

Training Program Manual
TREE CARE INDUSTRY ASSOCIATION



Aerial Rescue
Training Program™

produced in partnership with:



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Aerial Rescue Training Program



TCAARW

Non-Member \$54.99

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AERIAL RESCUE TRAINING TEST ANSWER SHEET

Employee name _____ Date: _____

Company _____ Address _____

If you received your manual at a workshop, where was it? _____
City _____ State _____

Instructions: Darken the corresponding bubbles completely on the answer sheet using a black pen or a No. 2 pencil.

CHAPTER 1

True False

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CHAPTER 2

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CHAPTER 3

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CHAPTER 4

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CHAPTER 5

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Keep a copy of this test answer sheet for your office records. Please mail original to:

Attn: EHAP Coordinator,
TCIA
670 N. Commercial St., Suite 201
Manchester, NH 03101



On-the-Job Employee Competency Certification Checklist

Notice to employer/trainer/employee: Providing false information is a violation of TCIA Code of Ethics.

Enter the date on which each of the following was completed:

AERIAL RESCUE TRAINING QUALIFICATIONS

As part of the Aerial Rescue Training Program, your employer must certify that you can demonstrate the skills necessary to attend a potential aerial rescue situation related with a workplace emergency. In general, in order to be considered qualified, you must have the following:

1. ____ / ____ / ____ Knowledge and understanding of ANSI Z133 safety standards and your company's safety rules, and all the equipment's owner/operator manuals.
2. ____ / ____ / ____ Ability to apply good decision-making using the Aerial Rescue Flowchart to different practice aerial rescue scenarios.
3. ____ / ____ / ____ Can properly identify when to proceed with an aerial rescue and when to secure the area and await EMS.
4. ____ / ____ / ____ Can demonstrate how to move away from a potentially energized aerial lift.
5. ____ / ____ / ____ Can lower a bucket operator (dummy) using the lower controls.
6. ____ / ____ / ____ Watched the Aerial Rescue DVD.
7. ____ / ____ / ____ **For Aerial Lift Specialists only:** Can demonstrate proper technique and decision making to assist climber.
8. ____ / ____ / ____ **For Tree Climber Specialists only:** Can demonstrate proper technique and decision making to assist climber.
9. ____ / ____ / ____ Has successfully completed practice aerial rescue.

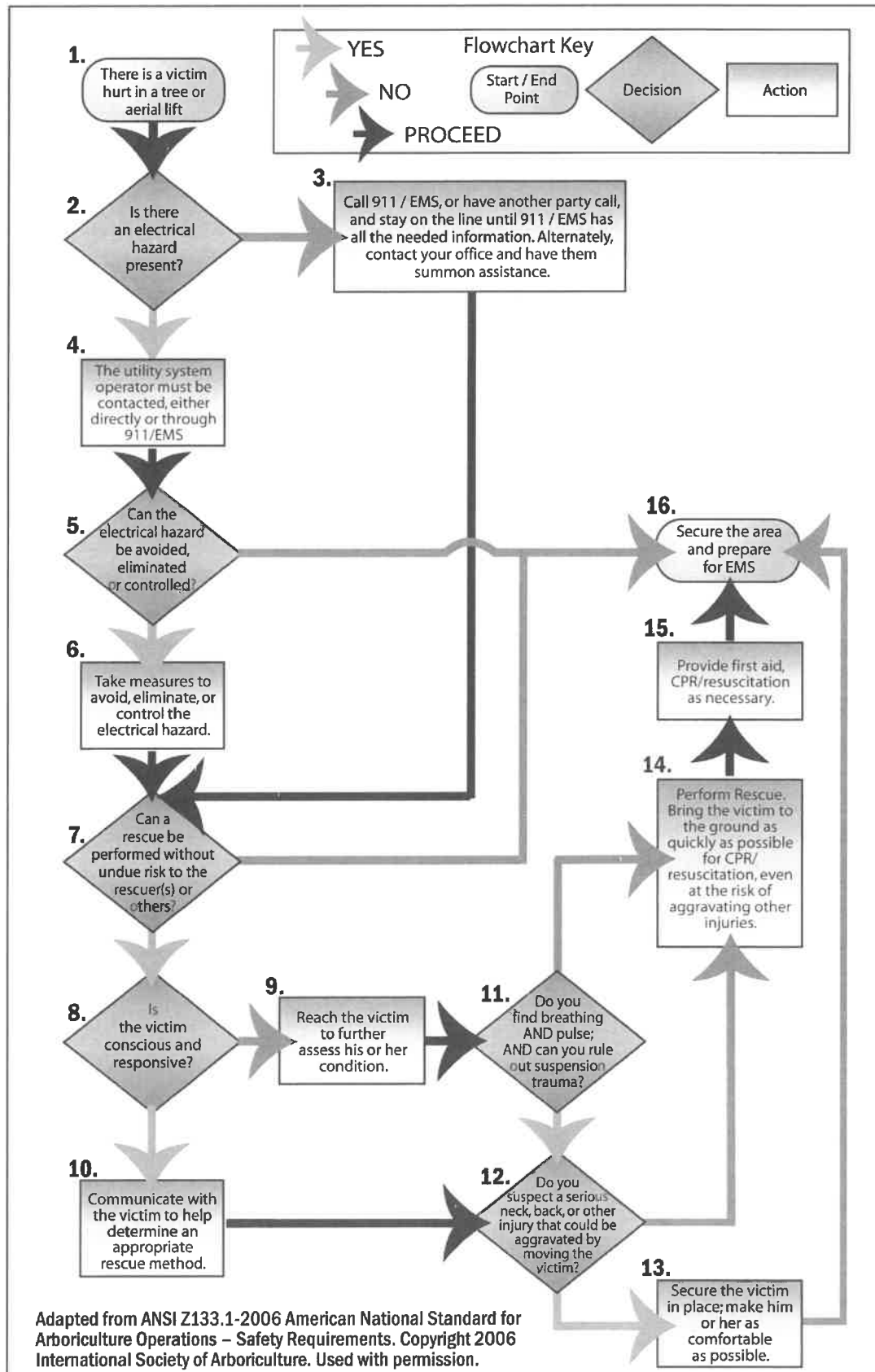
I, the employer/trainer, verify the above training and competency:

employer or trainer _____ Date: _____

employee _____ Date: _____

Keep a copy of this certification page for your office records. Please mail original to:
Attn: EHAP Coordinator, TCIA, 670 N. Commercial St., Suite 201, Manchester, NH 03101

Aerial Rescue Flowchart



Adapted from ANSI Z133.1-2006 American National Standard for Arboriculture Operations – Safety Requirements. Copyright 2006 International Society of Arboriculture. Used with permission.



Annex A - Recommended First Aid Kit Contents

The following is a recommended list of first aid kit contents for Arborist First Aid Kits. These can be ordered from TCIA by calling 1-800-733-2622 or on the Web: www.tcia.org.

The kits are designed to meet ANSI and OSHA standards as applicable for general tree care operations. Your actual work operation and location from medical services may require different contents.

- | | |
|---|---|
| (1) Waterproof First Aid Kit Box | (1) CPR Protective Kit |
| (1) Absorbent Compress, 32 sq. in. | (1) Eye Flush and Dressing Kit |
| (6) Adhesive Bandages, 2" x 4.5" | (1) First Aid Guide |
| (16) Adhesive Bandages, 1" x 3" | (4) Gauze Compress, 3" x 3" |
| (10) Antibiotic Ointment packets | (1) Scissors |
| (10) Antiseptic Wipe packets | (1) Splinter Forceps |
| (1) Blood Borne Pathogen Protective Kit | (10) Sting Relief Wipe packets |
| (12) Burn Ointment packets | (1) Tape, 0.5" x 5 yds. |
| (1) Cold Pack | (1) Triangular Bandage, 40" x 40" x 56" |

Final Instructions

- ☐ 1. Check to see that your employer/trainer has certified that you can demonstrate competency (are qualified). Your employer/trainer must do this by completing the On-the-Job Employee Competency Certification Checklist. The checklist must be signed and dated by you and your employer/trainer (see page 27).
- ☐ 2. Check to be sure you answered all the test questions.
- ☐ 3. Be sure you or your employer/trainer send the original test answer sheet and the On-the-Job Employee Competency Certification Checklist to TCIA for correction. Make an extra copy for your office records. Mail to: Attn: EHAP Coordinator, TCIA, 670 N. Commercial St., Suite 201, Manchester, NH 03101. You will be informed of your score, and a certificate of completion, helmet decal and wallet card will be sent to you.

TCIA wishes to extend a special thank you to our review team of:

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Hagerstown, MD 21742

EMS may give instructions for:

- ☐ How to check and give a status report on the victim
- ☐ How to administer first aid/CPR aloft
- ☐ How to use specialized rescue equipment that may be sent up to you
- ☐ How to stabilize the victim before lowering
- ☐ How to prep and "package" the victim for lowering
- ☐ Lowering precautions and/or techniques
- ☐ How to assist with first aid/CPR once on the ground

EMS may instruct you to secure the victim while they prepare to conduct a rescue.



Special Considerations:

Electrical Contacts.

Tree workers can survive electrical contact with distribution lines, though as with falls from heights above 40 feet, the usual outcome from electrical contact with distribution voltage is death.

In addition to being fatal, electrical shock can cause internal injuries, severe external and internal burns, spinal cord damage and broken bones. Some of the injuries may take days or even months for symptoms to appear and, if untreated, can result in kidney failure and death.

If a crew member survives contact with an electrical conductor:

- ☐ Take them to the emergency room;
- ☐ Alert EMS when they arrive at the site;
- ☐ Alert the hospital if you are driving the victim; and/or
- ☐ Tell physicians, EMS, and 911 dispatchers that the injury is due to contact with an electrical conductor.

Suspension Trauma (Orthostatic Intolerance).

Rescue procedures for a victim who may have suspension trauma should include the following actions:

- ☐ If self-rescue is impossible, or if rescue cannot be performed promptly, the worker should be trained to "pump" his/her legs frequently to activate the muscles and reduce the risk of venous pooling. Footholds can be used to alleviate pressure, delay symptoms, and provide support for "muscle pumping."
- ☐ Continuously monitor the suspended worker for signs and symptoms of orthostatic intolerance and suspension trauma.

