



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916

**REPORT#:** 2015-04

**REPORT DATE:** April 12, 2018

### INCIDENT HIGHLIGHTS



**DATE:**  
August 8, 2013



**TIME:**  
8:50 a.m.



**VICTIM:**  
31-year old tree feller



**INDUSTRY/NAICS CODE:**  
Forestry/11



**EMPLOYER:**  
Logging



**SAFETY & TRAINING:**  
The company had a comprehensive safety program



**SCENE:**  
Forested area



**LOCATION:**  
North Carolina



**EVENT TYPE:**  
Struck by



## Feller Struck by Dead Locust Tree While Felling Adjacent Tree—North Carolina

### SUMMARY

On August 8, 2014, a 31-year-old tree feller died after he was struck by a dead tree. At the time of the incident, two fellers were working on a wood lot in separate cut blocks approximately 600 feet apart. The fatally injured feller had cut a poplar tree and retreated to the chosen escape path. However, before he could escape the area, he was struck by a dead locust tree that had been caught in the poplar branches... [READ THE FULL REPORT> \(p.3\)](#)

### CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Snagged dead tree
- Weather
- Emergency plan

### RECOMMENDATIONS

NIOSH investigators concluded that, to help prevent similar occurrences, employers should:

- Conduct a site assessment and develop a site safety plan based on hazards identified before felling activities begin
- Train fellers to evaluate the area around timber to be felled to identify potential hazards and take appropriate control measures.
- Develop and implement a plan for inclement weather... [LEARN MORE> \(p.6\)](#)





### Fatality Assessment and Control Evaluation (FACE) Program

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1982, NIOSH initiated the Fatality Assessment and Control Evaluation (FACE) Program. FACE examines the circumstances of targeted causes of traumatic occupational so that safety professionals, researchers, employers, trainers, and workers can learn from these incidents. The primary goal of these investigations is for NIOSH to make recommendations to prevent similar occurrences. These NIOSH investigations are intended to reduce or prevent occupational deaths and are completely separate from the rule making, enforcement and inspection activities of any other federal or state agency. Under the FACE program, NIOSH investigators interview persons with knowledge of the incident and review available records to develop a description of the conditions and circumstances leading to the deaths in order to provide a context for the agency's recommendations. The NIOSH summary of these conditions and circumstances in its reports is not intended as a legal statement of facts. This summary, as well as the conclusions and recommendations made by NIOSH, should not be used for the purpose of litigation or the adjudication of any claim. For further information, visit the program website at [www.cdc.gov/niosh/face/](http://www.cdc.gov/niosh/face/) or call toll free at 1-800-CDC-INFO (1-800-232-4636).



Centers for Disease Control  
and Prevention  
National Institute for Occupational  
Safety and Health

NIOSH • 304-285-5916  
1095 Willowdale Road  
Morgantown, West Virginia  
26505



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



## SUMMARY

On August 8, 2014, a 31-year-old tree feller died after he was struck by a dead tree. At the time of the incident, two fellers were working on a wood lot in separate cut blocks approximately 600 feet apart. The fatally injured feller had cut a poplar tree and retreated to the chosen escape path. However, before he could escape the area, he was struck by a dead locust tree that had been caught in the poplar branches. Shortly after the incident, the owner arrived on-site and tried to reach the fellers by radio. Only one feller responded. The second feller went to the cut block, found the feller under the tree and radioed the owner to call 911. Emergency medical services arrived on-site within 20 minutes to find the feller unresponsive.

## INTRODUCTION

On August 8, 2014, a 31-year-old tree feller died after being struck by a dead tree. On August 8, 2014, the employer notified the North Carolina Department of Labor (NCDOL) of the incident. On September 15, 2015, a health scientist from the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research, Fatality Assessment and Control Evaluation program conducted an investigation of the fatality and reviewed circumstances of the incident with the investigating NCDOL safety compliance officer. Photographs of the incident site and statements taken by the NCDOL safety compliance officer were reviewed. In addition, the medical examiner report was reviewed.

