NJ FACE

INVESTIGATION REPORT

Fatality Assessment & Control Evaluation Project

FACE 12-NJ-078 **August 26, 2014**

Tree-care Worker is Crushed by Cut Tree Section During Storm Damage Cleanup

A 59-year-old tree-care worker was killed after a section of a tree he was cutting fell on top of him. The incident occurred on a residential property in a heavily-wooded area in northern NJ. On the day of the incident, the victim and two other workers were conducting storm-damage cleanup on several trees, some still standing, some down. The victim was working on a large white oak tree that had fallen down during a hurricane. He was bucking the tree (cutting it into sections), and had already made five cuts starting from the canopy. He was standing on a slight downhill slope when he made his final cut; the cut section fell towards him and landed on his chest, pinning him down. His coworkers and several other tree-care workers, who were working in an adjacent lot, heard the crash and came running to the site. The victim was freed from the section, but died shortly afterwards at the hospital.

Contributing Factors:

- Standing on downhill side of cut
- Tree was downed, partially attached
- Tension and compression forces on the downed tree

NJ FACE investigators recommend that these safety guidelines be followed to prevent similar incidents:

- **When operating a chain saw on downed trees, when possible, the safer position is on the uphill side of the work.**
- **Take the time to check for and recognize if a fallen tree is under pressure. If so, take additional precautions to prevent or alleviate hazardous conditions.**

Public Health Services Branch
Division of Epidemiology, Environmental and Occupational Health
Occupational Health Surveillance Unit
(609) 826-4984
nj.gov/health/surv/face/index.shtml

- **Always have a clear retreat path when bucking downed trees.**
- **Always work with a spotter in any potentially hazardous situation.**
- **A safety and health plan based on a job hazard analysis should be developed by the employer and followed where workers are assigned tasks.**

INTRODUCTION

In fall 2012, NJ FACE staff was notified of the death of a 59-year-old male tree care worker who was killed after a large section of tree he was cutting fell and pinned him. The incident occurred in a heavily-wooded backyard residence in a northern NJ suburb. The victim had worked for this tree-care company for many years, and had more than 40 years of experience in the industry. The employer conducted monthly health and safety meetings; the victim was the supervisor on site and on the day of the incident had reviewed and assigned employee tasks for the day.

An NJ FACE investigator contacted the OSHA Area office and conducted a concurrent investigation. Additional information was obtained from the medical examiner's report, death certificate, police report, and the news.

INVESTIGATION

The incident occurred on an overcast, fall day (approximately 37^{o}F at the time of the incident, maximum wind speed was about 10 mph, and no recorded precipitation). The incident site was a heavily-wooded backyard of a residence, in a suburban area of northern NJ (Figure 1). Many trees in the area had been affected by wind from a hurricane, which had struck the region about a month earlier. The owner of the residence had hired a small tree-care company to work in the wooded area behind their house to prune damaged branches. An add-on job was included, which was to buck a fallen tree that was still connected above the stump (Figure 1).

Three workers arrived in the morning on the day of the incident; the victim's job was to use a chainsaw to buck a fallen tree, which was to be left on the property. The other two workers were assigned to remove storm-damaged branches from evergreen trees approximately 50-75 yards away (towards the residence). The evergreens were located on an uphill, such that the coworkers could not see the victim. According to the coworkers, roughly 15 minutes before the incident, the victim had come up to their

work area to refill his chainsaw with gasoline and then proceeded back to the fallen tree. The coworkers heard a loud crash (and yelling from a neighbor) and ran down to the area where the victim had been working. They found him pinned between an eight-foot long, three-foot diameter log and an already downed tree (Figure 2). He was lying face up, his arms spread out above his head, and the log across his chest. His legs were elevated off the ground on the other side of the log. One of the coworkers called 9-1-1. The other coworker proceeded to make a cut on the log near the base, releasing the log from the tree so it could be lifted in order to free the victim. On an adjacent property, a four-member crew of tree-care workers were also cutting and felling trees. When they heard the crash and yelling, they came running to the site, and aided in freeing the victim. The log was pried and lifted using other branches (Figure 2).