- ☐ Ensure that a worker receives standard trauma resuscitation once rescued. Some authorities recommend that the patient be transported with the upper body raised.
- ☐ Monitor the worker after rescue, and ensure that the worker is evaluated by a health-care professional. The worker should be hospitalized when appropriate. Possible delayed effects, such as kidney failure, which is not unusual in these cases, are difficult to assess on the scene.

Chapter Five - Test

1. Aerial rescue is a type of high-angle technical rescue that your local EMS may or may not be trained to perform.
 - a. true
 - b. false
2. What will EMS do once they arrive?
 - a. They may ask you for technical assistance.
 - b. They will take over direction of the rescue effort.
 - c. They may ask you to do nothing.
 - d. all of the above
3. When EMS arrives what should you do?
 - a. Report what you have done so far.
 - b. Direct the technical portion of the rescue.
 - c. Lead the security effort.
 - d. all of the above
4. Why is it important to communicate with EMS on the scene?
 - a. If you are aloft with the victim you may be aware of hazards that EMS personnel cannot see from the ground.
 - b. You may be aware of hazards that your local EMS is not trained to recognize.
 - c. You may need to warn EMS personnel about any hazards.
 - d. all of the above
5. What should you do if a crew member survives contact with an electrical conductor?
 - a. If there are no physical injuries, no action is needed.
 - b. Ask the victim if hospitalization is needed.
 - c. Tell physicians, EMS, and 911 dispatchers that the injury is due to contact with an electrical conductor.
 - d. Determine if there is a back injury.
6. What should you do if a worker is suspended and you suspect suspension trauma?
 - a. Possibly rescue, stabilize and transport in an upright position.
 - b. Do not lay the victim down suddenly if rescued.
 - c. Tell the victim to "pump" his/her legs frequently if suspended.
 - d. all of the above

Chapter Five - Working with EMS in real world situations

Section 1. Introduction to EMS concepts and constraints

Aerial rescue is a type of high-angle technical rescue that your local EMS may or may not be trained to perform. This varies because there is no one way that municipalities and communities deploy resources for fire and EMS services. Usually they analyze the risks and demand for services in their local area and balance these against the community's desire for other forms of protection.

A decision of where resources are deployed (and how many) is a policy question that balances risk vs. cost. Usually the frequency of high-angle technical rescues is lower than other types of rescues. This means the amount of resources provided for equipment and training of your local EMS in high-angle technical rescue may be limited.

Many towns, small cities, and even some larger cities do not have an operations manager (chief), trainer, or even crew specifically dedicated to technical rescue. In most cases high-angle rescue will be grouped with all other technical rescues. Often the crews that respond to technical rescue calls have normal fire suppression and EMS responsibilities as well.

A technical rescue is an incident where victim rescue operations requires specialized personal protective equipment and techniques generally beyond the capability and training of ambulance paramedic personnel.

The term technical rescue usually refers to:

- ☐ Victim entrapment or extrication from a vehicle prior to ambulance paramedic arrival at the scene or when ambulance paramedic cannot safely access the victim;
- ☐ High or low angle rescue operations requiring ropes and other rescue equipment for safe victim access and rescue;
- ☐ Confined space or trench collapse rescue; or
- ☐ Swift water rescue.

A worst case scenario may be an all-volunteer management and crew that is cross-trained to respond to various fire suppression, EMS and technical rescue calls.

A best case scenario may be a department that has a specific technical rescue operations manager (chief), dedicated technical rescue crew(s), and technical rescue trainer(s)/training system.

In addition, this can vary from one community to the next. You need to be aware of how each community you work in is prepared to react during a high-angle rescue.

Section 2. Communicating with your local EMS before critical events occur

The first step is to talk to your city or town about their EMS organization and find out if there is an operations manager (chief), trainer or crew(s) dedicated to technical rescues.

If your local EMS services provide this level of specialization, you should be able to discuss the unique aspects of aerial rescues in tree care with a chief, trainer or crew member(s) responsible for technical rescues.

A trainer may be willing to visit your job sites or include tree care aerial rescue training and information to EMS crew(s).

A technical operations manager (chief) may even work with you to produce an EMS action plan for a tree care aerial rescue.

Section 3. Working with local EMS in emergency situations

In all situations, once EMS arrives they will take over direction of the rescue effort. You should report any attempts you made or are making at rescue and offer assistance if appropriate. If your local EMS specializes in high-angle rescue, they may take over the technical rescue operation completely, including reaching and lowering the victim.

Be prepared to assist:

If your local EMS cannot access the tree and/or the victim, or you have already reached the victim, you may be asked to assist in the rescue operation. Whether EMS can reach the victim or not, you may provide the quickest and most efficient means of reaching and lowering the victim. You may be asked to assist in administering first aid/CPR as well.

Be prepared to communicate with EMS:

If you are aloft with the victim you may be aware of hazards that EMS personnel cannot see from the ground or are not trained to recognize. Be sure to warn EMS personnel about any hazards that affect lowering of the victim or other parts of the rescue operation.

Be prepared to follow EMS instructions:

Even if the arriving EMS does not specialize in high-angle technical rescues, you will need to follow their guidance for many other items such as how to prepare a victim for lowering.

If you are aloft with the victim, you will most likely be given instructions for prepping and "packaging" the victim for lowering. These are very important to avoid further injury to the victim, so be sure you understand and follow the instructions.

- 14. Action – Perform rescue and lower the victim or remove him/her from the bucket immediately, bring to ground, and prepare to administer CPR.** If there is no breathing or pulse and there is severe bleeding or suspension trauma, perform rescue, even at the risk of aggravating other injuries. If possible, you may start rescue breathing before or during lowering. If there is severe bleeding, you should try to control it before and/or while lowering the victim. **Go to number 15.**

Perform Rescue:
Bring the victim to the ground as quickly as possible for CPR/resuscitation, even at the risk of aggravating other injuries.

- 15. Once on the ground, provide first aid/CPR until EMS arrives.** Follow standard first aid/CPR procedures according to your training. Do not stop because of lack of pulse or lack of breathing. **See number 16, end point for protocol.**

Provide first aid, CPR/resuscitation as necessary.

- 16. End Point.**

Secure the area and prepare for EMS

Section 2. Implementing the aerial rescue protocol in various emergency scenarios

The ARTP DVD contains a number of different scenarios. Watch the DVD and then discuss what you might do in similar situations or in scenarios of your own. Always consider what might happen if the rescuer has problems or becomes a victim. When practicing aerial rescue, use different scenarios.

Chapter Four – Test

1. Be aware, the victim may be unconscious and not able to call for help.
 - a. true
 - b. false
2. According to aerial rescue protocol, out of the choices provided what is the first decision you may need to make?
 - a. Determine the best method for lowering.
 - b. Is there an electrical hazard present?
 - c. Was the victim conscious and responsive?
 - d. Determine if the victim is conscious and responsive.
3. According to the aerial rescue protocol, what must you do if an electrical hazard is present?
 - a. Jump on the running boards of the truck.
 - b. Wait for EMS.
 - c. Call the utility system owner along with 911/EMS.
 - d. Move the truck.
4. Only the utility system owner can safely eliminate or control an electrical hazard.
 - a. true
 - b. false
5. According to the aerial rescue protocol, what should you do next if the victim is conscious and responsive?
 - a. Reach the victim to assess his/her condition.
 - b. Wait for EMS
 - c. Talk to the victim and determine what caused the injury and an appropriate rescue method.
 - d. none of the above
6. According to the aerial rescue protocol, when you reach the victim and determine that the victim is not breathing, what should you do next?
 - a. lower the victim immediately
 - b. remove victim from the bucket immediately
 - c. bring to ground, and prepare to administer CPR
 - d. all of the above
7. According to the aerial rescue protocol, what should you do if you determine that there could be a serious neck, back or other injury that may be aggravated by moving the victim?
 - a. lower the victim immediately
 - b. secure the victim in place; make comfortable, secure area and prepare for EMS
 - c. bring to the ground, and prepare to administer CPR
 - d. all of the above
8. One decision you must make is to determine if a rescue can be performed without any undue risk to the rescuers or others.
 - a. true
 - b. false
9. If proceeding with an aerial rescue will cause undue risk to the rescuer or others, what should you do?
 - a. proceed with caution
 - b. secure the area and proceed with caution
 - c. secure the area and wait for EMS
 - d. proceed until EMS arrives
10. Occasionally it is acceptable to use rope or pole tools to touch, lift, or move utility lines, including communication lines.
 - a. true
 - b. false
11. Which of the following statements is true about the aerial rescue protocol?
 - a. It is not intended to take the place of company safety policies.
 - b. It is not intended to take the place of basic first aid/CPR.
 - c. It is not intended to take the place of first responder training and procedures.
 - d. all of the above
12. What must you do if you determine that the electrical hazard can not be avoided, eliminated or controlled?
 - a. Secure the area and wait for EMS.
 - b. Move trucks out of the area.
 - c. Conduct a lower control rescue.
 - d. Wait in the cab of the truck.
13. What is the source of the aerial rescue protocol?
 - a. OSHA 1910.269
 - b. OSHA 1910.268
 - c. TCIA Tailgate Safety Program
 - d. ANSI Z133 – Annex F
14. If the electrical hazard involves primary distribution wires/voltages, it is unlikely that you will be able to avoid an electrical hazard and you will need to secure the area and wait for EMS.
 - a. true
 - b. false

- 7. Decision – Determine if a rescue can be performed without any undue risk to the rescuers or others.** Determine if the tree is unsound or weak. Determine if the tree and/or aerial lift was damaged by the accident and cannot be used to reach the victim. Look for other hazards that may cause undue risk. Determine if there is a safe method that can be used to reach the victim. Look for alternatives that might be used to minimize the risk to an acceptable level such as climbing a near-by tree or procuring another aerial lift.



No, stop and secure the area, prepare for EMS. There is probably nothing else you can do to help without making yourself or others additional victims. **See number 16, end point for protocol.**

Yes, rescue can be performed without undue risk: Go to number 8.

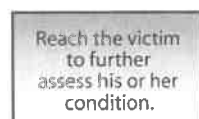
- 8. Decision – Determine if the victim is conscious and responsive.**



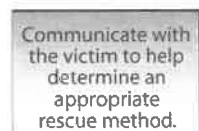
No, the victim is not conscious and responsive: Go to number 9.