## EMPLOYERS

The timber felling company had been in business since 2012 and employed three people. The business focused on timber felling, forestry consulting, and forest operations. The owner had been felling for 8 years. A separate contractor was hired to perform logging on the tract, but was not on site at the time of the incident.

## WRITTEN SAFETY PROGRAMS and TRAINING

The company had a documented, comprehensive safety and health program that addressed hazard analysis, emergency response planning, danger ribbons, kickback zones, radio communication, spring pole education, tension wood education, and personal protective equipment (PPE). The employees were trained using the British Columbia WorkSafe feller training standard [[BCFSC n.d.a](#)] and OSHA 1910.266 Logging Operations [[OSHA 2014](#)]. All employees trained as a feller are under direct supervision of the lead feller for at least 4 months before they were determined to be competent to fell trees. Additionally, fellers were trained using the British Columbia WorkSafe program on how to identify dangerous trees. Employees had received first aid CPR training in the past but their certificates were not up to date.

## PERSONAL PROTECTIVE EQUIPMENT

Employer-provided safety equipment included head, neck, eye, face, hearing, hand, and leg protection. It also included high-visibility apparel, foot wear, whistles, two-way radios, first aid kits, a felling axe, two wedges, a chainsaw, a spare chain, gas and bar oil, water, and an all-terrain vehicle.



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



### WORKER INFORMATION

The male feller was 31 and had worked for the employer for 2 years as a feller. The feller had shadowed another employee upon initial employment and was still subject to active field mentoring and random audits.

### EQUIPMENT and PERSONNEL

Two timber fellers were on-site using chainsaws to directionally fell trees. The chainsaw used by the feller was a Husqvarna 340 with a 32-inch bar. The logging contractor was involved in logging activities on the tract, with equipment on-site belonging to the logging employer, but none of their employees were on this site. The fellers typically worked from 6:30 a.m. to 3:00 p.m.

### WEATHER

When the fellers arrived on-site at 7:00 a.m., the temperature was 62 degrees with scattered clouds. At the time of the incident at 9:00 a.m., the temperature was 64 degrees and raining. [[Weather Underground 2014](#)]. Weather may have been a factor in this incident. The rain may have interfered with the feller being able to clearly see the locust tree leaning on the poplar tree.

### INCIDENT SCENE

The incident occurred in a rural area on a 155-acre wood lot (Photo). The work was spaced into cutblocks, which were random in size and were defined by the topography. The two workers were spaced 600 feet apart to limit hazards created by each other's felling activities. The operation involved manual felling of hardwood and pine trees. No logging



**Photo. Felling job site.**  
*(Photo courtesy of NCDOL)*



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



activities were allowed in the cutblocks where felling operations took place. The job had started in July of 2014, so the company had been on-site for several weeks. Emergency medical services (EMS) was located approximately 15 minutes from the work site.

### INVESTIGATION

On August 8, 2014, the two fellers arrived on-site at 7:00 a.m. and discussed the cutblocks and safety activities before beginning work. They had been working on-site since July 2014. Once the fellers gathered their equipment, they went to their respective cutblocks. When the fellers arrived on-site it was cool and cloudy. It started to drizzle around 7:30 a.m., and the rain began around 9:00 a.m. Around 8:45 a.m., the fellers corresponded by radio and they could hear each other's chainsaws. The fellers were directionally felling and the retreat paths were generally diagonal uphill. The slope of the hill ranged from 25 to 30 degrees. The feller involved in this incident was cutting a poplar tree approximately 100 feet tall. The feller had identified an escape path toward the left, uphill, and at a diagonal 20 degrees from the direction of fall. The escape path was clear of debris for 20 feet. There were no witnesses to the incident. However evidence suggests that the 65-foot dead locust tree had fallen and was leaning against the limb of the poplar tree, caught in its branches. The locust tree was approximately 18 feet uphill from the poplar (Diagram). Apparently, the feller did not realize the dead locust was caught in the poplar branches. The rain may have interfered with the feller having a clear view above. The feller cut the poplar tree and began his retreat up the hill but after traveling 6 feet up the escape path was struck by the locust tree as it was pulled over by the falling poplar tree.

