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Regulatory
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Proposed Regulation Agency Background Document

Agency name	Virginia Department of Labor and Industry
Virginia Administrative Code (VAC) citation	16 VAC 25 – 73
Regulation title	Regulation Applicable to Tree Trimming Operations
Action title	Proposed regulation to adopt regulations applicable to Tree Trimming Operations
Date this document prepared	July 28, 2008

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 21 (2002) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual*.

Brief summary

In a short paragraph, please summarize all substantive changes that are being proposed in this regulatory action.

The VOSH Program seeks to adopt regulations applicable to Tree Trimming Operations. The proposed regulation is based on the American National Standard’s Institute (ANSI) Z133.1-2006, Safety Requirements for Arboricultural Operations (With Modifications), for Application to Tree Trimming Operations. The proposal addresses non-logging, tree-trimming and cutting operations on residential and commercial work sites. The proposed regulation based on ANSI-Z133.1-2006 contains components such as general safety requirements (traffic control around the jobsite, emergency procedures and readiness, personal protective equipment, fire protection); electrical hazards; safe use of vehicles and mobile equipment used in arboriculture portable power hand tools; hand tools and ladders; work procedures (ropes and arborist climbing equipment, pruning and trimming, cabling, rigging, tree removal, bush removal and chipping, limbing and bucking, pesticide application); and training.

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including (1) the most relevant law and/or regulation, including Code of Virginia citation and General Assembly

chapter number(s), if applicable, and (2) promulgating entity, i.e., the agency, board, or person. Describe the legal authority and the extent to which the authority is mandatory or discretionary.

The Safety and Health Codes Board is authorized by Title 40.1-22(5) to: “... adopt, alter, amend, or repeal rules and regulations to further, protect and promote the safety and health of employees in places of employment over which it has jurisdiction and to effect compliance with the federal OSH Act of 1970...as may be necessary to carry out its functions established under this title”.

“In making such rules and regulations to protect the occupational safety and health of employees, the Board shall adopt the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence that no employee will suffer material impairment of health or functional capacity”.

“However, such standards shall be at least as stringent as the standards promulgated by the federal OSH Act of 1970 (P.L.91-596). In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations shall be the latest available scientific data in the field, the feasibility of the standards, and experiences gained under this and other health and safety laws.”

Purpose

Please explain the need for the new or amended regulation by (1) detailing the specific reasons why this regulatory action is essential to protect the health, safety, or welfare of citizens, and (2) discussing the goals of the proposal, the environmental benefits, and the problems the proposal is intended to solve.

The purpose of the proposed change is to reduce/eliminate employee injuries and fatalities by considering for adoption a comprehensive regulation to address non-logging, arborist/tree trimming and cutting operations on residential and commercial work sites.

Substance

Please briefly identify and explain the new substantive provisions, the substantive changes to existing sections, or both where appropriate. (More detail about these changes is requested in the “Detail of changes” section.)

The proposed regulation is based on the American National Standard’s Institute (ANSI) Z133.1-2006, Safety Requirements for Arboricultural Operations (With Modifications), for Application to Tree Trimming Operations. The proposal addresses non-logging, tree-trimming and cutting operations on residential and commercial work sites.

The proposed regulation contains the following components:

- General safety requirements (traffic control around the jobsite, emergency procedures and readiness, personal protective equipment, fire protection);
- Electrical hazards (working in proximity to electrical hazards, storm work and emergency conditions, line clearance);

- Safe use of vehicles and mobile equipment used in arboriculture (aerial devices, brush chippers, sprayers and related equipment, stump cutters, vehicles, log loaders, knucklebooms, cranes and related hoists, specialized units, equipment-mounted winches);
- Portable power hand tools (portable electric power tools, chain saws, powered pole tools and backpack power units);
- Hand tools and ladders (cant hooks, cant dogs, peaveys and tongs, wedges, chisels, gouges, chopping tools, ladders);
- Work procedures (ropes and arborist climbing equipment, pruning and trimming, cabling, rigging, tree removal, bush removal and chipping, limbing and bucking, pesticide application); and
- Training.