Although there were no witnesses, NJ FACE interviewed the coworkers, the neighbor, the police, the homeowner, and the four-team crew that arrived on scene to help determine the events that took place leading up to the incident. According to the homeowner, the tree had fallen during the storm, it was also agreed that there was considerable white rot at the base of the tree (a coworker noted what he perceived to be lightning damage).

The victim made the first cut at the canopy end of the tree just before it split into a "Y" at the top of the tree (Figure 3). This cut was a snap cut (in this case, bottom-cut and then a top-cut), after which the canopy end dropped straight down, as evidenced by inspecting the section. Three more sections were cut, each approximately four feet in length, and each completed by a straight-through snap cut that dropped the section straight down (Figure 3). The next section that was cut was against a birch tree (rubbing tree, or tree that the downed tree contacted/leaned against) and was also a straight-through-cut that dropped the section straight down. Before the final cut was made, it was believed that the victim made a cut closer to the tree that would help relieve the pressure (not shown). This relief cut was not made all the way through and it was thought that the victim anticipated it to break with the fall of the next cut. The final cut (Figure 4) was also a snap cut created via a short top-cut and a long bottom-cut. When the coworkers and other tree-care workers inspected this cut, they believed that the saw may have bound (when the chain is pinched/blocked and stops; evidence of a bind, finely ground saw dust, was found at the cut point). The saw was repositioned to complete the bottom cut. When the cut was completed the victim was standing down gradient of the tree. The four foot section fell straight down (Section 5 in Figure 3), as had the previous sections that were cut. However, as the bottom cut was made, the remainder of the tree pivoted at the point of the fifth cut (which was not made completely through) and fell on a sharp angle towards the victim. It is unknown if the victim had intended for the

remaining portion to fall, but if he did, he likely anticipated it to fall straight down. The other employees felt that the victim may have tried to exit the path of the log by moving backwards and tripped over a pre-existing tree on the ground. The chainsaw the victim was using was found approximately six feet to the right of his body (away from the tree).

FIGURE 1: Incident site (left: view of area; right: base of broken tree, where the stick represents the approximate angle of the tree before cutting).

FIGURE 2. Point where victim was crushed underneath log.

