

**Firefighter is Electrocuted After Contacting Overhead
Power Line
Incident Number: 14KY049**



Photo courtesy of KY OSH

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Kentucky Fatality Assessment and Control Evaluation (FACE) Program
Incident Number: 14KY049
Release Date: August 12, 2015
Subject: Firefighter is Electrocuted after Contacting Overhead Power Line.

Introduction

On August 21, 2014, four firefighters arrived at a local university to assist in a national disease fundraising event. After debating where to set up their tower truck, the firefighters parked the tower truck close to a hydrant and two drains to protect landscape and provide drainage. Overhead power lines were present at all locations discussed. Firefighters 1 and 2 were in the bucket of the tower truck, a third firefighter was on the turntable of the truck opening the valves to access the water, while firefighter 4 was by the back of the truck watching the university film crew tape the introduction. Fundraising participants stood in front of the tower truck and firefighters opened the hose and sprayed them as they sang their school's song. Once the song finished the crowd thanked the firemen and dispersed.

As the firefighters disassembled, one witness noticed that while attempting to dock, the bucket moved upward towards power lines instead of lowering. Firefighter 1, who was in control of the bucket, struck the powered electrical line sending a charge throughout the tower truck. Firefighter 1 then slumped down and witnesses heard him moaning. The victim then stood and struck the power line again with the left side of his head. Firefighter 2 who was also in the bucket with Firefighter 1 yelled for help.

At 11:44 am, emergency medical services were dispatched to the scene and arrived at 11:48 am. Paramedics treated firefighters 3 and 4 for non-life threatening injuries, and transported them to a local hospital. Firefighter 2 was transported first to a regional hospital then flown to a trauma center with electrical burns. Firefighter 1 was directly airlifted to a trauma center and succumbed to his injuries one month later from electrical burn complications.

To prevent future occurrences of similar incidents, the following recommendations have been made:

Recommendation No. 1: Whenever possible, avoid operating tower trucks where overhead power lines are present.

Recommendation No. 2: Employers should ensure that firefighters wear protective head gear, footwear, and gloves, especially in a bucket where power lines are present.

Recommendation No. 3: Employers should designate a spotter on the ground to observe each time the bucket is raised and lowered.

Recommendation No.4: Employers should ensure bucket equipment is inspected as recommended by the manufacturer.

Recommendation No 5: A communication intercom system from base to bucket should be established when the aerial truck is in use.

Employer

The employer was a city fire department with 127 employees at this location.

Written Safety Programs and Training

The employer had all written safety programs and provided annual updated training records for each employee. The employer required volunteer firefighters to have 150 hours of basic training with 20 hours of annual refresher training. Career firefighters are required to obtain 400 hours of basic training and 100 hours of annual refresher training. Training included hazards of overhead power lines.

Victim

The victim, a 41-year-old father of five children, was a 16-year veteran career firefighter who was described by coworkers as one who took his job very seriously. He attained the rank of Captain and served as a training officer for two county fire departments.

Incident Scene

A tower truck was parked at an intersection on a university campus. Overhead power lines were present at 40 feet 6 inches above the ground with a voltage of 69kV.

Weather

August 21, 2014, was a clear day with temperatures ranging from 76 to 87 degrees Fahrenheit. Weather was not believed to have been a contributing factor in this incident.

Investigation

The Kentucky Fatality Assessment and Control Evaluation Program was notified through the media of an occupational incident involving four firefighters.

A university band director contacted the local fire department to request assistance for a national disease fundraising event. Four firefighters arrived at the university at 11:00 am. It took approximately 40 minutes for the firefighters to set up the tower truck and position the bucket for the fundraising event. The firefighters chose an initial location but because of drainage, landscape, and power line concerns, moved the location. The second location was at the

intersection of two streets close to a fire hydrant, on level ground that accessed two drains but power lines were still present.

Firefighters 1 and 2 entered the bucket of the tower truck and proceeded to raise the bucket to the position necessary to spray the water. Firefighter 3 was on the turntable of the truck, opening the valves to access the water. Firefighter 4 was in the back of the truck watching the university film crew tape the band members' introduction. The firefighters in the bucket were not wearing helmets or protective footwear but both were wearing ladder belts.

The band stood in front of the tower truck where the bucket was raised, and the firefighters opened the hose to spray them as they sang their school song. The firefighters then turned off the hose as the students walked past calling out their thanks.