At the time of the incident, the two fellers were working in separate cut blocks approximately 600 feet apart. Shortly after the incident, around 9:00 a.m., the owner arrived on-site and tried to reach the fellers by radio; only one feller responded. The second feller tried to reach the feller again by radio with no response. The second feller went to the cut block, found the feller under the locust tree, and radioed the owner to call 911. The second feller began CPR at 9:24 a.m. The owner found the feller's chainsaw idling with the chain brake engaged and set forward. The owner sent the feller down to assist EMS in locating the injured worker and resumed CPR. EMS arrived on-site within 20 minutes to find the feller unresponsive.

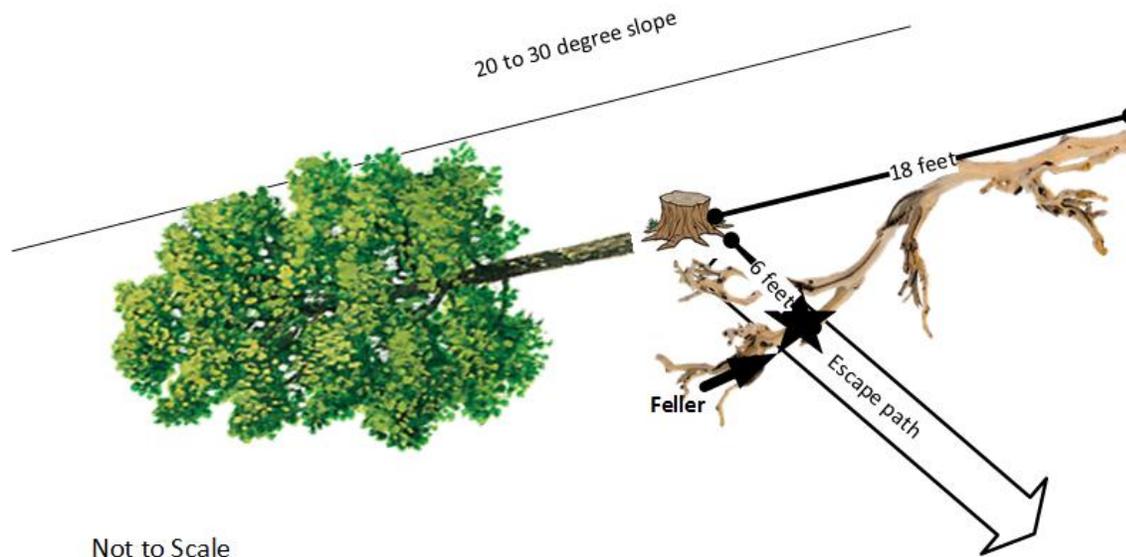
### CAUSE OF DEATH

The medical examiner listed the cause of death as blunt force trauma and suffocation.

### 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 the injury or fatality. NIOSH investigators identified the following unrecognized hazards as key contributing factors in this incident:

- *Snagged dead tree*
- *Weather*
- *Emergency plan*



**Diagram. Incident scene**

## RECOMMENDATIONS/DISCUSSION

### ***Recommendation #1 Employers should conduct a site assessment and develop a site safety plan based on hazards identified before felling activities begin***

Prior to the start of felling operations a qualified person should conduct and document a site assessment and develop a site safety plan based on the hazards identified. This assessment should review aerial photographs, forest cover and terrain maps, forest management guidelines, site plans, and stand management guidelines. The site assessment should include the site history, common rain, snow, and ice conditions, flooding, tree uproot, tree top condition, tree injury, tree lean, and other site specific factors. During this assessment hazardous trees should be documented and marked or removed by a qualified feller. Dangerous trees that require no surrounding work activity but are not removed should have flagging and a no-work zone created around them depending on the size of tree and hazard presented. Dangerous trees that require surrounding work activity should be marked with flagging, paint, or other effective marking techniques, and the workers should be informed of the appropriate safety precautions necessary for working around that tree. The degree of hazard will vary with each tree by the size of tree, type of tree, tree sweep, tree location, slope of land, location of damage to the tree, and nature of worker activities. A tree can be hazardous if it has defects at the tree top, intertwined branches with other trees, dead limbs, witches broom (deformed mass of twigs and branches, which appear broom-like in appearance), split trunks, stem damage, bark falling off, cankers, mushroom growth, tree lean, and root disturbance. Tree inspections should only be conducted on trees which are visually “suspect” (i.e., they are damaged or potentially dangerous) and tree inspections should be to the highest disturbance level (i.e., work activity) you expect to attain on site. [[BCFSC 2017](#)]

