

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (CA/FACE) Program

SUBJECT: A Tree Trimmer is Electrocuted When a Tree Branch Falls onto Energized Electric Power Lines

SUMMARY
California FACE Report #11CA003

A tree trimmer was electrocuted while trimming tree branches in a residential front yard. The victim was hired by a homeowner to trim the branches of a tree growing into utility lines in his front yard. The victim was wearing a full-body harness for fall protection, and had a climbing rope, flip line, drop line, and climbing spurs on his feet. He used a chain saw to cut away the branches of the tree. A branch that was cut did not fully detach from the tree and struck the energized electric power lines. The electric current flowed through the cut branch and into the victim who was attached to the tree with his climbing spurs. Contributing factors identified in this investigation were improper work practices in line-clearance tree trimming, and working in close proximity to energized utility lines. The CA/FACE investigator determined that in order to prevent future incidents, tree trimmers who perform line-clearance tree trimming should ensure that:

- The electric utility company is notified whenever tree trimming is closer than ten feet to energized high-voltage lines; and
- They have received training and certification in line-clearance tree trimming operations by qualified instructors.

In addition, homeowners who need trees trimmed or removed that are in close proximity to high voltage lines should:

- Contact the electric utility company and request they trim the trees; or
- Hire only qualified line-clearance tree trimmers or contractors who are trained and certified by organizations such as the ISA (International Society of Arboriculture) or the TCIA (Tree Care Industry Association).

INTRODUCTION

On Tuesday, April 19, 2011, at approximately 3:00 p.m., a 39-year-old Hispanic tree trimmer was electrocuted while trimming tree branches in a residential yard. The CA/FACE investigator received notification of this incident on April 20, 2011, from the Monrovia District Office of the Division of Occupational Safety and Health (Cal/OSHA).

On May 10, 2011, the CA/FACE investigator visited the incident scene and interviewed the victim's two sons and brother. The neighbors who lived next door and across the street from the home where the incident occurred were also interviewed, however the homeowner declined to be interviewed. Pictures of the tree involved in the incident were retrieved from the Internet at Google Maps. Copies of the police and coroner reports were also obtained.

VICTIM

According to the victim's sons, the victim was born in Mexico and came to the United States with his family 20 years ago, working as a self-employed handyman which included tree trimming. The sons stated that, 17 years ago, the victim obtained a regular day job as a construction worker with a paving company but continued to perform side jobs as a self-employed handyman. It is unknown how often he performed tree trimming during this time. The victim had a 9th grade education and spoke both English and Spanish.

EMPLOYER

The victim was a self-employed handyman. According to the victim's sons, the homeowner approached their father and hired him to trim the tree in their front yard. One of the branches had broken off and fallen on the house, while others were growing into the utility lines that ran in front of the house. The sons stated that the homeowner's neighbors told him that their father was a self-employed handyman who trimmed trees in the neighborhood.

WRITTEN SAFETY PROGRAMS AND TRAINING

The victim did not have an Injury and Illness Prevention Program (IIPP). According to his sons, the victim never had any formal training in gardening, landscaping, or tree trimming. The victim's sons stated that he had learned these trades from working with others.

INCIDENT SCENE

The location of the incident was a tree (approximately 55 feet high) in the front yard of a single family dwelling in a populated residential area of Los Angeles County.

WEATHER

The incident occurred at approximately 3:00 p.m. The day was partly sunny and the temperature averaged in the low 70's. The wind speed averaged 9-10 mph. There is no indication that weather played a role in this incident.

INVESTIGATION

On the day of the incident, the victim arrived at the incident scene at 8:00 a.m. to trim

the tree with his brother and sons. The tree was located approximately eight feet from the home and was adjacent to the 16,000 volt power distribution lines that supplied electricity to the homes on that street. The victim put on a fall protection harness and a slip line, a climbing rope, and drop line along with climbing spurs on his legs. He then climbed the tree, removed all slack in his climbing rope, pulled up a chain saw, and began trimming the branches. As the branches fell to the ground, the victim's brother and sons dragged them to a trailer attached to a pickup truck parked in front of the house. Many neighbors gathered across the street to watch the work in progress.

At approximately 3:00 p.m., the victim was about 35 feet up in the tree and cut a branch that fell onto the energized electric power line. The cut branch had not completely detached from the tree and, when it made contact with the energized power line, the electric current traveled through the branch, back to the tree, and then to the victim through his climbing spurs, climbing rope, or flip line. According to the victim's brother, the victim dropped the chain saw to the ground and fell backwards in his harness as his legs straddled a larger branch of the tree.

The paramedics and fire department were immediately notified by the victim's son and numerous neighbors and arrived at the incident scene within minutes. The victim was pronounced dead at the scene. Paramedics were able to remove the body from the tree approximately two hours later, after the utility company de-energized the power lines.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in an injury or fatality. The CA/FACE team identified the following as contributing factors in this incident:

- Working too close to energized electric lines.
- Improper work practice in line-clearance tree trimming.

CAUSE OF DEATH

The cause of death according to the death certificate was electrocution.

RECOMMENDATIONS / DISCUSSION

Tree trimmers performing line-clearance tree trimming should ensure that:

Recommendation #1: The electric utility company is notified whenever tree trimming is closer than ten feet to energized high-voltage electrical lines.