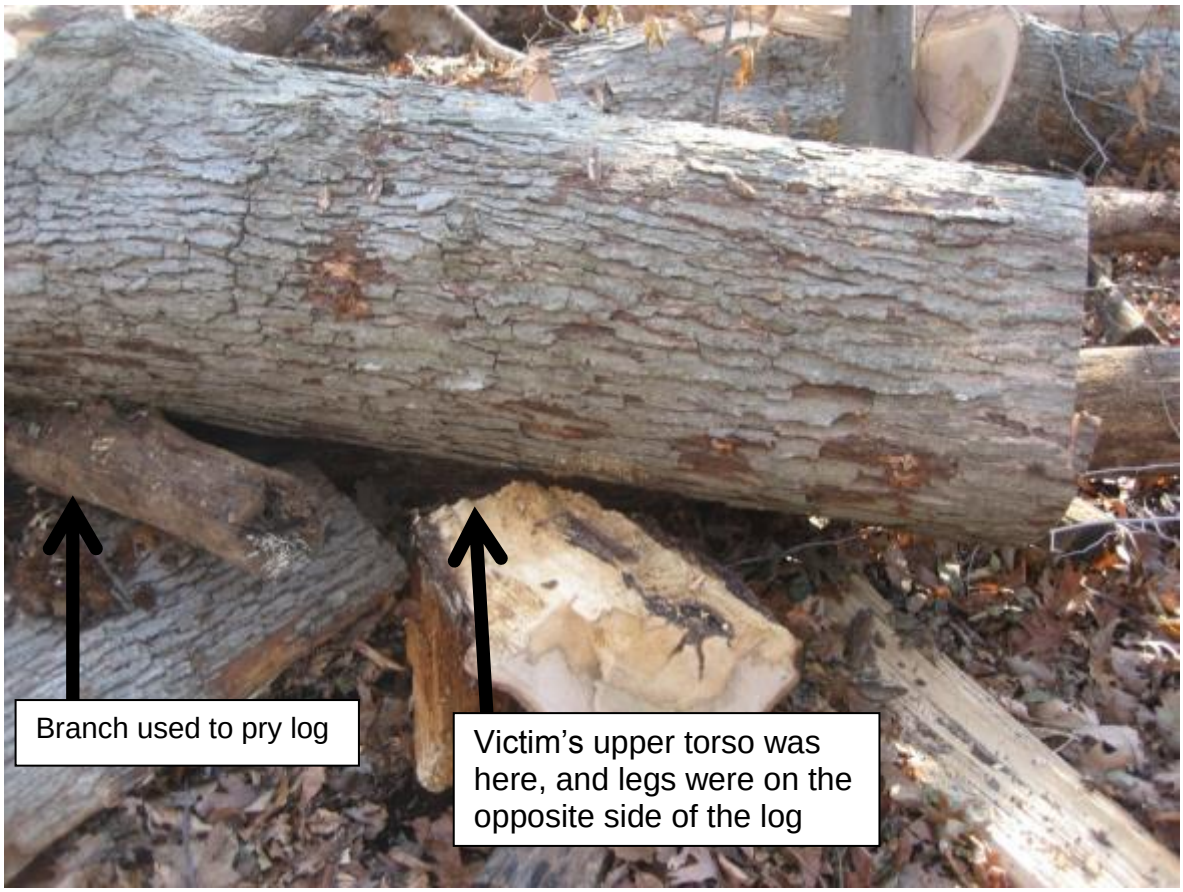


FIGURE 3. Bucking of the downed tree (boxed numbers represent the cut sections).