Firefighter 4 removed pins from the front driver's side outrigger while firefighter 3 stood at the pump panel to open the main drain to the pump, close the main streamer from the hydrant, and close the aerial discharge valve. As firefighters 1 and 2 were docking the bucket, a witness, (a fifth firefighter who was there as only a spectator) noticed the tower ladder move inward and upward instead of outward and down. Before the witness could yell a warning about the power lines, the head of firefighter 1 struck the powered electrical line, sending a charge through the tower truck.

Firefighter 4 noticed a ball of fire that shot out from under the truck and a flash at the turntable. Firefighter 3 walked away from the truck, thinking that a hydraulic line incident was responsible for the flash. However, as firefighter 3 walked toward the truck he heard firefighter 2 in the bucket with firefighter 1, yelling that the Captain (firefighter 1) was down and needed help. Firefighter 3 looked up and saw firefighter 1's wrist engulfed in flame. Firefighter 1 stood in the bucket, appearing dazed. He braced his hands on the back of the basket and moved his head to the right. As he moved his head back to the left, he hit the power line a second time. There was a bright flash around his head and he slumped over the bucket and hung by his ladder belt. Another flash was observed at the same time from under the turntable and a second fireball shot out from under the truck. Firefighters 3 and 4 radioed the incident, and requested emergency medical services.

At 11:44 am emergency medical services were dispatched to the scene and arrived at 11:48 am. Another firefighter at the scene jumped onto the truck to access the turntable and another arc occurred. He jumped clear of the truck, then jumped back onto the truck, accessed the turntable and lowered the platform to the ground. Paramedics immediately took over the scene. Firefighters 3 and 4 were checked out by EMS, transported to a regional hospital where they were treated for non-life threatening injuries and released later that day. Firefighter 2 was transported to a regional hospital then flown to a trauma center in serious condition with electrical burns. Firefighter 2 was released from the trauma center on September 15, 2014. Firefighter 1 was airlifted to the nearest trauma center for treatment and succumbed to his injuries on September 20, 2014.

Cause of Death

The cause of death was complications from electrical burns.

Recommendations and Discussions

Recommendation No. 1: Whenever possible, avoid operating tower trucks where overhead power lines are present.¹

Overhead power lines create a hazard and should be avoided whenever possible. The best practice in this case would have been to move the disease fundraising event to an empty flat parking lot or open field.²

Recommendation No. 2: Employers should ensure that firefighters wear protective head gear, footwear and gloves, especially in a bucket where power lines are present.

The helmets worn by firefighters are certified to NFPA 1971-2013 or NFPA 1951-2013 standards and will protect them up to 20,000 volts. Had the firefighter worn this type of helmet, he may have reduced his electrical shock hazard. Also, footwear to protect against electrical hazards may have reduced the risk.

Recommendation No. 3: Employers should designate a spotter on the ground to observe each time the bucket is raised and lowered.

A designated spotter on the ground could assist in watching for overhead hazards while the tower is raised and lowered, reducing the risk of injury.

Recommendation No.4: Employers should ensure bucket equipment is inspected as recommended by the manufacturer.

In this incident, it was unclear whether there was a bucket equipment malfunction or human error. The vehicle manufacturer recommended weekly tower truck inspections to ensure proper working condition. Records indicated the inspections occurred monthly. Most fire departments standard operating procedures recommend an equipment check at the beginning of each shift change according to NFPA 1911 standards.

Recommendation No 5: A communication intercom system from base to bucket should be established when the aerial truck is in use.

Had the employees used a communication system from base to bucket, information on overhead hazards could have been quickly communicated. Firefighter 5 observed the bucket moving upwards towards the power lines while attempting to dock. Had he used an intercom system, the victim may have heard him in time to stop the movement of the bucket.

Keywords

Aerial lifts
Firefighters
Electrocutions
Power lines

References

¹*Electrical Safety: Safety and Health for Electrical Trades Student Manual*. CDC.

[<http://www.cdc.gov/niosh/docs/2009-113/default.html>]

²*29 CFR 1926.416(a): Safety and Health Regulations for Construction- Electrical*. United States Department of Labor. [

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10717]

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Photo of the turntable.

Photo courtesy of KY OSH



Photo of outrigger where arc occurred.

Photo courtesy of KY OSH



Photo of inside bucket and ladder belt that was cut

Photo courtesy of KY OSH



Photo of tower apparatus and electrical lines

Photo courtesy of KY OSH