers (the victim) of this crew had previously received certification from the company to be a substitute foreperson and was acting in that capacity on the day of the incident, fulfilling the typical responsibilities of the foreman. The other tree trimmer on the victim's crew was a first-year-climber, or what the company referred to as a Trimmer C. The truck that carried the victim and the other tree trimmer to the residence was not equipped with a radio, and only the victim carried a cellular phone.

The victim's crew was trimming trees along a 34.5 kilovolt power line that ran parallel to the road and behind some private residences. A 48 ½ foot box elder tree was adjacent to the residence near the power line. According to the tree trimmer coworker, the victim performed an analysis of the job site and held a pre-shift job briefing, which identified the close proximity of the power line to the box elder tree as well as other safety concerns. The briefing also covered personal protection equipment (PPE), hazards, minimum approach distances (MAD), special precautions to consider, emergency procedures, and an assessment of the box elder.

The victim assigned the other tree trimmer to use a chain saw and cut brush on an embankment 15 feet below the base of the tree. Equipped with an insulated pruner pole and a chain saw, the victim rigged his climbing rope, secured his fall arrest harness, and climbed the tree. While he was wearing leather work gloves, they were not insulated rubber gloves that are designed to protect from energized sources. When the victim reached a height of approximately 25 ft. 4 in. from the ground, he began cutting a 2-inch diameter limb growing at an approximately 75-degree angle to the ground with the chain saw. Investigation of the scene indicates that the limb moved toward and made contact with the 34.5 kilovolt power line as the victim was holding it. This resulted in the victim sustaining electrocution.

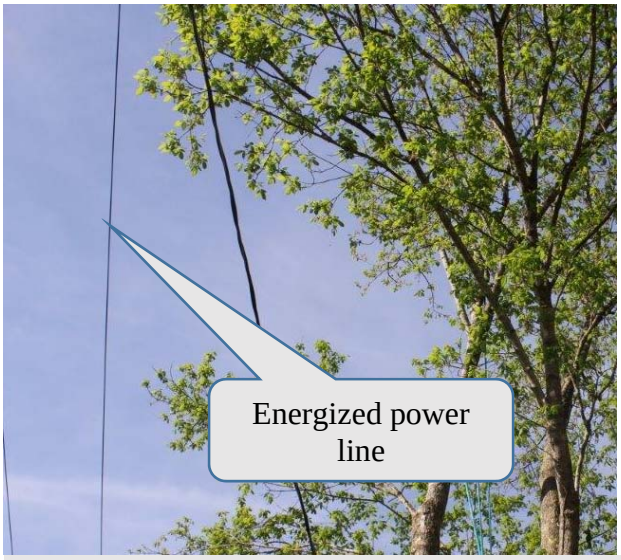


**Figure 6.** Energized power line in proximity to the tree's branches.

The other tree trimmer cutting brush on the slope below stated that he would occasionally glance back to check on the victim every few minutes. At approximately 9:38 am he thought he saw a spark followed by a strange noise. He immediately glanced back and saw the victim dangling from the tree with smoke emitting from his pants and shirt sleeves. The tree trimmer ran to the victim to try and help. Unable to determine if he was still in contact with the electrical current, he ran to the house for assistance. The homeowner, having witnessed from a window the victim convulsing and falling backwards, was already phoning emergency services dispatch. The tree

trimmer coworker flagged down a passing motorist and asked him to contact the crew working down the road to come to the job site immediately.

Arriving at the scene, the general foreman climbed the tree, retrieved the victim, and began CPR. He continued CPR for approximately 15-20 minutes until emergency services arrived on the scene at 10:06 am, took over CPR and used an automated external defibrillator (AED). The coroner was called at 10:16 am and arrived at the job site at 10:51 am, where he pronounced the victim dead.

*Evidence of Contact*


**Figure 7.** One of three burn marks on the branch (A); burn mark on the victim's glove (B).

According to the official preliminary investigation of the scene, a tree limb measuring approximately 15 ft. 4 in. was found lying beneath the tree in the victim's working vicinity. The tree limb had burn marks in three different locations: one at 1 ft. 2 in., one at 1 ft. 7 in., and one at 11 ft. from the branch's end. Additionally, burn marks on the victim's gloves indicated contact with a high electrical voltage source (Figure 7B). The locations of the burn marks on both the branch and the gloves suggest that the victim was holding the branch as he sawed it from the tree, and the branch came into contact with the exposed 34.5 kilovolt power line.