The work area should be assessed for hazardous trees:

- prior to any workers entering the area
- if more than three days have passed since the previous assessment
- if the level of disturbance is different from the initial intended work activity [[BCFSC 2017](#)]



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



At the time of the incident there was no bark on the dead locust tree and it apparently was leaning against and hung up in the poplar tree. As the poplar fell after being cut, it completely uprooted the locust tree.

***Recommendation #2: Employers should train fellers to evaluate the area around timber to be felled to identify potential hazards and take appropriate control measures.***

Discussion: Employers should train fellers to evaluate the area around timber to be felled to identify potential hazards and take appropriate control measures. Employers should ensure that employees assess trees and surrounding areas to identify potential hazards and implement control measures. Employers should train employees to look for dead hung up or snagged trees and limbs and communicate with each other about these hazards.

The following should be considered:

- Develop a safe work plan prior to removing the trees.
- Plan escape routes.
- Assess whether the hung-up tree can be felled safely.
- Assess the hung-up tree with another experienced feller if necessary.
- If a feller cannot fell the hung-up tree safely, consider an alternative felling method or flagging the area so no workers enter the area.
- Never work in the danger zone under a hung-up tree.
- Keep the trunk of the supporting tree between yourself and the hung-up tree [[BCFSC 2012b](#)].

The employer trained their fellers on identifying hazards. The tree canopy of the cutblock was dense, but did not reduce visibility in the cutblock. At the time of the incident there was no bark on the dead locust tree, which apparently was leaning against and hung up in the poplar tree entwine. Since the incident, the employer has added weekly training that includes the following safety measures:

- Updated emergency response plan
- Use of danger ribbons for hazards
- Radio communications
- Spring pole safety
- Reading tension wood
- Kickback zone on the bar
- Calked boots
- Slips and trips

***Recommendation #3: Employers should develop and implement a plan for inclement weather.***

Employers should develop a plan for inclement weather conditions. It was raining at the time of the incident. The rain may have reduced the visibility for the workers. Employers and employees should discuss potential weather conditions that could be encountered during work. Fog, rain, and snow reduce visibility, muffle sound, and cause slippery footing increasing the risk to workers during felling activities. Employers should mitigate hazards and take precautions imposed by inclement weather to ensure worker safety. Employers should consider halting operations or implementing the shutdown procedures if conditions significantly reduce visibility or footing. Shutdown procedures include assuring all



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



workers are accounted for before leaving the operating area. In inclement conditions, employers should ensure increased safe distances are maintained. Standard safe distances are a minimum of two tree lengths between fellers [[BCFSC 2012b](#); [OSHA 2014](#)].

***Recommendation #4: Employers should develop, implement, and train on an emergency response plan.***

Discussion: Employers should develop and train on an emergency response plan. The fellers were working in a remote location, which requires prior planning for emergency events. Employers and employees should discuss potential emergency response events and develop appropriate action plans. Also, employers should contact local mutual aid and emergency medical services (EMS) to review the job location and emergency response plan with them. Elements of an emergency response plan should include man-check procedures to account for the location and well-being of each worker and first aid coverage.

Man-check procedures:

- Establish a man-check system, using methods like radios or phones, to contact workers at regular intervals, i.e., start of day, every 20–30 min, and end of day.
- When working in inclement weather, the contact frequency should increase.
- If there is no response, walk over to check after ensuring it is safe to enter the felling area.
- If you hear a whistle or a call for help, alert First Aid then go to render assistance immediately; take what is needed for a potential rescue; i.e., tools, chainsaw and first aid kit.