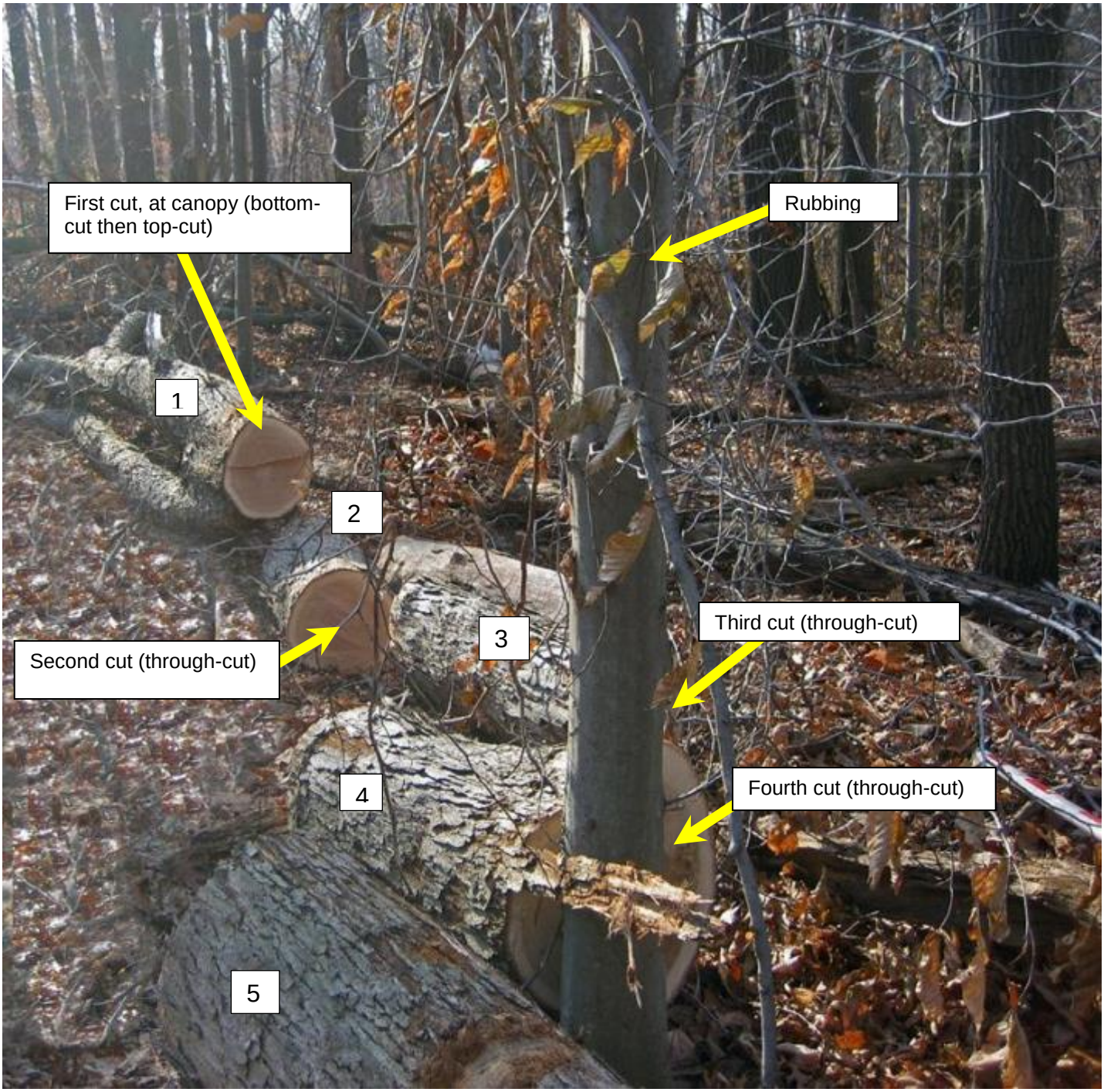
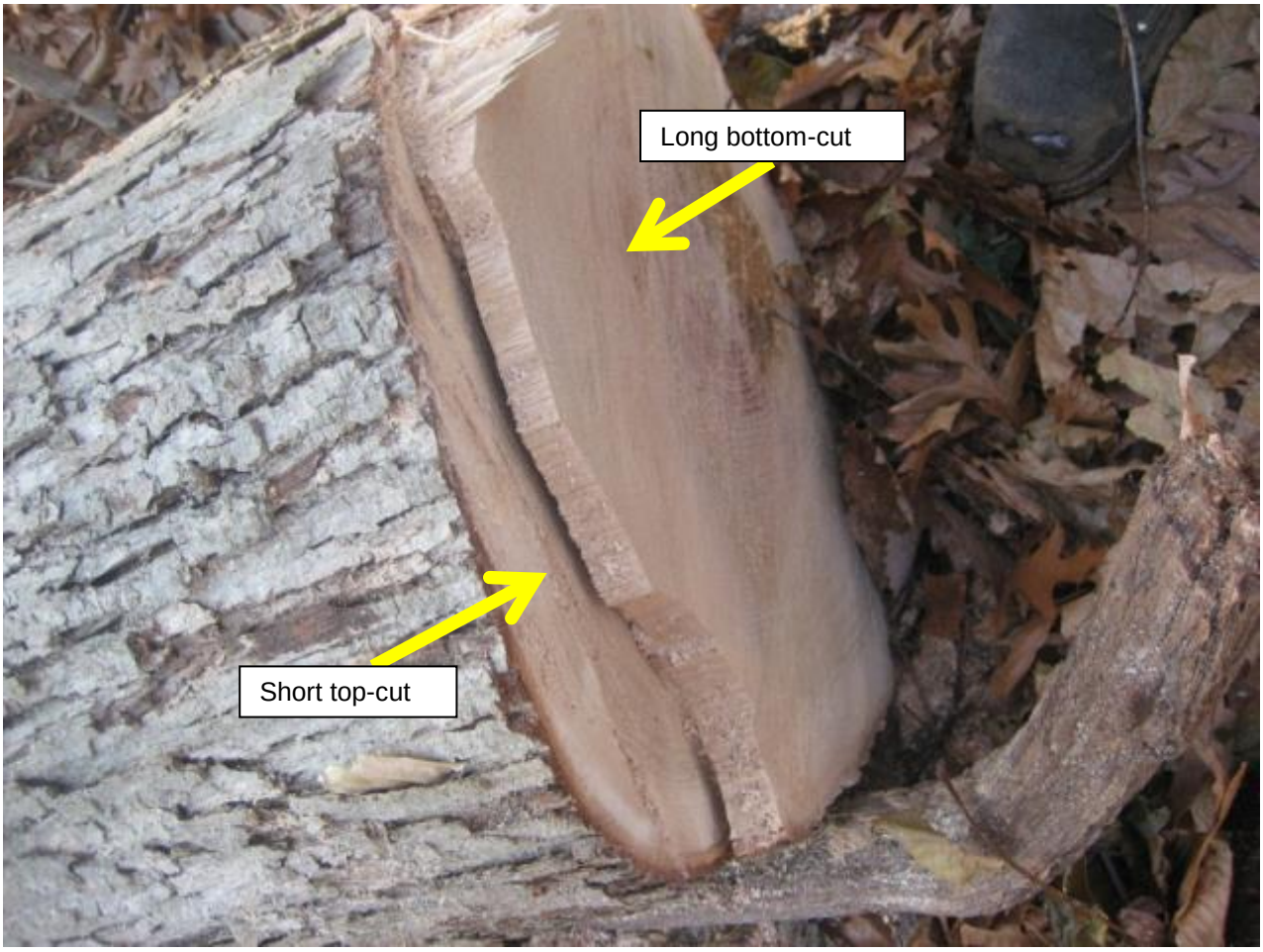