*Insufficient Insulation*

While the victim was using an insulated pruner pole and chainsaw, he was not wearing non-conductive rubber gloves or sleeves, nor had he arranged for the power line to be insulated prior to beginning work. OSHA requires that employees be restricted from approaching or taking any conductive objects "closer to exposed energized parts than the employer's established minimum approach distance", unless the employee is equipped with insulating PPE and equipment to protect them from the energized part (rubber insulating gloves and/or sleeves), the exposed energized source is insulated (insulating power line sleeves), or the employee is "insulated from any other exposed conductive objects in accordance with OSHA requirements for live-line bare

hand work."[2] The victim was not wearing rubber insulating gloves, the exposed power line was not insulated, and he was in contact with other conductive objects when the branch he was holding came into contact with the power line. While the victim was wearing leather work gloves, they were not sufficiently insulated to prevent electrical shock, as evidenced by the burn marks (Figure 7B).

## CAUSE OF DEATH

The cause of death was electrocution.

## CONTRIBUTING FACTORS

This investigation identified the following factors that may have contributed to the fatality:

- Not wearing rubber insulating gloves and sleeves.
- Not insulating the exposed energized source prior to beginning work.
- Proximity of tree to power line.
- Holding a tree limb in proximity to an energized source.

## RECOMMENDATIONS AND DISCUSSIONS

***Recommendation No. 1:*** **Insulating equipment, such as insulating rubber gloves and sleeve combinations, or insulated power line sleeves, should be used when tree trimming work is to be performed within the minimum approach distance (MAD).**

Employers are required to establish minimum approach distances (MAD) that are no less than those mandated by OSHA (refer to tables in reference 3 to compute these distances). Additionally, employers are required to restrict employees from removing branches or handling any items which come within the MAD unless the employee is insulated from the energized source or the energized source itself is insulated prior to beginning work.[2] The use of rubber insulating gloves and sleeves together fulfill this requirement. The victim in this incident was holding a tree limb that came within the MAD of the uninsulated power lines. Wearing rubber insulating gloves and sleeves may have prevented the electrical current from travelling through the victim's body and causing the fatal shock. Alternatively, the energized power line should be insulated prior to beginning work. Employees who lack line insulating resources should contact the local power utility provider to request that sleeves be installed prior to beginning work.

***Recommendation No. 2:*** **Whenever tree limbs within the MAD are to be removed, a second line-clearance tree trimmer should be at ground level to provide verbal assistance from a second vantage point.**

OSHA standard § 1910.269(r)(1)(ii) requires that a second line-clearance tree trimmer be within voice-communication distance whenever any of the following are true[3]:

a. Any line-clearance tree trimmer is within 10 feet or closer of an exposed energy source of more than 750 volts (0.75 kilovolt);
b. Any branches or limbs which are to be removed are within the MAD of lines energized at more than 750 volts; or
c. If roping is to be used to remove branches or limbs from an exposed energy source of more than 750 volts.

The second tree trimmer was clearing brush further down the slope at a lower grade than the tree when the incident happened. He was also operating brush clearing equipment which would have impeded verbal communication. To help reduce the likelihood of injury, a second line-clearance tree trimmer should remain close to the tree that is being trimmed and provide verbal assistance to the line-clearance tree trimmer who is performing tree trimming tasks. Verbal contact with a tree trimmer at the ground level may help increase situational awareness and lessen the likelihood of inadvertently contacting exposed power lines.

***Recommendation No. 3:*** **Safety hazards identified in risk assessments should be properly abated prior to beginning work.**

The tree trimmer working alongside the victim stated that the victim was a safety-conscious individual and performed a pre-shift risk assessment prior to beginning the job, as usual. However, sufficient protections were not put in place to prevent contact with the exposed, energized power line. When risk assessments are conducted and hazards are identified, proper follow up action should be initiated in accordance with the hierarchy of controls to prevent injury. For example, if we were to apply Hierarchy of Controls to a case like this, the energized power line could not be eliminated or substituted. Engineering controls would most likely involve permanent insulation of the overhead power lines by the line manufacturers, but this solution is unlikely due to the high associated cost. The next step in the hierarchy of controls is to provide administrative controls, followed by protecting the workers through use of personal protective equipment. OSHA standards require both administrative controls and personal protective equipment for line-clearance tree trimmers working within the MAD, or handling conductive objects within the MAD of exposed power lines.