The following issues have been addressed in recommended changes to the original text for ANSI Z133.1-2006:

- Clarification is provided with regard to the following areas:
 - Line clearance tree-trimming (see 16VAC25-90-1910.269), and the Overhead High Voltage Line Safety Act, Va. Code §§59.1-406 to -414
 - Logging operations (see 1910.266)
 - Lot clearing activities involving felling of trees (see 16VAC25-90-1910.266)
- The original text contained “should” or “may” language in some provisions, which are unenforceable from a compliance standpoint. Prescriptive language such as “shall” or “will” was added, as appropriate.
- VOSH currently enforces Administrative Regulations Manual (ARM) §120 (16VAC25-60-120) requiring that employers comply with manufacturer’s specifications and limitations applicable to the operation, training, use, installation, inspection, testing, repair and maintenance of machinery, vehicles, tools, materials and equipment. ANSI Z133.1-2006 contains provisions that address the use and operation of machinery, vehicles, tools, etc., so any conflicts with ARM §120 (16VAC25-60-120) have been corrected (e.g., ANSI Z133.1-2006 contains provisions allowing the use of a crane to lift an individual in an arborist’s saddle, but the ability to make such a lift would be contingent on the crane manufacturer’s operating instructions).
- The original text contains provisions addressing traffic safety and references the U. S. Department of Transportation (DOT) Manual on Uniform Traffic Control Devices (MUTCD) and applicable state and local laws and regulations. Although the MUTCD has been adopted by OSHA and VOSH, it has been found to contain

a great deal of “should” or “may” language, which means those provisions are not enforceable in a compliance setting. In its stead, the Virginia Department of Transportation (VDOT) Manual on Uniform Traffic Control Devices has been substituted as it contains fewer “shoulds” and “mays”.

- The original text contains provisions addressing first aid and cardiopulmonary resuscitation (CPR). The Board’s current rulemaking which proposes a change in the general industry requirements for first aid/CPR is incorporated by reference.
- The original text addresses the issue of exposure to noise hazards. Reference is made in the proposal to requirements contained in the VOSH Noise Standard, 16VAC25-90-1910.95.
- The original text addresses the use of personal protective equipment (PPE). Reference is made in the proposal to requirements contained in the VOSH PPE Standards, 16VAC25-90-1910.132 through 138.
- The original text contains provisions addressing reverse signal operation of vehicles. The Board’s current rulemaking which proposes a change in the general industry requirements for reverse signal operation of vehicles is incorporated by reference.
- The original text contains provisions addressing proper use of personal fall arrest systems while working from an aerial lift (permits use of either a full body harness and lanyard or a body belt and lanyard). In light of advances in PPE and current manufacturer’s requirements for use of PPE in aerial lifts (full body harness and energy absorbing lanyard are normally required while working from aerial lifts), the option to allow an employee to use a body belt and lanyard in an aerial lift has been removed.
- The original text addresses the use of cranes. In light of certain requirements contained in VOSH Standards 16VAC25-90-1910.180, Crawler, Locomotive and Truck Cranes, and 16VAC25-90-1910.184, Slings, certain additions have been made (e.g. the prohibition against employees working under a suspended load of a crane).
- Certain arborist-related terms used in the original text were not defined in (e.g., “split-tail system” and “split tails”). Definitions have been added.

Issues

Please identify the issues associated with the proposed regulatory action, including:

- 1) the primary advantages and disadvantages to the public, such as individual private citizens or businesses, of implementing the new or amended provisions;*
- 2) the primary advantages and disadvantages to the agency or the Commonwealth; and*
- 3) other pertinent matters of interest to the regulated community, government officials, and the public.*

If the regulatory action poses no disadvantages to the public or the Commonwealth, please so indicate.

VOSH currently applies the Logging Standard, 16VAC25-90-1910.266, to arborists/tree trimming operations anytime a tree is “felled,” or cut down. The Logging Standard does not apply to tree trimming activities where the tree is not felled or cut down, so there is no specific regulation to address hazards associated with just trimming trees.