Figure 4. Final cut, in which saw was bound.



RECOMMENDATIONS/DISCUSSIONS

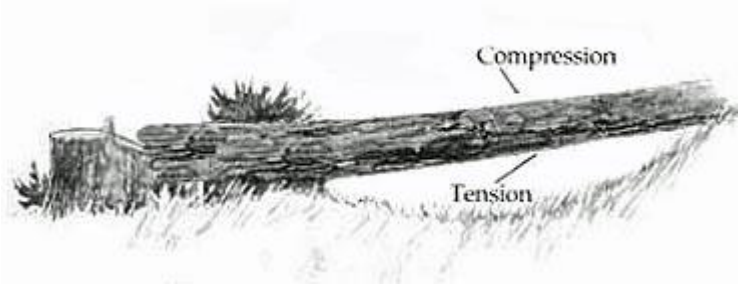
Recommendation #1: When operating a chain saw on downed trees, when possible, the safer position is on the uphill side of the work.

Discussion: As per ANSI Z133-2012, 8.7.4, (*Limbing and Bucking*), while operating a chain saw, the preferred working position is on the uphill side of the work.[1] When working on any sloped ground, always cut from the upper side of a fallen tree because sections can easily roll/pivot in the downhill direction after bucking.

Recommendation #2: Take the time to check for and recognize if a fallen tree is under pressure. If so, take additional precautions to prevent or alleviate hazardous conditions.

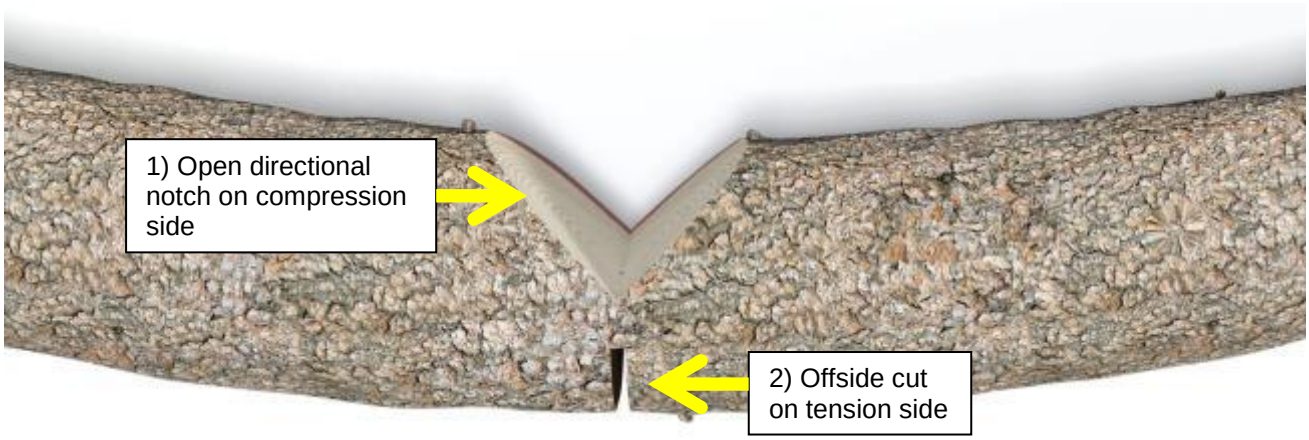
Discussion: Fallen trees are frequently under tension and compression forces (on opposite sides) depending on the way they are supported by the ground or their limbs.[2] Compression wood is being squeezed, and if the saw cuts too far into the compression area it will begin to close and potentially bind the saw (Figure 5). Compression wood is cut part-way first, then bucking is completed on the tension side, which will open away from the saw as the cut deepens because the wood fibers are being stretched.[3] In this incident, it was believed that the victim's saw bound during the top-cut of the last section. A wedge-shaped cut is recommended to help prevent saw binding and to help control the fall of the cut section. As the final cut is made, rather than the log falling as in a snap cut, it collapses at the wedge and the fall is slowed (Figure 6). Alternatively, plastic wedges can used; they are pounded into the cut to prevent binding of the saw. It is also recommended that limbs be cut off the upper canopy before the first trunk cut was made, as this can reduce the weight and tension.