Discussion: In this incident, the victim climbed up a tree and began trimming the branches which were growing into the energized electric utility lines. According to the victim's son and brother, the electric utility company was not notified of the planned work. Because of the imminent hazard associated with energized high-voltage electric lines, the electric utility should always be notified whenever work is within ten feet of

energized high-voltage lines. The lines should be de-energized or covered prior to the work being performed, and then re-energized or uncovered after the work is complete. Had the electric utility company been contacted and informed of the tree trimming operation, the line would have been de-energized and the victim would not have been electrocuted.

Recommendation #2: They have received training and certification in line-clearance tree trimming operations by qualified instructors.

Discussion: In this incident, the victim climbed the tree to trim the branches without any training in electric line clearance. Without this training, it is likely the victim did not recognize the potential hazard of working close to high-voltage power lines, or know the proper practices to follow to perform the work safely. Training in line-clearance tree trimming operations includes how to:

- Inspect the work area to identify potential hazards.
- Recognize energized electric lines that pose a hazard to tree work.
- Conduct tailgate meetings to discuss work procedures.
- Know the minimum distances required for the different voltages.
- Use insulating equipment and clothing.
- Use ropes and tie knots.
- Recognize adverse weather conditions that would make line clearance work unsafe.
- Contact the electric utility to de-energize or cover the lines as needed.
- Utilize a second line-clearance tree trimmer within normal voice communication under any of the following conditions:
 - (a) If a line-clearance tree trimmer approaches closer than ten feet (305 cm) to any conductor or electrical apparatus energized at more than 600 volts; or
 - (b) If branches or limbs being removed are closer to lines energized at more than 600 volts; or
 - (c) If roping is necessary to remove branches or limbs from lines or electrical equipment.

Had the victim received such training prior to performing his job, he may have recognized the hazard and known how to perform such work in a safe manner, thereby preventing his electrocution.

In addition, homeowners whose trees are growing near or into electric power lines should:

Recommendation #3: Contact the electric utility company and request they trim the trees.

Discussion: In this incident, the homeowner hired the victim to trim the tree in his front yard that was growing into the electric utility lines. Electric utility companies provide numerous services to their customers, including trimming trees that interfere with the energized lines providing electric power to the homes. Electrical utility companies utilize employees who are certified line-clearing tree trimmers, or hire contractors with the

same certification. Typically, electric utility company will trim trees on private property if they interfere with the lines that stretch from pole to pole. There is no fee for this service. However, if the affected electric power line runs from the pole to the customer, then the customer is responsible for keeping that line free from overgrown trees. In this incident, the affected line was pole to pole and the electric utility company would have trimmed the tree for the homeowner had they been notified.

Recommendation #4: Hire only qualified line-clearance tree trimmers or contractors who are trained and certified by organizations such as the ISA (International Society of Arboriculture) or the TCIA (Tree Care Industry Association).

Discussion: In this incident, the homeowner hired the victim to perform hazardous work in close proximity to energized high-voltage electric lines. When hiring a company that employs qualified line-clearance tree-trimmers, homeowners can be reasonably assured that the work will be performed according to recommended safe work practices. The ISA and the TCIA are organizations that train and certify tree trimmers in all aspects of job safety, including how to perform a safety hazard assessment of a tree and what to do when tree branches are in close proximity to energized electric utility lines. All certified tree workers must pass a knowledge and skills exam conducted by trained evaluators. Had the homeowner hired a qualified line-clearance tree trimmer, this incident might not have occurred.

References:

Division of Occupational Safety and Health - Title 8 regulations
Subchapter 7 - General Industry Safety Orders Group 3. Tree Work, Maintenance or Removal §3421. General. §3427. Safe Work Procedures. §3428. Operating Rules.

Subchapter 5. Electrical Safety Orders - Group 2. - High-Voltage Electrical Safety Orders - Article 37. Provisions for Preventing Accidents Due to Proximity to Overhead Lines

§2946. Provisions for Preventing Accidents Due to Proximity to Overhead Lines.

§2948. Notification to the Operators of High-Voltage Lines and Responsibility for Safeguards.

Article 38. - Line Clearance Tree Trimming Operations §2951. Line Clearance Operations.

“Preventing Falls and Electrocutions During Tree Trimming”- NIOSH ALERT: August 1992 DHHS (NIOSH) Publication No. 92-106

<http://www.cdc.gov/niosh/docs/92-106/>

“How to Hire an Arborist” - Sacramento Tree Foundation

<http://www.sactree.com/doc.aspx?64>

“Training Workshops” – Tree Care Industry Association (TCIA)

<http://www.tcia.org/training/TCA.htm>

<http://www.sce.com/Safety/worker/tree-timmers-and-landscapers.htm>

EXHIBITS:

General Clearances Required from Energized Overhead High-Voltage Conductors

	Nominal voltage (Phase to Phase)	Minimum Required Clearance (Feet)
	600.....50,000	6
over	50,000.....345,000	10
over	345,000....750,000	16
over	750,000...1,000,000	20

Exhibit 1. General clearances required from energized overhead high-voltage conductors.



Exhibit 2. The tree and electrical utility lines.



Exhibit 3. The front yard after the tree was removed.

Hank Cierpich
FACE Investigator

Robert Harrison, MD, MPH
FACE Project Officer

March 30, 2012

Laura Styles, MPH
Research Scientist

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Public Health, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of the CA/FACE program is to prevent fatal work injuries. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, state-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding the CA/FACE program is available from:

**California FACE Program
California Department of Public Health
Occupational Health Branch
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804**

<http://www.cdph.ca.gov/programs/ohb-face>