Yes, the victim is conscious and responsive: Go to number 10.

- 9. Action – Reach the victim to further assess his or her condition.** Determine and proceed with the safest way for you to enter the tree or access the aerial lift unit in order to reach or lower the victim. **Go to number 11.**



- 10. Action – Talk to the victim and determine what caused the injury and an appropriate rescue method.** Ask if there is any immediate danger to the victim, to you or to others. **Go to number 12.**



- 11. Decision – Once you reach the victim, determine if the victim is breathing and has a pulse and there are no signs of suspension trauma.** Once you reach the victim check vital signs: Is the airway open AND the victim is breathing AND there is no severe bleeding AND you can rule out suspension trauma?



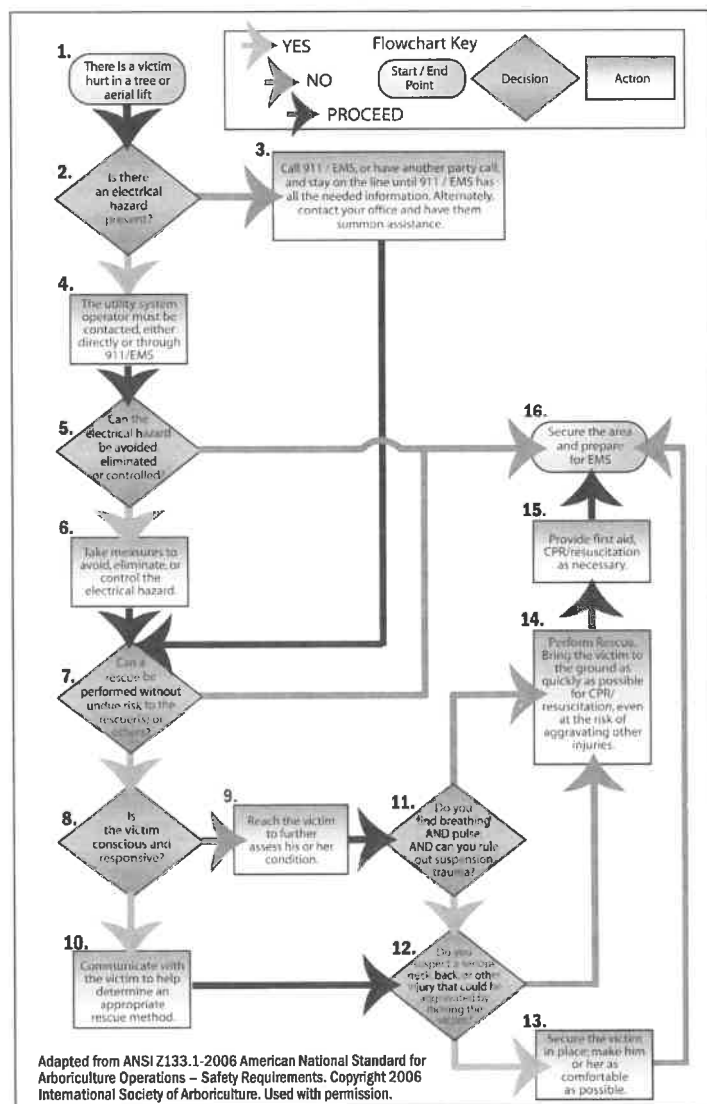
No, there is no pulse, no breathing, there is severe bleeding and/or suspension trauma. Go to number 14.

Yes, victim is breathing, has pulse and appears stable. Go to number 12.



- 12. Decision – Determine if there could be a serious neck, back or other injury that may be aggravated by moving the victim.**

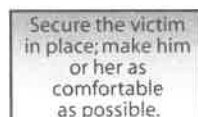
Aerial Rescue Flowchart



No, there is no sign or reasonable chance of neck or back injury. Go to number 14.

Yes, there is a chance of neck or back injury. Go to number 13.

- 13. Action – Secure the victim in place; make comfortable, secure area and prepare for EMS.** This will help avoid worsening the injuries. Alert persons on the ground of the victim's condition and extent of injuries. This will help EMS get prepared for the rescue operation. Make the victim comfortable. If there is bleeding, use basic first aid techniques to control it. Once the victim is secure, make yourself comfortable as well. **See number 16, end point for protocol.**



Chapter Four - Aerial Rescue Protocol

Section 1. Introduction to the aerial rescue protocol

The aerial rescue protocol is provided by the ANSI Z133 safety standard in Annex F. Review the protocol and use it to help you make good decisions. Follow it during aerial rescue practice.

The protocol is not intended to take the place of, or precedence over, company safety policies, basic first aid/CPR and other first responder training and procedures.

The protocol guides you to make good decisions when:

- ☐ Assessing the situation;
- ☐ Identifying potential hazards;
- ☐ Taking initial actions (such as 911 call, securing the area, etc.);
- ☐ Determining what can be done in a safe manner; and,
- ☐ Proceeding after you have determined it is safe and you have chosen the best method to use.

1. Start Point – Identify a victim. Always be aware. The victim may be unconscious and not able to call for help. Not all accidents will be obvious. Also, try to establish communication with the suspected injured worker BEFORE calling 911 to be sure there is an actual emergency.

There is a victim hurt in a tree or aerial lift

Go to number 2.

2. Decision – Is there an electrical hazard present? Evaluate the situation. Determine if there is an electrical hazard.



No: Go to number 3.

Yes, electrical hazard present: Go to number 4.

3. Action – Call 911. You or a co-worker must make the call or

Call 911 / EMS, or have another party call, and stay on the line until 911 / EMS has all the needed information. Alternately, contact your office and have them summon assistance.

determine who is around to help make the call. You must be able to give an exact location as well as directions. If you must, ask homeowners or even

pedestrians to call 911 and verify back to you that they have done so. Whoever makes the call needs to follow instructions and stay on the line. As a rule, you should not hang up first when requesting emergency assistance. Be sure the dispatcher has your exact location and understands the nature of the injury. Note: A utility map location may have different street names than the 911 system.

Go to number 7.

Acr-Rev10-2/16

4. Action – If an electrical hazard is present, you must call the utility system owner along with 911/EMS. WARNING! Cell phone calls to 911 often connect you to the state police in the area

The utility system operator must be contacted, either directly or through 911/EMS

code where your cell phone is from. Usually, they will not be able to contact the utility system owner. This is why you should have an emergency phone number list or have emergency numbers programmed into your speed dial. You may have to contact your supervisor in order to contact the utility. Also, some cell phones can be locked into "Emergency Mode" and may not be able to be used without turning them off and back on first. Check with your cell phone company to see if they lock out the phone and how to return it to normal service.

Go to number 5.

5. Decision – Determine if the electrical hazard can be avoided, eliminated or controlled. WARNING! Only the utility system



owner can safely eliminate or control an electrical hazard. If the electrical hazard involves primary distribution wires/voltages, it is unlikely that you will be able to avoid an electrical hazard. Determine if the electrical hazard can be avoided, eliminated or controlled. It may be possible to avoid

an electrical hazard caused by a house drop (secondary voltage). Before making a decision, take into account the precautions and warnings outlined in this training program or by your company.

No, stop and secure the area, prepare for EMS. There is probably nothing else you can do to help without making yourself or others additional victims. Verification from the utility of line de-energizing (hazard eliminated or controlled), may change your determination in number 5. See number 16, end point for protocol.

Yes, electrical hazard can be avoided or the utility verified that the hazard was eliminated and/or controlled: Go to number 6.

6. Action – Take steps to avoid, eliminate, or control the electrical hazard. WARNING! Only the utility system

Take measures to avoid, eliminate, or control the electrical hazard.

owner can safely eliminate or control an electrical hazard. If the electrical hazard involves primary distribution wires/voltages, it is unlikely that you will be able to avoid an electrical hazard. There may be limited situations where an electrical hazard from a house drop (secondary voltage) can be avoided. WARNING! At no time should you use rope or pole tools to touch, lift, or move utility lines, including communication lines (per OSHA 1910.268 and .269).

Go to number 7.



8. Which of the following is the method where, after reaching the victim, you attach your front D-rings to the D-rings on the victim's saddle?
- D-ring
 - double climbing hitch
 - rescue pulley
 - modified
9. Which of the following rescue methods can be done by a single rescuer?
- D-ring
 - double climbing hitch
 - rescue pulley
 - all of the above
10. When using a double climbing hitch technique, what advantage is provided by attaching a small pulley or carabiner above the victim's hitch and connecting it to your saddle?
- Allows you to descend by working your climbing hitch with one hand.
 - Does not allow your other hand to be free.
 - Allows the bucket operator to lower the victim.
 - none of the above
11. A bucket operator who is not qualified to climb can lower a climbing victim by using the boom controls to lower and guide a victim to the ground.
- true
 - false
12. If you reposition the aerial lift, which of the following must you do?
- take the time to position the vehicle correctly
 - set the outriggers and pads
 - set the wheel chocks
 - all of the above
13. When should you access a potentially energized aerial lift?
- Only when the boom is insulated.
 - Only after you call 911.
 - Never
 - When an aerial rescue is needed.
14. There are very few reasons why you would cut a rope while a worker was aloft during an actual aerial rescue.
- true
 - false
15. Which of the following is an objective of practice aerial rescues?
- Review the aerial rescue protocol from Annex F in ANSI Z133.
 - Learn how to evaluate emergency situations and determine which technique, if any, is best according to the protocol.
 - Discuss and identify each aerial rescue technique's advantages and disadvantages in various situations.
 - all of the above
16. Which of the following is an aerial rescue practice specification?
- The rescuer must use the ANSI Z133 aerial rescue protocol as a decision-making guide.
 - The rescuer must perform a hazard assessment.
 - The rescuer must formulate a rescue plan, including the rescue method to be used, before beginning the aerial rescue practice.
 - all of the above



are very few reasons why you would cut a rope while a worker was aloft during an actual rescue. Many of the rescue procedures that do not require cutting rope are safer than cutting the injured worker's rope.

Aerial rescue practice objectives:

- Review the aerial rescue protocol from Annex F in ANSI Z133.
- Learn how to evaluate emergency situations and determine which technique, if any, is best according to the protocol.
- Discuss and identify each aerial rescue technique's advantages and disadvantages in various situations.
- Groundworkers must be able to assist climbers and rescue aerial lift operators using the lower controls.
- Practice at least once every quarter using a different scenario. Try rescuing the rescuer in the scenarios.