Figure 5. Tension and compression forces on a fallen tree.*



*Adapted from https://www.osha.gov/SLTC/etools/logging/manual/limbing_bucking.html[4]

Figure 6. Sequence of wedge-shaped cut and offside cut to prevent binding and control the fall of the section.[†]



[†]Adapted and used with permission from Husqvarna®.

Recommendation #3: Always have a clear retreat path when bucking downed trees.

Discussion: A clear escape route to safety is critical during tree felling, but is also important during bucking operations. Escape routes should be the same in principle during bucking, that is, determine the danger zones and plan an escape route that avoids them.[2] Always ensure that the route is clear and free of debris. In this case, the escape route that was used during the incident was not clear, and it was thought that the victim may have tripped and fell backwards while trying to escape (Figure 7).

Recommendation #4: Always work with a spotter in any potentially hazardous situation.

Discussion: In this case, the victim was working out of sight of the rest of the crew. NJ FACE recommends that in any potentially hazardous situation, such as working on a downed tree in which tension and compression forces are present, workers should work in teams with at least one spotter. A spotter out of the danger zone may have helped the victim recognize potential pinching of the saw, changes in tension, and remaining distance of cuts.

Recommendation #5: A safety and health plan based on a job hazard analysis should be developed by the employer and followed where workers are assigned tasks.

Discussion: 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. A source of information on conducting a job hazard analysis can be obtained from the US Department of Labor.[5] Additional resources on logging can also be found in the Appendix.[6-7]

Figure 7. Simulated retreat path for victim.

APPENDIX

RECOMMENDED RESOURCES

It is essential that employers obtain accurate information on health, safety, and applicable OSHA standards. NJ FACE recommends the following sources of information which can help both employers and employees:

U.S. Department of Labor, Occupational Safety & Health Administration (OSHA)

Federal OSHA can provide information on safety and health standards on request. OSHA has several offices in New Jersey that cover the following counties:

☏ Hunterdon, Middlesex, Somerset, Union, and Warren counties….....732-750-3270

☏ Essex, Hudson, Morris, and Sussex counties….....973-263-1003

☏ Bergen and Passaic counties….....201-288-1700

☏ Atlantic, Burlington, Cape May, Camden, Cumberland, Gloucester, Mercer, Monmouth, Ocean, and Salem counties….....856-596-5200

💻 Web site: *www.osha.gov*

New Jersey Public Employees Occupational Safety and Health (PEOSH) Program

The PEOSH Act covers all NJ state, county, and municipal employees. Two state departments administer the Act; the NJ Department of Labor and Workforce Development (NJDLWD), which investigates safety hazards, and the NJ Department of Health (NJDOH) which investigates health hazards. PEOSH has information that may also benefit private employers.