First Aid Coverage. For first aid coverage to be effective in case of an emergency, everyone in the operation must know:

- The location of first aid supplies, equipment, and services
- Emergency numbers and the radio frequencies, who and how to call
- Daily process to test communication system
- Call-out locations, radio and cell phone dead zones
- Layout of worksite or GPS coordinates
- Information on how to transport an injured worker to medical aid, including workers requiring stretcher transport
- An outline for basic treatment and injured worker care

In this incident, the employer called 911 and EMS arrived 20 minutes later but needed assistance from the second feller to find the location. The emergency response plan should be practiced and evaluated at each new jobsite or at least annually [[U.S. Forest Service 2014](#); [BCFSC n.d.b](#), [BCFSC2012a](#); [BCFSC 2012b](#)].

***Recommendation #5: Employers should train employees on wilderness first responder and cardiopulmonary resuscitation (CPR).***

Discussion: Employers should train employees on first aid and CPR, but when work regularly requires employees to work in remote locations, employers should train employees on wilderness first responder and CPR. Working in remote locations requires additional planning and training. Response times for EMS are frequently delayed depending on the remoteness of the work location. [[American Red Cross 2014](#); [Wilderness Medical Associates 2012](#); [Wilderness Medical Associates International n.d.](#)] Because of this, employers should provide training to allow workers to provide an additional level of wilderness first aid care and CPR. Employers should also provide additional first aid supplies, like an



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916



automated external defibrillator (or AED), required for remote response activities. In this incident, the employees had received first aid CPR training in the past but their certificates were not up to date.

***Recommendation #6: Employers should develop and implement a safety and communication plan for lone workers.***

Discussion: Employers should develop a communication plan for lone workers. Working alone cannot always be avoided, but work activities and safety measures can be put into place to reduce the risk of working alone. In this incident, the two workers were working alone in the woods, approximately 600 feet apart from each other and without visual contact. When the supervisor arrived on-site, one of the two employees did not respond to radio communication. The safety procedure in place was a man-check procedure.

Employers and employees should discuss potential hazards posed by the job tasks and additional risks imposed by working alone. Employers should mitigate these hazards and put safety measures in place. Employers should train employees on the hazards of working alone and the hazard mitigation strategies being used. Some hazard mitigation strategies include:

- Work in pairs if possible.
- Establish a daily check in and check out system.
- Identify specific work tasks and methods that will be accomplished and set limits on what is permissible during lone work.
- Establish man-check procedures and radio, phone, or other formal communication every 20 to 30 minutes and more frequently for inclement weather. Information on location should be conveyed during this communication.
- Develop a hand signal communication system.
- If possible, maintain visual contact with other workers and wear high-visibility apparel.
- Shut off chainsaw every 20 to 30 minutes to listen for your partner and do a radio check.
- Use technology like automatic warning devices to track lone workers [for example [NFPA 1982](#); [Blackline Safety n.d.](#); [Grace Industries n.d.](#); [Lone worker solutions n.d.](#)].
- Require supervisors to check on lone workers periodically throughout the day.
- If supervisors cannot reach the lone worker, they should report to the jobsite to locate the worker.
- Assure that everyone knows the emergency response plan, has training on first aid and CPR, has a way to contact emergency services, and knows how to direct emergency response to the job site [[BCFSC, 2012a](#); [Musick 2015](#); [NIOSH 2005, 2006](#); [Washington State Department of Labor & Industries, 2011](#)].

**ADDITIONAL RESOURCES**

BC Forest Safety [n.d.]. [Faller certification](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council.

This website provides information on how to apply and be certified to safely fell trees based on British Columbia standards. In British Columbia, all manual tree fellers in forestry operations must be trained and certified. The BC Forest Safety Council (BCFSC) is authorized to administer feller certification in the Province of BC. According to the British Columbia Occupational Health and Safety Regulation (OHSR) [26.22 \(2\) \(a\)](#), new fellers are required to take basic training in felling trees by working one-on-one with a qualified feller or trainer for a period of not less than 30 days. This training must be conducted through an approved administrator.

BC Forest Safety [n.d.]. [Emergency Response Planning](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council.