Aerial rescue practice specifications:

In general:

- The rescuer must use the ANSI Z133 aerial rescue protocol as a decision-making guide.
- The rescuer must perform a hazard assessment.
- The rescuer must formulate a rescue plan, including the rescue method to be used, before beginning the aerial rescue practice.
- Do not practice at excessive heights or heights at which you are not qualified to work.
- There is no time requirement.
- Use four minutes as a reference point, since those who are not breathing and/or in cardiac arrest for over four minutes may suffer permanent brain injuries. Remember, conducting an adequate hazard assessment and the safety of the rescuer take precedence over time.

For climbers:

- A rescue height of approximately 35 feet is recommended for experienced, qualified climbers.

For lift operators:

- Practice using an aerial lift to rescue a simulated climbing victim at a height of approximately 35 feet. Never load a bucket beyond the manufacturer's recommended capacity.
- Practice a lower control rescue from a working height.
- Practice removing a victim from a landed bucket.

For groundworkers:

- Practice assisting lift operators and/or climbers.
- Practice a lower control rescue from a height of approximately 35 feet (if you are qualified by your employer to do so).
- Practice removing a victim from a landed bucket.

Chapter Three - Test

1. Which of the following applies to TCIA's ARTP?

- a. ARTP provides an outline of aerial rescue procedures.
- b. Procedures and techniques presented are approved by your company.
- c. It limits the methods in which a victim may be reached and lowered.
- d. all of the above

2. It is your responsibility to know and comply with your company's policies.

- a. true
- b. false

3. Company policies may include a list of aerial rescue techniques approved for use at your company.

- a. true
- b. false

4. Regardless of how the rescuer decides to reach the victim, ANSI Z133 requirements must be _____.

- a. followed as long as they don't slow you down
- b. considered
- c. followed at all times
- d. understood, but can be waived

5. Which of the following are some recognized ascent techniques?

- a. Use an aerial lift to reach the victim
- b. Use climbers (spikes)
- c. Use a pre-installed ascent line
- d. all of the above

6. Which of the following is the method where you reach the victim, lower yourself on your climbing line while lowering the victim on the victim's climbing line?

- a. D-ring
- b. double climbing hitch
- c. rescue pulley
- d. modified

7. Which of the following is the method where you lower the pulley line if the victim has a clear, straight path to ground?

- a. D-ring
- b. double climbing hitch
- c. rescue pulley
- d. modified

Hydraulic power loss:

If hydraulic power is lost or damaged, it may be necessary to lower the aerial lift's boom manually. Follow the manufacturer's emergency lowering procedures in the owner's manual to do this. Only personnel trained in manual lowering procedures should attempt to manually lower a bucket under emergency conditions.

Techniques for removing the victim from the bucket:

Removing an unconscious victim from a bucket can be difficult, only do so if there is a reason to (CPR required, severe bleeding, etc). Be sure there are no back, neck or other injuries that might be aggravated before attempting to remove the victim from the bucket.

If you can, get help. Do not strain your back trying to remove the victim from a bucket.

Use features of the bucket to make removing the victim easier:

- ☐ If equipped, use the bucket tilt feature; or
- ☐ Force the bucket to tip with the hydraulics, breaking the leveling cable/chain (this should only be done in case of emergency and not during aerial rescue practice).

Rescuer using bucket tilt feature to remove a victim who is unconscious and not breathing.



One of the following techniques may be used to remove a victim from a bucket:



Simple pull technique. Pull the victim's arms over the lip of the bucket opposite the side where the boom is attached. Remove the victim's safety strap from the boom and hang it over the lip. Lift or pull the victim over the edge of the bucket by grasping him or her under the arms or by the belt.

Rope technique. More leverage may be needed if you cannot use the normal technique. Loop a rope under the victim's arms or legs. A variation is to attach a strap to the boom to set up a simple mechanical advantage.

Fireman's carrying technique. Pull the victim's arms over the lip of the bucket opposite the side where the boom is attached. Remove the victim's safety strap from the boom and hang it over the lip. Place one arm around the victim's shoulder and one arm between the victim's legs, lift and lower him or her to the ground.

Section 2. Practicing aerial rescues

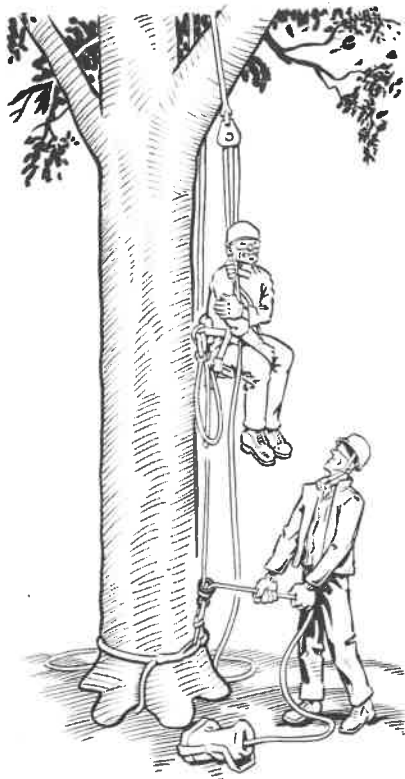
You must be adequately trained and competent in the performance of an aerial rescue. You must be able to assist others during an aerial rescue. The only way to do this is with practice.

Caution: Cutting a climbing line or untying a climbing hitch of a live co-worker or trainer is extremely dangerous and can result in severe injury or death if done incorrectly. Do not cut the climbing line or untie the climbing hitch of a live co-worker or trainer as part of a practice aerial rescue. Instead, use a rescue dummy, or other appropriate simulation, when practicing aerial rescue. Also, there

3. Rescue Pulley

Lower the pulley line if the victim has a clear, straight path to ground. If there is not a clear path to ground, you may need to reach the victim and help guide the victim down.

Technique 3.
Slight injury. Climber being lowered by ground worker.



Possible Advantages	Possible Disadvantages
Can be performed by one person	Victim is lowered from the ground
Victim's line remains secured	Victim is not guided down by a climber
Victim is lowered on their own line	Will not work if the climber has used their lanyard to secure themselves to the tree.
	Mechanical advantage increases the amount of weight on the pulley and limb.

4. Lowering by bucket operator

A bucket operator who is not qualified to climb can lower a climbing victim by using the boom controls to lower and guide a victim to the ground. A small pulley is attached above the victim's hitch, attached to a line, strap or lanyard and held by the bucket operator as the boom is slowly lowered. The pulley exerts downward pressure on the climber's hitch, allowing the victim to be lowered on their climbing line as the bucket is lowered.

Caution: If you reposition the aerial lift, you must take the time to position the vehicle correctly, set the outriggers and pads, and set the wheel chocks as required at the site.

Technique 4. Victim is unconscious and not breathing.



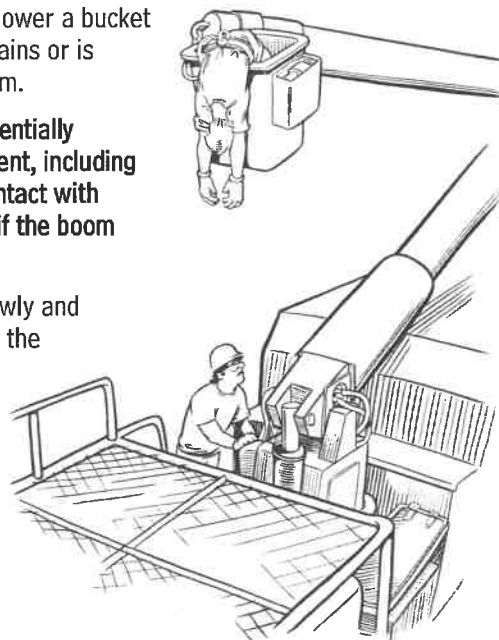
Possible Advantages	Possible Disadvantages
Can be performed by one person	Aerial lift is required
Victim's line remains secured	Aerial lift may need to be repositioned
Victim is lowered on their own line	

5. Lowering using aerial lift lower controls.

A rescuer may be able to use the lower controls to lower a bucket or boom that contains or is suspending a victim.

Do not access potentially energized equipment, including an aerial lift in contact with conductors, even if the boom is insulated.

Use caution to slowly and deliberately lower the victim safely.



Victim is unconscious,
not breathing.
Using a pulley
assist.



Caution: The breaking strength of the arborist climbing line in new condition is a minimum of 5,400 pounds, so unless it is damaged or worn, it can hold both of you. However, the tie-in point must be strong enough to handle the added load. Also, the extra weight of two people on one rope may cause the hitch to heat up quickly. The descent must be controlled and smooth. Quick stops may cause the hitch to bind.

The advantage is that you have to work only one hitch. This leaves one hand free to cradle and control the victim on the way down. It also saves time because usually you can tie directly to the victim quickly.



Technique 2. Victim is bleeding heavily, must be lowered, rope is damaged. Using a D-ring technique.

Possible Advantages	Possible Disadvantages
Can be performed by one person	The climber may need to operate two hitches
Victim's line remains secured	The climber may need to guide victim with feet/legs
Victim is lowered on their own line	
Victim is guided down by a climber	
Technical variations are available	

2. D-ring Rescue

After you reach the victim, attach your front D-rings to the D-rings on the victim's saddle. You can connect to each other by any of the support and positioning attachment points on your saddles; be careful not to use any of the accessory snaps or rings as these are not rated for support. To do this, use a carabiner, a large locking snap, or your lanyard. At this point, you and the victim are tied into the victim's line and can descend together.

Alternate technique: There is a variation of this technique used when the victim's rope is damaged. Tie in using your climbing line and attach the victim's D-rings to your D-rings. After freeing the victim from the damaged rope, you can descend with the victim on your climbing line.

Possible Advantages	Possible Disadvantages
Can be performed by one person	Both victim and climber descend on one line.
Victim's line remains secured	
Victim is lowered on their own line	
Victim is guided down by a climber	
Technical variations are available	

Chapter Three - Aerial Rescue Techniques

Section 1. Tree care industry aerial rescue techniques

Note about company policies: It is your responsibility to know and comply with your company's policies, including all policies that outline aerial rescue procedures. If unsure, ask your supervisor.