NJDLWD, Office of Public Employees Safety

☏Telephone: 609-633-3896

💻 Web site: *www.nj.gov/labor/lsse/lspeosh.html*

NJDOH, Public Employees Occupational Safety & Health Program

☏Telephone: 609-984-1863

💻 Web site: *www.nj.gov/health/peosh*

On-site Consultation for Public Employers

☏Telephone: 609-984-1863 (health) or 609-633-2587 (safety)

💻 Web site: www.*state.nj.us/health/eoh/peoshweb/peoshcon.htm*

New Jersey Department of Labor and Workforce Development, Occupational Safety and Health On-Site Consultation Program

This program provides free advice to private businesses on improving safety and health in the workplace and complying with OSHA standards.

☎Telephone: 609-984-0785

💻 Web site: *www.nj.gov/labor/lsse/lsonsite.html*

New Jersey State Safety Council

The New Jersey State Safety Council provides a variety of courses on work-related safety. There is a charge for the seminars.

☎Telephone: 908-272-7712.

💻 Web site: *www.njsafety.org*

Internet Resources

Other useful Internet sites for occupational safety and health information:

- CDC/NIOSH – *www.cdc.gov/niosh*
- USDOL Employment Laws Assistance for Workers and Small Businesses – *www.dol.gov/elaws*
- National Safety Council – *www.nsc.org*
- NJDOH FACE reports – *www.nj.gov/health/surv/face/index.shtml*
- CDC/NIOSH FACE – *www.cdc.gov/niosh/face/faceweb.html*
- OSHA – *www.osha.gov*
- ANSI – *www.ansi.org*

REFERENCES

1. American National Standard for Arboricultural Operations—Safety Requirements. Z133-2012. 8.7.4: *Limbing and Bucking*.

2. US Department of Agriculture, US Forest Service, Technology & Development Program. Chain Saw and Crosscut Saw Training Course Student's Guidebook 2006 Edition (0667-2805-MTDC). Available at: http://www.fs.fed.us/t-d/pubs/htmlpubs/htm06672805/index.htm. Accessed November 2013.

3. Safe chainsaw operation, but A. Scott Reed & Jack True. Available at: http://www.extension.umn.edu/food/small-farms/safety/safe-chainsaw-operation/. Accessed July 2014.

4. OSHA, Logging eTool, Manual Operations: Limbing and Bucking. Available at: https://www.osha.gov/SLTC/etools/logging/manual/limbing_bucking.html. Accessed November 2013.

5. *Job Hazard Analysis*. US Department of Labor Publication # OSHA-3071, 1998 (revised). USDOL, OSHA Publications, PO Box 37535, Washington DC 20013-7535

6. University of New Hampshire, Cooperative Extension. Safe Timber Harvesting. Available at https://extension.unh.edu/resources/files/Resource001062_Rep1293.pdf. Accessed November 2013.

7. NY State Department of Health, Logging Safety: A Field Guide (Section Four: Limbing and Bucking). Available at: http://www.health.ny.gov/publications/3132/logging_section_four.htm. Accessed November 2013.

Fatality Assessment and Control Evaluation (FACE) Project
Investigation # 12-NJ-078

This report was prepared by staff members of the New Jersey Department of Health's Occupational Health Surveillance Unit. The goal of FACE is to prevent fatal work-related injuries by studying the work environment, the worker, the task, the tools the worker was using, the energy exchange resulting in the fatal injury, and the role of management in controlling how these factors interact. FACE gathers information from multiple sources that may include interviews of employers, workers, and other investigators; examination of the fatality site and related equipment; and reviewing OSHA, police, and medical examiner reports, employer safety procedures, and training plans. The FACE program does not determine fault or place blame on employers or individual workers. Findings are summarized in narrative investigation reports that include recommendations for preventing similar events. All names and other identifiers are removed from FACE reports and other data to protect the confidentiality of those who participate in the program.

NIOSH-funded state-based FACE Programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington. Please visit the NJ FACE Web site at *www.nj.gov/health/surv/face/index.shtml* or the CDC/NIOSH FACE Web site at *www.cdc.gov/niosh/face/faceweb.html* for more information.

The NJ FACE Project is supported by the Centers for Disease Control and Prevention (CDC). The contents of this report are solely the responsibility of the authors and do not necessarily represent the official views of the CDC.

Public Health Services Branch
Division of Epidemiology, Environmental and Occupational Health
Occupational Health Surveillance Unit
(609) 826-4984
nj.gov/health/surv/face/index.shtml