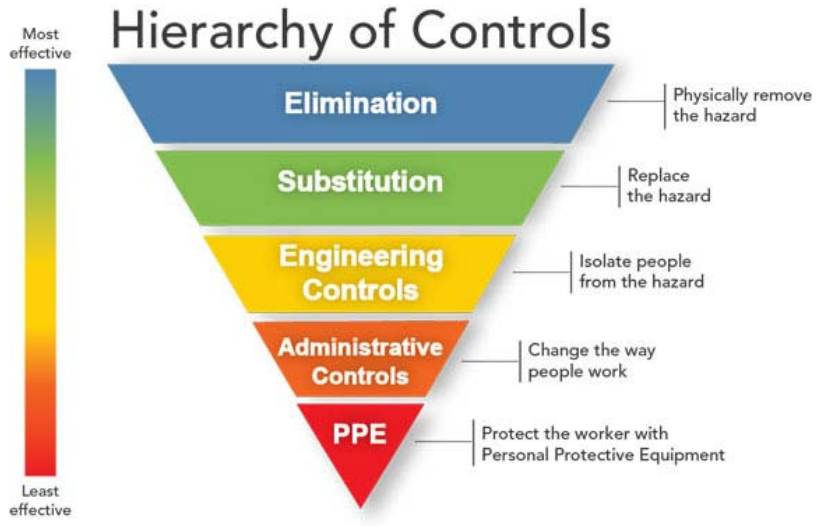


**Figure 8.** Hierarchy of Controls. Source: NIOSH.

Additionally, employers should conduct a job hazard analysis, with the participation of employees, of all work areas and job tasks. A job hazard analysis should begin by reviewing the work activities for which the employee is responsible, and the equipment that is needed. Each task is further examined for mechanical, electrical, chemical, or any other hazard the worker may encounter. In this case, a job hazard analysis may have prevented this fatality by targeting the idea of appropriate PPE use. A source of information on conducting a job hazard analysis can be obtained from the US Department of Labor.[4]

**Please take the time to complete our brief survey regarding this report: (**https://uky.az1.qualtrics.com/jfe/form/SV_b9Ikv4LIEleug05**)**

## KEYWORDS

Tree trimming
Power lines
Chain saws
Insulated pole saws
Electrocution

## REFERENCES

[1] **“**Historical Weather”. *Archive.* Weather Underground. [https://www.wunderground.com/history]

[2] “1910.269(l)(3)(i)-(iii) ”. Electrical Power Generation, Transmission, and Distribution.Occupational Safety and Health Administration, U.S. Department of Labor. [https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9868]

[3]“§ 1910.269(r)(1)(ii)(A)-(C)”. Electrical Power Generation, Transmission, and Distribution. Occupational Safety and Health Administration, U.S. Department of Labor. [https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9868]

[4]”Job Hazard Analysis (OSHA 3071 2002 – Revised)”. Occupational Safety and Health Administration, U.S. Department of Labor. [https://www.osha.gov/Publications/osha3071.pdf]

## PHOTO CREDIT

Figure 2 is credited to Kentucky FACE, Figure 8 to the National Institute for Occupational Safety and Health, Center for Disease Control and Prevention. The remainder of photos are credited to the Kentucky Occupational Safety and Health Program, Kentucky Labor Cabinet.

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**DISCLAIMER**

This case report was developed to draw the attention of employers and employees to a serious safety hazard and is based on preliminary data only. This publication does not represent final determinations regarding the nature of the incident, cause of the injury, or fault of employer, employee, or any party involved. Findings in this report are based upon preliminary findings and are subject to differ from final official determinations.

This case report was developed by the Kentucky Fatality Assessment and Control Evaluation (FACE) Program. Kentucky FACE is a NIOSH-funded occupational fatality surveillance program with the goal of preventing fatal work injuries by studying the worker, the work environment, and the role of management, engineering, and behavioral changes in preventing future injuries. The FACE Program is located in the Kentucky Injury Prevention and Research Center (KIPRC). KIPRC is a bona fide agent for the Kentucky Department for Public Health.

**Email: kyfaceprogram@uky.edu | Telephone: 859-257-5839**
**333 Waller Avenue Suite 242, Lexington, KY 40504**

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