This is important because:

1. Company policies may include a list of aerial rescue techniques approved for use at your company; and,
2. TCIA's ARTP presents a broad outline of aerial rescue procedures and techniques that may or may not be approved by your company. It is not intended to limit the methods in which a victim may be reached and lowered.

Ascent methods:

Regardless of how the rescuer decides to reach the victim, ANSI Z133 requirements must be followed at all times. Among other things, this means that the rescuer must be secured at all times while aloft. Methods of reaching the victim include:

- 1.) Use an aerial lift to reach the victim. Bucket operators who are qualified to climb can bring a climbing line and saddle. The operator can tie-in and get out of the bucket to perform one of the following climbing method rescues. Note: Never load a bucket beyond the manufacturer's recommended capacity.
- 2.) Use the pre-installed access line to reach the victim;
- 3.) If no access line was used, you may be able to set a line and climb to the victim; or,
- 4.) Use climbers (spur, gaffs, hooks, spikes).



Lowering methods:

Alert in tree with chain saw cut, rescuer preparing to use pre-installed access line.

1. Double Climbing Hitch Rescue

After you reach the victim, lower yourself on your climbing line while lowering the victim on the victim's climbing line.

Since your hands will be busy working both of the hitches, you must use your feet and legs for maneuvering and helping to guide the victim.

You may wrap your lanyard around the victim and snap it back to your saddle. When moving to clear a limb, the victim will be pulled along with you.



Technique 1. Victim is alert, slight injury, no serious back or neck injury. Using a double-hitch technique.

Alternate technique: To make this easier, attach a small pulley or carabiner above the victim's hitch and connect it to your saddle. This allows you to descend by working your climbing hitch with one hand, and the other hand can be used to control the victim. The length of the cord/strap/etc., is crucial. It must long enough so that you can lower both yourself and the victim by controlling only your knot. It must not be too long, however, since you still may need to reach the victim's hitch.



Chapter Two - Test

Note: Be aware that this technique could quadruple the load on the anchor. A 250 lb. load could exert 1,000 pounds at the tie-in point.

1. For what are all crew members responsible?

- a. conducting an aerial rescue
- b. their own safety and the safety of other crew members
- c. becoming certified as a first responder
- d. all of the above

2. What should you do when other crew members are not behaving responsibly?

- a. discuss safety with other crew members
- b. inform your supervisor
- c. inform your company's owner
- d. all of the above may be acceptable

3. Taking responsibility for yourself and other crew members is key to being prepared to conduct an aerial rescue.

- a. true
- b. false

4. Which of the following should you always have available?

- a. an adequately stocked first aid kit
- b. AED device
- c. a backboard
- d. all of the above

5. Where should an aerial rescue kit be placed?

- a. at the work site, in the truck
- b. at the work site, in a tool box
- c. at the work site, placed away from the truck
- d. at the shop, available by a phone call

6. Which of the following should an aerial rescue kit contain?

- a. clean and dry throw line
- b. clean and dry climbing line and climbing saddle
- c. positioning lanyard(s)
- d. all of the above

7. In an emergency, the truck may become energized or damaged.

- a. true
- b. false

8. Which of the following is a best practice regarding emergency phone calls?

- a. Go over the work location in the morning before you leave the shop.
- b. Know your work location and be able to give directions.
- c. Do not keep cell phones in the truck.
- d. all of the above

9. Climbers who use more advanced climbing systems are responsible for ensuring that crew members know _____ the system so that a rescue can be performed.

- a. how to climb with
- b. the basic operation of
- c. advanced techniques used with
- d. how to change

10. Prepare for an aerial rescue by _____ in hard-to-access trees.

- a. positioning an aerial lift bucket
- b. installing a first aid kit
- c. installing a separate access line
- d. all of the above

11. Climbers who use Single Rope Technique (SRT) should not install a rescue pulley or use another similar technique for aerial rescue preparedness.

- a. true
- b. false

12. In addition to 911, which numbers should you have available for emergency calls?

- a. your work supervisor's direct number
- b. your office number
- c. if applicable, the utility representative and/or supervisor's number
- d. all of the above

Climbing system choice can also affect your preparation for aerial rescue. Tree workers need to be familiar with the climbing systems used at the company and how they will affect an aerial rescue.

Using a split-tail system is encouraged as a form of aerial rescue preparedness. Split-tail systems offer a good combination of:

- ☐ a technical advantage for the rescuer (usually no need to cut rope or untie a climbing hitch during a rescue); and,
- ☐ ease of understanding (the basic concept and operation of a split-tail system is not complicated).

Climbers who use more advanced climbing systems, such as a single rope technique (SRT), are responsible for ensuring that crew members know the basic operation of the system so that a rescue can be performed.

Installing a separate access line. Prepare for an aerial rescue by installing a separate access line in hard-to-access trees. Consider doing this as part of all your normal climbing procedures. The climber may bring an additional line up and install it. The access line may also be an ascent line the climber used to enter the tree.



Separate access line.

Climb using a rescue pulley. Climbers who use single rope technique (SRT) can use this or similar techniques. This technique allows a victim to be lowered without climbing the tree, so long as the victim has a clear, straight path to the ground.

The rescue pulley can be set from the ground:

- ☐ The climber's line is threaded through the rescue pulley;
- ☐ The pulley is attached to a second climbing line, referred to hereafter as the pulley line;
- ☐ the pulley line is set over a suitable crotch;
- ☐ the pulley line is pulled through so the rescue pulley is positioned just below the crotch; and,
- ☐ The tail end of the pulley line is wrapped twice around the tree trunk and secured at the base of the tree.

If there is an emergency and the victim has a clear path to ground, the pulley line can be untied from the tree and the climber and the rescue pulley lowered to the ground.



SRT climber using a pulley.



Chapter Two – Aerial Rescue Preparedness

Section 1. Introduction to aerial rescue emergency preparedness

You must be prepared to deal with emergencies. This means you need to plan how you will handle an emergency before one occurs. Planning how to handle emergencies includes training and planning for aerial rescues. The training that this program provides is, in part, accident avoidance. You and your crews should be training to avoid being in a situation where a rescue will be necessary. An aerial rescue is a little like an airbag in a car or a backup parachute: you never want to use it, but you want to know that it is going to function properly if it is needed.

Additional inspections should be used to prevent accidents. Initial hazard assessments and job briefings are required; however you should also do regular inspections for hazardous conditions during work operations. Correct deficiencies immediately, including any unsafe actions by crew members.

Responsibility for safety. All crew members are responsible for their own safety and the safety of other crew members. Foster a team atmosphere so each crew member feels responsible for the other. Crew members should make frequent visual checks on each other to be sure all are safe.

What do you do when other crew members are not responsible? As a crew member, you should feel empowered to discuss safety with other crew members. Inform your supervisor or company owner if crew members will not follow safety rules and/or accept responsibility for safety.

Taking responsibility is key to fostering a culture of safety.

Section 2. Techniques for aerial rescue preparedness in tree care

Always have the following available:

- ☐ an adequately stocked first aid kit;
- ☐ a working cell phone;
- ☐ emergency phone numbers;
- ☐ an aerial rescue kit; and,
- ☐ a means for calling for help.

Aerial Rescue Kit. Have the following items available at the work site, but placed away from the truck, to assist in aerial rescue:

- clean and dry throw line;
- clean and dry climbing line and climbing saddle;
- positioning lanyard(s);
- set of climbers (spurs, gaffs, hooks, spikes);
- hand pruner or trauma shears;
- clean and dry non-conductive pole saw;
- emergency phone numbers; and,
- fully stocked first aid kit.

Note: The items in your aerial rescue kit are not dielectrically tested for insulation and should not be used to contact or move other energized items. You should always use clean and dry equipment in your aerial rescue kit to reduce the possibility of electrical conductivity from unrecognized electrical hazards. Dirty, soiled and/or wet equipment is more likely to conduct electricity.

Be prepared to call for help. The best means of calling for help is usually a working cell phone. If you have a cell phone, make sure it works at the job site and all crew members know how to use that particular model of phone. If a working cell phone is not available, you should at the least know where the nearest telephone is located and how you will access it. **Example:** Client has a phone and is home; public phone at corner store; etc.

Do not keep cell phones in the truck. In an emergency, the truck may become energized or damaged. When possible, leave the cell phone with the aerial rescue kit and be sure all crew members know it is there. This way it is always available for use no matter who is injured. If security is an issue, leave the cell phone in a secure location that crew members can access.

Know your work location and be able to give directions. A 911 call on a cell phone may go to the state police in the home area code of your cell phone, not your actual location. Even if the call is local, the operator may have no knowledge of your actual location.

If possible, go over the work location in the morning **before** you leave the shop. If someone is not familiar with the location, you can still get directions before you leave.

You must be able to give the emergency call center the 911 system street address and directions to the location. If an emergency occurs, rescuers will need to know where and how to reach you. **Note:** A utility map location may have different street names than the 911 system.

Emergency phone numbers. In addition to 911, you should know and have available in writing your work supervisor's direct number, your office number, and, if applicable, the utility representative and/or supervisor's number for the area in which you are working.