In instances where the Logging Standard does not apply, VOSH has had to use regulations of general application to address some hazards (e.g., 16VAC25-90-1910.95, Occupational Noise Exposure; 16VAC25-90-1910.132, Personal protective equipment; 16VAC25-90-1910.133, Eye and face protection; 16VAC25-90-1910.135, Head Protection; 16VAC25-90-1910.136, Foot protection; 16VAC25-90-1910.151, Medical services and first aid; 16VAC25-90-1910.67, Vehicle-mounted elevating and rotating work platforms; etc.), and the “general duty clause,” Va. Code §40.1-51.1(a), which provides that:

“It shall be the duty of every employer to furnish to each of his employees safe employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees....”

As is evident from the wording of the statute, it does not address in anyway the issue of hazards associated with tree trimming operations. Instead VOSH procedures and court case law would allow the VOSH Program to issue a general duty violation and base it on a national consensus standard addressing tree trimming hazards (such as the ANSI Z133.1-2006 standard), or some other reliable industry standard the tree trimmer knew of or should have known about. While preferable to no enforcement tool at all, the general duty clause does not provide either the regulated community, employees or the VOSH Program with substantive and consistent procedures and guidance on how to reduce or eliminate tree trimming hazards. Other problems with the use of the general duty clause include the inability to use it to enforce and consensus standard provisions which use “should” or “may” language, and the inability to cite other-than-serious violations.

The arborist industry has complained at times about application of the Logging Standard to their industry because they work in residential neighborhoods and commercial areas, not in a forest; and because they often use teams of workers in directional felling of trees (with the use of ropes) and “piecing out” of trees or cutting down trees in sections (loggers usually do not operate in teams or piece out trees). They consider their work and the hazards they face to be fundamentally different from hazards faced by loggers.

The need for the regulation is very evident when fatality statistics are reviewed. As the chart below demonstrates, since 1993 we have had 46 non-logging, tree trimming/cutting/felling fatalities (7% of all fatalities since 1993), with 34 of those occurring since 2000 (9% of all fatalities since 2000). For an industry of the relatively small size of the tree care industry, this is a very high number of fatal accidents.

Virginia Occupational Safety and Health
Tree-Related Fatality Statistics (Non-Logging) as of September 28, 2007

Year	Chipper	Tree Trimming	Aerial Lift	Power Line	Struck-by Vehicle	Site Clearance	Total	Total VOSH Fatalities	Percentage of Tree Fatalities
2007		2					2	30	7%
2006		4		3	1		8	56	14%
2005		1			1		2	59	3%
2004		2		1		1	4	51	8%
2003		4		1			5	47	11%
2002		4					4	48	8%
2001		4			2		6	54	11%
2000		1		2			3	59	5%
subtotal		22	0	7	4	1	34	404	8%
1999		2					2	45	4%
1998				2			2	40	5%
1997	1	1	1			1	4	56	7%
1996		2					2	49	4%
1995							0	32	0%
1994						1	1	50	0%
1993				1			1	26	4%
subtotal	1	5	1	3	0	2	12	298	4%
Total	1	27	1	10	4	3	46	702	7%

SIC Codes: 0782, 0783, 0191, 1623, 1629 and 2411

NOTE: Logging fatalities are not included in the above table.

Employers should benefit from reductions in injuries and fatalities associated with current unsafe tree trimming practices which would be addressed by any comprehensive regulation. On average over the last 15 years there are three (3) fatal tree trimming accidents that occur per year which could be prevented if the proposed regulation is fully complied with.

Employers with employees in the affected industry would have to familiarize themselves with the requirements of any new regulation and train employees on the requirements of the regulation. As the proposed regulation is based on a national consensus standard (ANSI Z-133.1-2006) originally developed by industry representatives and currently followed by many affected employers, the cost impact of the proposed regulation on affected employers should be significantly less than would be imposed by a completely new regulation.

Employees would benefit from increased safety protections provided by a comprehensive regulation to address hazards of arborist/tree trimming and cutting operations on residential and commercial work sites. Employees in the affected industry would have to be trained on the requirements of any new regulation.