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916

This website has information on developing emergency response plans, videos on emergency planning in forestry, emergency response and first aid, emergency response on the road, and emergency response at home.

NOLS [n.d.]. [Wilderness first aid](#). Lander, WY: National Outdoor Leadership School.

This course offers hands-on introduction to wilderness medicine, taught over two or two and a half days. Topics covered include the patient assessment system, how to provide effective first aid treatments for injuries and illnesses common in the outdoors, and how to make appropriate evacuation decisions.

University of Northern British Columbia [2017]. [Wildlife Danger Tree Assessor Certificate: Forest Harvesting and Silviculture Module](#). Prince George, BC, Canada

This two-day classroom and field course trains participants to identify wildlife trees and assess steps necessary to ensure worker safety and habitat protection when operating around wildlife/dangerous trees.

#### DISCLAIMER

Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

#### REFERENCES

American Red Cross [2014]. [Wilderness and remote first aid](#). Washington, DC: American Red Cross.

BCFSC [2017]. [Wildlife/danger tree assessor's course workbook, forest harvesting and silviculture course module](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council, WorkSafe.

BCFSC [2012a]. [BC faller training standard 1](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council, WorkSafe.

BCFSC [2012b]. [BC faller training standard 2](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council, WorkSafe.

BCFSC [n.d.a]. [Faller certification](#). Vancouver, BC, Canada: British Columbia Forestry Safety Council, WorkSafe.

BCFSC [n.d.b]. [Guide to creating an emergency response plan](#). Nanaimo, BC, Canada: British Columbia Forestry Safety Council, WorkSafe.

Blackline Safety [n.d.] [Lone worker detection](#). Calgary, AB Canada

Grace Industries [n.d.]. [Grace Lone Worker Safety Systems](#). Fredonia, PA

Lone worker solutions [n.d.]. [Safe Hub](#). Edison, NJ

Musick T [2015]. [Lone worker safety](#), Saf Health, July 25.

NFPA [1982]. [Standard on Personal Alert Safety Systems \(PASS\)](#). Quincy, MA: National Fire Protection Association



NIOSH • 1095 Willowdale Road, Morgantown, West Virginia 26505 • 304-285-5916

NIOSH [2005]. [Part-time metal salvager died when crushed in tractor overturn with loader](#). Morgantown, WV: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Iowa Case Report: 05IA004.

NIOSH [2006]. [Ranch worker killed by pressurized water striking eye](#). Morgantown, WV; US. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Oregon Case Report: 06-OR-025

OSHA [2014]. 29 CFR 1910.266(h)(2)(i–vii) [Logging operations](#). Washington, DC: U.S. Department of Labor, Occupational Safety and Health Administration.

U.S Forest Service [2014]. [6725 Emergency Medical Services](#). In: Forest service manual Intermountain Region, R4. Washington, DC: U.S. Department of Agriculture, U.S. Forest Service.

Washington State Department of Labor & Industries [2011]. [A commercial cleaning company worker dies of carbon monoxide \(CO\) poisoning at a warehouse in Washington State](#). Olympia, WA: Washington State Department of Labor & Industries, Washington State FACE Program, 06WA021.

Weather Underground [2014]. [Weather history for K0A9, August 8](#). Atlanta, GA: The Weather Channel Interactive, Inc.

Wilderness Medical Associates [2012]. [Wilderness medicine field protocols](#). Portland, ME: Wilderness Medical Associates.

Wilderness Medical Associates International [n.d.]. [Wilderness first responder—WFR](#). Portland, ME: Wilderness Medical Associates International.

### INVESTIGATOR INFORMATION

This investigation was conducted by Jennifer E. Lincoln, Health Scientist, Fatality Investigations Team, Surveillance and Field Investigation Branch, Division of Safety Research.

### ACKNOWLEDGEMENT

The NIOSH FACE Program would like to acknowledge the compliance officer and staff of the North Carolina Department of Labor, Occupational Safety and Health Division for providing assistance and information for this investigation and Todd Schoonover from the Safety & Health Assessment & Research for Prevention (SHARP) at Washington State Department of Labor & Industries Washington.