Chapter One - Test

1. What is the most common reason for double fatalities in our industry?
 - a. Electrocution
 - b. Failed rescue attempts
 - c. Struck-by
 - d. Falls
2. What is the Cardinal Rule of Aerial Rescue?
 - a. The rescuer must save the victim.
 - b. The rescuer must conduct an aerial rescue.
 - c. The rescuer must not become a victim.
 - d. Aerial rescue training does not take the place of first aid training.
3. When could an aerial emergency situation develop?
 - a. Any time you and your crew are performing tree care operations aloft.
 - b. In the vicinity of aerial utility lines.
 - c. When an aerial lift is running.
 - d. Only when a climber is aloft.
4. This DVD and workbook training program, in combination with _____ and _____, is designed to give you the knowledge needed to evaluate an emergency situation.
 - a. on-the-job training; observation
 - b. on-the-job training; practice
 - c. observation; practice
 - d. reading; practice
5. An accident occurs when a series of mistakes are made in an unfortunate _____.
 - a. incident
 - b. number of events
 - c. circumstance
 - d. sequence
6. Contact with a(n) _____ accounts for the majority of accidents in our profession.
 - a. utility line
 - b. object ("struck-by")
 - c. hard surface (fall)
 - d. chain saw (cut)
7. Grounding (and the resulting step potential) can occur around _____.
 - a. downed energized conductors
 - b. the base of an energized tree or equipment
 - c. the base of an energized utility pole
 - d. all of the above
8. Aerial lifts, any trailed equipment such as chippers, or any other equipment contacting an energized conductor must be considered energized.
 - a. true
 - b. false
9. Lowering the victim immediately may _____.
 - a. make the injury worse
 - b. cause severe bleeding
 - c. cause the victim to go into shock
 - d. all of the above
10. If the victim has stable vital signs (pulse, breathing, no severe bleeding) and you suspect a back or neck injury, it is usually best _____.
 - a. to secure the victim in the tree, administer first aid, and await EMS
 - b. to lower immediately for treatment
 - c. to get out of the tree and summon help
 - d. to fashion a make-shift backboard and lower the victim
11. Only the utility system owner can safely eliminate or control an electrical hazard.
 - a. true
 - b. false
12. When could suspension trauma occur during a tree care emergency?
 - a. after blood loss from a chain saw cut
 - b. after a groundworker is hit in the head with a branch
 - c. when a climber is suspended by their saddle after a fall
 - d. all of the above

Some common symptoms of orthostatic intolerance are:

- ☐ light-headedness;
- ☐ palpitations;
- ☐ tremulousness;
- ☐ poor concentration;
- ☐ fatigue;
- ☐ nausea;
- ☐ dizziness;
- ☐ headache;
- ☐ sweating;
- ☐ weakness; and,
- ☐ fainting.



Victim, unconscious, hanging upright (forward) in saddle, after taking uncontrolled swing, can't be reached by ground worker rescuer.

Severe venous pooling causes a reduction in the quantity and/or quality (oxygen content) of blood flowing to the brain. If a climber or bucket operator is suspended upright in their harness or saddle and unable to move their legs and/or move to a horizontal position, severe venous pooling can occur causing suspension trauma.

Suspension trauma causes unconsciousness as an early symptom and can lead to death as the brain, kidneys and other organs are deprived of oxygen.

Orthostatic intolerance can be made worse by other circumstances related to the incident. Shock or injuries suffered during the incident, poor fit/positioning of the harness or saddle, the environmental conditions, and the worker's psychological state all may speed onset and increase severity of suspension trauma.

The amount of time spent suspended, with the legs below the heart, affects the manner in which the worker should be rescued. Moving the worker quickly into a horizontal position – a natural reaction – may cause a large volume of deoxygenated blood to move to the heart. If the worker has been suspended for an extended period, the heart may be unable to cope with the abrupt increase in blood flow, causing cardiac arrest. Rescue procedures must take this into account.

Remember:

- Be aware that suspended workers are at risk of suspension trauma.
- When possible, rescue suspended workers before orthostatic intolerance sets in.
- Be aware of signs and symptoms of orthostatic intolerance.
- Be aware that orthostatic intolerance is potentially life threatening, especially for suspended workers with head injuries or who are unconscious.
- Be aware of factors that can increase the risk of suspension trauma.
- Be aware that some authorities advise against moving the rescued workers to a horizontal position too quickly.

Key precautions when you find a suspended victim:

- ☐ Determine how long the victim has been suspended;
- ☐ If the victim has been suspended for a short period of time and does not have neck or back injuries, move them to a horizontal position; or,
- ☐ If the victim cannot be reached but is conscious and not complaining of neck/back injuries, encourage them to move to a horizontal position, or to keep moving their legs, as if they are riding a bike, to help pump blood until EMS arrives.

Avoid being electrocuted:

- Do not allow trees, branches, aerial lift equipment, or other equipment to touch conductors (become energized);
- Do not touch, lean on, or attempt to access trees, branches or equipment that is in contact with utility wires. This includes insulated aerial lifts;
- Avoid the area around the outriggers; and,
- Use shuffle-steps to **move away** from energized trees, equipment or other electrical hazards.



Utility hardware and procedures warning:

Never assume that a line has been automatically or otherwise de-energized. Do not make guesses about utility procedures or hardware operation. It is possible for a circuit breaker or other related hardware to de-energize a line in an emergency situation. It is also possible that the line may be re-energized at any time automatically and/or remotely without warning.

Only the utility system owner can safely eliminate or control an electrical hazard. You can consider a line de-energized once a utility representative on site has verified this and you are convinced the line is de-energized. If there is evidence that the line may still be energized, do not proceed and ask to speak to a utility supervisor.



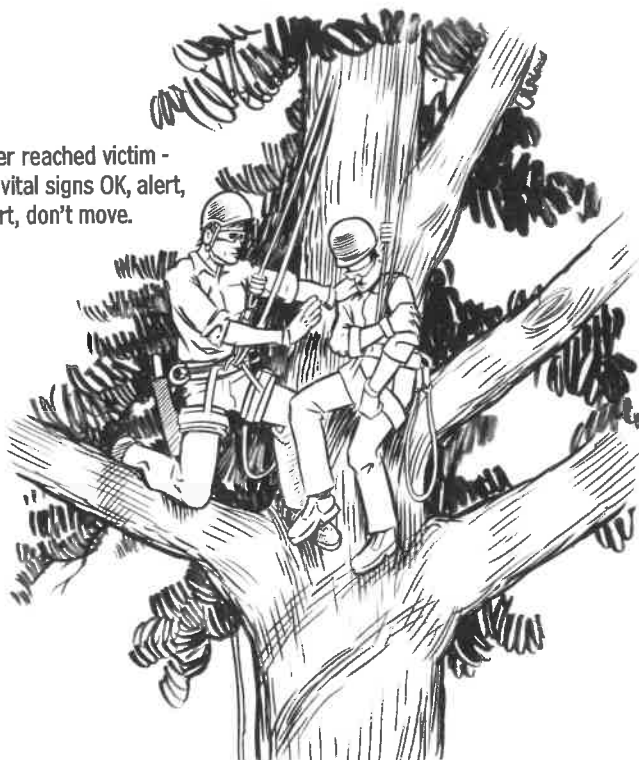
Suspension trauma (a form of orthostatic intolerance).

Suspension trauma can occur when a climber or bucket operator is suspended by their harness or saddle after a fall and are unable to move by themselves. A bucket operator may have been jolted out of the bucket and be injured or unable to climb back in. A climber may have been knocked unconscious and be hanging in their saddle.

Orthostatic intolerance can occur because blood accumulates in the veins when someone remains sedentary, especially when upright. This is commonly called "venous pooling." A mild example of this is when you get up suddenly after sitting for a long time and become light-headed.

When an individual is suspended aloft, venous pooling can occur in the legs due to the force of gravity and a lack of movement. In the veins, blood normally is moved back to the heart through one-way valves using the normal muscular action associated with limb movement. If the legs are immobile, then these "muscle pumps" do not operate effectively, and blood can accumulate. Since veins can expand, a large volume of blood may accumulate.

Rescuer reached victim -
victim vital signs OK, alert,
but hurt, don't move.



Back and neck injuries. Back and neck injuries can be caused by struck-bys, falls and even contact with energized conductors. If the victim has stable vital signs (pulse, breathing, no severe bleeding) and you suspect a back or neck injury, it is usually best to secure the victim in the tree, administer first aid, and await EMS. Lowering the victim immediately may make the injury worse or cause the victim to go into shock.

Electrocution hazard during aerial rescues:

Research shows that most contacts with energized conductors in the tree care industry result in death. Rescuer(s) may become a second victim if the injury was caused by an electrical contact and/or an electrical hazard exists. You may create a path to ground for electricity and be seriously injured or killed if you touch anything that is energized, including the victim, a rope, a tree, a truck or other piece of equipment.

Trying to help a co-worker stranded aloft in an energized bucket or in an energized tree may place the rescuer in danger. In these situations, if the hazard cannot be avoided, controlled or eliminated:

- ☐ wait for emergency response personnel to arrive;
- ☐ watch to see if the victim can move the boom/bucket to safety, move themselves to safety, or make the situation safe themselves; and/or,
- ☐ wait until the system is de-energized.

WARNING! At no time should you use rope or pole tools to touch, lift or move utility lines, including communication lines (per OSHA 1910.268 and .269).

Energized tree warning:

The tree that the victim is in may be energized. You must be sure the tree is not energized before proceeding.

Energized truck/equipment warning:

Aerial lifts, any trailed equipment such as chippers, or any other equipment contacting an energized conductor must be considered energized. If equipment is energized, you could be electrocuted. Do not proceed. Do not attempt to access energized equipment.

Step potential may exist around energized outriggers as current dissipates in the ground. This dissipation, or grounding, occurs over a distance due to the natural resistance in the soil. Grounding can also occur around downed energized conductors, around the base of an energized tree, around the base of an energized utility pole, etc.

Electrical shock may occur if you create a path of least resistance. This can be done if your legs or other body parts connect an area of higher voltage with an area of lower voltage. The step potential hazard area is larger in sandy soils and when a good conductor is allowing the current to travel into the ground (such as energized steel outriggers or an energized utility line touching the ground directly).



Serious electrical hazard - do not attempt rescue,
call 911, monitor.



8.1.2 *A second arborist or other worker trained in emergency procedures shall be within visual or voice communication during arboricultural operations above 12 feet (3.65 m) that are not subject to the requirements of subsection 4.2.4.*

You cannot maintain a safety culture and encourage each other to be responsible for safety without good communication. This includes maintaining visual or voice communication.

Subsection 8.4 Rigging

8.4.1 *Arborists performing rigging operations shall inspect trees for their integrity to determine whether the trees have any visible defect that could affect the operation. If it is determined that the tree poses a risk of failure due to the forces and strains that will be created by the design of the rigging operation, an alternate plan shall be used.*

Perform an inspection and discuss the results with the crew before beginning rigging operations. Never be afraid to halt operations, request different equipment or create a new work plan. Having to adjust to actual circumstances on the job is part of everyday tree care operations. Being able to inspect, adjust and communicate with the crew is necessary to avoid accidents.

Annex B, safety training guidelines

B.2.4 Electrical Hazards: *Provide education and training in the recognition and avoidance of electrical hazards applicable to employee job assignments (line clearance or tree care).*

This is not provided by TCIA's ARTP. You can use the TCIA EHAP program to help facilitate electrical hazards training.

B.2.6 Jobsite Briefings: Provide education and training in jobsite-specific hazards associated with the job, work procedures, and practices involved. Instruct employees about special precautions, personal protective clothing, and equipment requirements as applicable to employee job assignments.

Aerial rescue preparedness is part of a job briefing. All crew members should be trained to include this as part of a job briefing.

B.3.2 Emergency Response Procedures: Furnish employees with appropriate information and training necessary to expedite a response to a work site emergency, such as first-aid, CPR, and aerial rescue (see Annex F, Aerial Rescue Flowchart).

TCIA's ARTP is designed to help you gain knowledge and training

needed to respond appropriately during an emergency that may require an aerial rescue. See Chapter 4 in the manual for more information on the aerial rescue flowchart.

Section 4. Tree care industry aerial rescue precautions

Cardinal Rule of Aerial Rescue: The rescuer must not become a victim when conducting an actual or practice aerial rescue.

General Precaution: Use extreme caution. Any method outlined in the TCIA ARTP may result in injury or death to the rescuer and victim. Special precautions must be taken if the tree, victim or equipment is energized due to electrical contact, or the tree or equipment has been damaged in the accident.

First Aid/CPR training: Assessing injuries and the appropriate response is part of first aid/CPR training. TCIA's Aerial Rescue Training Program is not intended to take the place of, or have precedence over, first aid/CPR training or any other recognized first responder training. See Annex A for items that should be stocked in the first aid kit.

Precautions regarding special injuries:

There are a number of circumstances and special types of injuries where you can do more harm than good by moving an injured co-worker. You need to be aware of these types of injuries and what to do when you come across them.

Struck-by/pinning injuries. A struck-by injury caused when a falling or thrown piece of wood, trunk, limb or piece of equipment strikes a person aloft may also pin the victim in the tree. A pinned victim may also have a puncture wound or back and neck injuries.

Rule out impalement or spinal injury prior to attempting extraction or evacuation in a rescue. If vital signs are stable (pulse, breathing, no severe bleeding), you should not move the victim until EMS arrives. The injury may already be stable and immobile. The cause of a puncture may be preventing severe bleeding.

Lowering the victim immediately may make the injury worse, cause severe bleeding, or cause the victim to go into shock.

3.1.4 A job briefing shall be performed by the qualified arborist in charge before the start of each job. The briefing shall be communicated to all affected workers. An employee working alone need not conduct a job briefing. However, the employer shall ensure that the tasks are being performed as if a briefing were required.

Job briefings are tailored to the actual site and job at hand. In addition to a work site hazard assessment and a work plan review, briefings should include:

- ☐ any special work site hazards that may lead to an accident;
- ☐ how the crew is prepared to perform an aerial rescue at the specific work site and/or in a specific tree;
- ☐ the location of the work site (for 911 calls); and,
- ☐ the location of the cell phone, aerial rescue kit, and first aid kit at the work site.

Section 3.3 Emergency Procedures and Readiness

3.3.1 Emergency phone numbers shall be available when and where arboricultural operations are being carried out. Arborists and other workers shall be instructed as to the specific location of such information.

3.3.2 A first-aid kit, adequately stocked and maintained, shall be provided by the employer when and where arboricultural operations are being carried out. Arborists and other workers shall be instructed in its use and specific location.

3.3.4 Employees who may be faced with a rescue decision shall receive training in emergency response and rescue procedures appropriate and applicable to the work to be performed, as well as training to recognize the hazards inherent in rescue efforts (Annex F).

3.3.5 Cardiopulmonary resuscitation (CPR) and first-aid training shall be provided in the absence of an infirmary, clinic, or hospital near the work site.

ANSI Z133 Section 4 Electrical Hazards provides safety standards for working in proximity to electrical hazards. You must read, understand and follow this whole section as well as the whole ANSI Z133 safety standard and your company's safe work rules. Ask your supervisor if you have any questions.

TCIA's Electrical Hazards Awareness Program (EHAP) provides information and a training structure for arborists and arborist trainees. Please refer to that program for specific information and training regarding electrical hazards.

The following are some specific standards from Section 4:

4.1.1 All overhead and underground electrical conductors and all

communication wires and cables shall be considered energized with potentially fatal voltages.

This applies to all circumstances, including emergencies. Do not proceed during emergency situations until you are certain the electrical system has been made safe.

4.1.2 The employer shall certify that each employee has been trained to recognize and is appropriately qualified to work within proximity to electrical hazards that are applicable to the employee's assignment.

Unless you are certified by your employer as a qualified line-clearance arborist or qualified line-clearance arborist trainee, you must maintain the minimum approach distance of 10 feet (or greater for voltages above 50kV) according to ANSI Z133 Table 2.

Even if you are not certified by your employer as a line-clearance arborist (tree trimmer) or trainee, you still must be given documented training to recognize electrical hazards. TCIA's ARTP does not provide you with that training. Employers may use TCIA's EHAP program to help provide that training and as part of employer certification of line-clearance arborists.

4.2.2 An inspection shall be made by a qualified arborist to determine whether an **electrical hazard** exists before climbing, otherwise entering, or performing work in or on a tree.

A critical part of every pre-climb inspection is checking for electrical conductors. Always assume there is a conductor. Many accident reports note that the crew did not realize a distribution line was in the vicinity until contact was made. The workers should not have been there in the first place as they were not qualified line-clearance arborists.

If you do identify an electrical hazard, co-workers must be briefed and ANSI Z133 safety standards, including respecting minimum approach distances, must be followed when proceeding with tree care operations.

Subsection 8.1 Ropes and Arborist Climbing Equipment

8.1.1 A visual hazard assessment, including a root collar inspection, shall be performed prior to climbing, entering, or performing any work in a tree.

Assessing tree hazards requires a great deal of training and experience. Some trees have hidden defects that do not become apparent, even to highly trained and experienced workers, until the tree is in the process of being felled or pruned.

Performing a thorough hazard assessment is key to accident avoidance and aerial rescue preparedness. Report findings to all crew members. If you are unsure of an assessment (regardless of who did it), do not proceed until you have informed your supervisor.

- ☐ failure to adequately inspect or maintain aerial lifts (ANSI Z133)
- ☐ failure to conduct an adequate pre-climbing inspection for tree defects (ANSI Z133);
- ☐ failure to formulate and communicate a clear work plan to co-workers (ANSI Z133);
- ☐ failure to use rigging when needed;
- ☐ failure to determine if the tree could withstand the forces of rigging (ANSI Z133);
- ☐ failure to use appropriate rigging;
- ☐ taking too large a chunk;
- ☐ forming the hinge and/or back cut incorrectly; and/or,
- ☐ no felling plan, improper felling plan or not following the felling plan.

Advances in rigging equipment and techniques have resulted in significant increases in the strength of rigging equipment such as lines, blocks and false crotches. The only part of the system not strengthened is the tree. The tree is now often the weakest point of the system, and if there is a failure it is not a line that snaps but the limb or even the trunk.

Forces generated during rigging operations can be great and have the potential to create serious injuries or death. Struck-by related injuries that occur when rigging fails can lead to the following aerial rescue situations:

- ☐ pinning of a climber by a piece of wood;
- ☐ suffocation of climber due to pinning;
- ☐ incapacitation of a climber;
- ☐ trapping of an aerial lift operator due to boom failure; and/or,
- ☐ incapacitation of an aerial lift operator.

What would you do if a crew member was pinned to a tree?



Dr. Ball goes on to say that, "Since accidents are unplanned but not random, we can take steps to reduce them. They do not have to be accepted as part of the job. These steps start at the top of the company, not at the bottom. When I have company managers come up to me and say the problem is they cannot get their crews to conduct inspections and make work plans, the problem is not entirely with the crew. The problem is the lack of leadership. Everyone who has worked on a tree crew knows when the boss is giving lip service to safety, whereas production (at almost any cost) is the only thing that is truly important.

"The tree care industry does not lack safe practices and equip-

ment; we have made great strides in these areas during the past 50 years. The root cause of many of our accidents is related to unsafe behavior, not tools or techniques, and this is the area that needs to be addressed more in our efforts to improve safety in the industry."

Section 3. Introduction to regulatory requirements and safety standards relating to aerial rescue

Note about company policies: It is your responsibility to know and comply with your company's policies, including all policies that outline emergency response or aerial rescue procedures. If unsure, ask your supervisor.

This is important because:

1. Company policies may include a list of aerial rescue procedures and techniques approved for use at your company; and,
2. TCIA's ARTP presents a broad outline of aerial rescue procedures and techniques that may or may not be approved by your company. It is not intended to limit the methods in which a victim may be reached and lowered.

ANSI Z133 safety standard: Our industry safety standard is the American National Standards Institute (ANSI) Z133 Safety Requirements for Arboricultural Operations. ANSI Z133 safety standards can help you prevent accidents from occurring. To do this, you must follow all ANSI Z133 safety standards, along with your company's safe work rules.

When reading the ANSI Z133 safety standard, remember that the word "shall" denotes a mandatory requirement and the word "should" denotes a recommendation. In general, recommendations should be followed – they are not optional. There are situations where it may be inappropriate or less safe to follow the recommendation. For example: It is too late to attach a pull line in a tree after the notch is already made.

ANSI Z133 safety standards are included in the ARTP test.

The following are some ANSI Z133 safety standards that apply directly to aerial rescue preparedness, training and avoidance:

1.4 Responsibilities of the Employee: *Each person (employee or otherwise) shall be responsible for his or her own safety while on the job site and shall comply with the appropriate federal or state occupational safety and health standards and all rules, regulations, and orders that are applicable to his or her own actions and conduct.*

You are responsible for your safety. This is a basic safety concept. You must also help co-workers take responsibility for their safety. The whole crew must take responsibility for the safety of each crew member.



Almost all electrical contact fatalities and serious non-fatal injuries happen when:

- ☐ A tree worker touches the power line with either the back, shoulders or hand (direct contact);
- ☐ A tree worker cuts a branch that contacts the line while the arborist is still holding the branch (indirect contact) and suffers electrical shock and burns;
- ☐ A tree worker touches energized equipment that is in contact with conductors (indirect contact);
- ☐ A few are due to a fall that results from muscle contractions caused by electrical contact.

Most electrocutions occur to tree workers, not qualified line-clearance arborists. In other words, the people who don't normally do this work are more likely to be electrocuted.

The sequence of events

Dr. John Ball of South Dakota State University has done a great deal of research quantifying accidents in the tree care profession. The following is Dr. Ball's review of the sequences of events that often lead to an aerial rescue.

According to Dr. Ball, "This is something that I became interested in around 1999, because, unfortunately, it was too common for arborists to know somebody personally who was seriously injured or died while performing tree work. There are not too many professions that you can say that about. The tree care profession has a fatality rate that is at least 10 times the national all-industry average, an unenviable ranking that is only exceeded by a few other high-risk professions, such as logging and commercial fisheries. The fatalities are not highly visible, since tree workers tend to be seriously injured or die as individuals on a job site, not in a group, which tends to attract the news.

Looking at the risk this way, the odds of having a fatal accident in any given year for construction workers is about one in 10,000. For police it is about one in 8,200, firefighters about one in 6,500. How about for tree workers? It is about one in 3,000. This makes tree work one of the highest risk occupations in any community and for any city department.

According to OSHA, there were more than 120 tree and landscape fatalities in 2004. That is probably less than one-third the actual number of fatalities, as OSHA has a hard time tracking accidents that occur in small companies and to sole proprietors. Our non-fatal injuries – burns, concussions, fractures, lacerations, punctures, sprains – far exceed our fatalities and, of course, this is the focus of aerial rescue. Fatalities do not involve rescues but recoveries.

The greatest correlation is in regard to age; the older the worker, the more likely a serious accident. It is not that they are less agile or complacent, though these can be factors. The most important factor may be that the arborist has had longer exposure to this high-risk environment. They have rolled the dice every year and one year they come up snake eyes. This is not meant to imply that

the oldest worker has the most accidents – many accidents occur to the new person, one with less than one year of employment with the company. The "newbie" will have the most non-fatal injuries (cuts and nicks), and they sometimes make the mistake that results in the veteran's death. The point here is for the older arborist never to assume that their longevity is assured and that they can let their guard down.

We also try to explain the accidents we hear about by saying that's the other guy. The typical tree care accident does not occur to workers because they were stupid, clumsy or any other excuse. For the most part, they are just workers who made some serious mistakes, ones we are all capable of making. Calling the victims names is a way to separate them from us, but that also keeps us from investing the time to figure out why the accident occurred in the first place.'

When does an accident occur? I shake my head every time I hear a company owner or manager say to me, 'We don't need any safety talks and we don't need a safety person because we are not planning on having an accident.'

Must be nice, but an accident by definition is an unplanned event. Unplanned does not mean random, however. A frequent response by a worker who had a close call is, 'I have done it this way thousands of times without a problem.'

Not exactly. An accident occurs when a series of mistakes are made in a proper sequence. This is an important point. When we start looking at accidents to determine why they occurred, usually it is not one mistake or even two but several mistakes all made in a critical sequence. Accidents are like dominos; everything has to be set up just right (or perhaps wrong is a better word) to happen."

Some specific common accidents in this industry that may lead to an aerial rescue are:

- ☐ a climber being struck by, and/or pinned by, a piece of a tree;
- ☐ a climber or aerial lift operator being seriously cut by a chain saw, pole saw, or hand saw;
- ☐ an aerial lift operator experiencing equipment failure due to struck-by/tree failure;
- ☐ an aerial lift operator experiencing actual equipment failure;
- ☐ a climber or aerial lift operator being shocked; and,
- ☐ a climber taking an uncontrolled swing or partial fall into a branch or trunk.

All of these accidents are preventable.

Accidents of this type often occur due to:

- ☐ failure to conduct an adequate inspection of a site for electrical hazards (ANSI Z133);

Chapter One – Introduction to Tree Care Industry Aerial Rescue Concepts

Section 1. Introduction to aerial rescue and this training program

An aerial emergency situation could develop any time you and your crew are performing tree care operations aloft. You or your co-workers will need to determine, in a deliberate manner, if performing an aerial rescue is possible. You then may need to perform an aerial rescue.

Making the determination if an aerial rescue should be performed is key. The most common reason for double fatalities in our industry is failed rescue attempts.

This DVD and workbook training program, in combination with on-the-job training and practice, is designed to give you the knowledge needed to evaluate an emergency situation and possibly rescue an injured tree worker.

This DVD and workbook training program is also designed to meet industry training requirements for aerial rescue – **ANSI Z133** – which states: *Employees who may be faced with a rescue decision shall receive training in emergency response and rescue procedures appropriate and applicable to the work to be performed, as well as training to recognize the hazards inherent in rescue efforts (Annex F).*

This program is also designed to help you meet the OSHA 1910.269 requirements for training in appropriate emergency procedures when qualifying line clearance arborists.

Section 2. Introduction to sequences of events that may lead to an aerial emergency

An accident occurs when a series of mistakes are made in an unfortunate sequence. Accidents are like dominos; everything has to be set up in a sequence in order to happen.

This also means that prevention of an accident at any point – in other words removing any one of the dominos – can prevent the accident from happening.

Example: A climber falls due to cutting climbing line with chain saw. This accident is not caused by just the one act of cutting a climbing line. Here is a possible sequence of events that combined to cause the accident:

1. Company owner and/or climber not aware of ANSI Z133 safety standards regarding chain saw use while aloft.
2. Climber not trained to use two forms of attachment when using a chain saw aloft.
3. Safety standard not enforced by company and/or safety culture at company does not encourage employees to correct and/or help each other.

4. Climber decides to use chain saw instead of hand saw.
5. Climber does not secure with second form of attachment before using chain saw.
6. Climber does not reposition to clear lines from cutting area and/or does not get into a good cutting position.
7. Climber does not communicate with ground crew before cutting (ground crew may have alerted climber about climbing line location).
8. Climber cuts climbing line.

This is just one example, you can easily create your own sequence of events.

Contact fatalities and non-fatal serious accidents

Contact with an object – sometimes referred to as a “struck-by” – accounts for the majority of accidents in our profession. The most common object arborists have contact with is a falling branch or section of the tree. A mature tree can have a weight of 20,000 tons or more and its impact can easily crush a car; a worker is even more vulnerable.



Electrical contact fatalities

Electrical contact is another leading cause of aerial accidents, and the usual outcome of this type of accident is a fatality, a point that must be considered when attempting a rescue. Is the victim still alive or will this be a recovery?

One of the most common reasons arborists are killed or injured by electrical contact is that they did not know the power line was in the work zone. The work zone is often thought of as a two dimensional area beneath the tree but it is really three dimensions and includes the aerial environment surrounding and within the tree's crown.



Note to Employer or Company Trainer

Keep your workers motivated and trained by giving them an industry credential. This will help you verify, according to OSHA guidelines, that you have given safety training to all your employees. The program helps you document training as well as identify and retain motivated employees. The program helps employees feel they are part of an important industry with a career path. This course is open to all tree care company employees. It is recommended that enrollees already hold a Ground Operations, Tree Climber and/or Aerial Lift Specialist certificate. Use of Aerial Rescue Training Program as part of the TCIA Tree Care Academy also meets the TCIA Accreditation standard.

How to use this program

- 1 Classroom Training.** Provide training by having the employee read this Aerial Rescue Training Program manual and watch the Aerial Rescue DVD.
- 2 On-the-Job Training (OJT).** Follow up classroom training with on-the-job training and perform a work-site visit to verify that the employee can demonstrate competency during actual tree care operations.
- 3 Employee Competency Certification Checklist.** Use the checklist on page 27 of this manual to document the employee's competency. Keep a copy for your office training records.
- 4 Aerial Rescue Training Program Tests.** Have the employee take the chapter tests at the end of each chapter, using the answer sheet provided on page 28.
- 5 Mail-in.** Send both the original Aerial Rescue Training Program chapter test answer sheet and the Employer Certification Checklist to TCIA for processing; keep a copy for your own records.

**Call TCIA at 1-800-733-2622 or visit
www.tcia.org for more information**

**Each Aerial Rescue Training Program Manual
is for an individual enrollment.**

The enrollment fee for each employee covers:

- Aerial Rescue Training Program manual
- Aerial Rescue Training Program chapter tests (included)
- Test correction and checklist verification by TCIA
- One test retake after a failing grade
- Transcript storage in TCIA database
- Helmet decal, certificate and wallet card upon completion

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This program is designed according to ANSI/ASTM E2659 standards for certificate programs to help employers and employees meet ANSI Z133 Arboricultural Safety standards and employer-certification and permitting requirements.

Table of Contents

Chapter One

Intro to Tree Care Industry Aerial Rescue Concepts	2
1. Intro to Aerial Rescue Training Program	2
2. Intro to sequences of events that may lead to an aerial emergency	2
3. Intro to regulatory requirements and safety standards	4
4. Tree care industry aerial rescue precautions	6
Chapter One Test	10

Chapter Two

Aerial Rescue Preparedness	11
1. Intro to aerial rescue emergency preparedness	11
2. Techniques for aerial rescue preparedness in tree care	11
Chapter Two Test	13

Chapter Three

Aerial Rescue Techniques	14
1. Tree care industry aerial rescue techniques	14
2. Practicing aerial rescues	17
Chapter Three Test	18

Chapter Four

Aerial Rescue Protocol	20
1. Intro to the industry aerial rescue protocol	20
2. Implementing the aerial rescue protocol in various emergency scenarios	22
Chapter Four Test	22

Chapter Five

Working with EMS in Real World Situations	23
1. Intro to EMS concepts and constraints	23
2. Communicating with your local EMS before critical events occur	23
3. Working with local EMS in emergency situations	23
Chapter Five Test	24

Annex A

Recommended First Aid Kit Contents	25
------------------------------------	----

Credits	25
---------	----

Annex B

Aerial Rescue Flowchart	26
-------------------------	----

On-the-Job Employee Competency Certification Checklist & Test	27
---	----

Chapter Tests Answer Sheet	28
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Training Program Manual

TREE CARE INDUSTRY ASSOCIATION



Aerial Rescue Training Program™

Student name _____

Company name _____



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ESTABLISHED 1938