Department personnel will have to be trained in the requirements of any new regulation. The Department plans to develop a standardized training program for employers that can be placed on the Department's website for easy access by employers. No significant financial impact is anticipated for the Department.

Requirements more restrictive than federal

Please identify and describe any requirement of the proposal which are more restrictive than applicable federal requirements. Include a rationale for the need for the more restrictive requirements. If there are no applicable federal requirements or no requirements that exceed applicable federal requirements, include a statement to that effect.

There are no comparable Federal OSHA requirements.

Localities particularly affected

Please identify any locality particularly affected by the proposed regulation. Locality particularly affected means any locality which bears any identified disproportionate material impact which would not be experienced by other localities.

There are no localities particular affected by this proposed regulation.

Public participation

Please include a statement that in addition to any other comments on the proposal, the agency is seeking comments on the costs and benefits of the proposal and the impacts of the regulated community.

In addition to any other comments, the board/agency is seeking comments on the costs and benefits of the proposal and the potential impacts of this regulatory proposal. Also, the agency/board is seeking information on impacts on small businesses as defined in § 2.2-4007.1 of the Code of Virginia. Information may include 1) projected reporting, recordkeeping and other administrative costs, 2) probable effect of the regulation on affected small businesses, and 3) description of less intrusive or costly alternative methods of achieving the purpose of the regulation.

Anyone wishing to submit written comments may do so by mail, email or fax to Mr. Jay Withrow, Director of the Division of Legal Support, Virginia Department of Labor and Industry, Powers-Taylor Building, 13 South Thirteenth Street, Richmond, VA 23219; telephone no.: (804)

786-9873; fax no.: (804) 786-8418; email address: jay.withrow@doli.virginia.gov Written comments must include the name and address of the commenter. In order to be considered, comments must be received by the last date of the public comment period.

[The following paragraph is optional:]

A public hearing will be held and notice of the public hearing may appear on the Virginia Regulatory Town Hall website (www.townhall.virginia.gov) and can be found in the Calendar of Events section of the Virginia Register of Regulations. Both oral and written comments may be submitted at that time.

Economic impact

Please identify the anticipated economic impact of the proposed regulation.

<p>Projected cost to the state to implement and enforce the proposed regulation, including (a) fund source / fund detail, and (b) a delineation of one-time versus on-going expenditures</p>	<p>No significant financial impact is anticipated for the Department. Department personnel will have to be trained in the requirements of any new regulation. The Department plans to develop a standardized training program for employers that can be placed on the Department’s website for easy access by employers.</p>
<p>Projected cost of the regulation on localities</p>	<p>Some localities employ arborists and other employees that engage in tree trimming operations or contract with private contractors that engage in tree trimming operations. Covered employees of localities will have to be trained in the requirements of any new regulation.</p> <p>According to an annual wage and benefit survey of its private sector members conducted in October, 2007, the Tree Care Industry Association (TCIA) indicates that a trainee’s pay can range from \$10.50/hr to \$21.50/hr. A median hourly wage is about \$17/hr. One must consider that the “statutory cost” – the hourly cost of an employee once all taxes and benefits are considered – is about 1.7 times the hourly wage.</p> <p>The orientation of new hires is estimated to take from six to eight hours, and training on standard compliance would be incorporated into this training. However, since new employee orientation would be carried out regardless, the additional cost of training in this standard should be very minor. It is worth noting that neither of these costs is substantially higher than what a company should be spending prior to this proposed law, if the company was already training according to the Z133 Standard.</p> <p>The most significant cost associated with compliance is the "practical" or "field" training, typically a series of training events and corrections until employees are able to transfer new knowledge to safe, compliant behaviors. Our members’ experience is that new employees trained</p>

	<p>properly from the beginning require much less oversight (for compliance) than seasoned employees who have been using older techniques and are more resistant to change.</p> <p>With all forms of training considered, our estimation for compliance is roughly <i>10 hours for a trained worker</i> and <i>40 hours for an untrained worker</i>.</p> <p>We assume that the cost of providing the training materials in any case would be negligible, since the standard and other training materials can be found in the public domain. Using the median pay rate of \$17.00 per hour and a statutory cost of 1.7, the cost of compliance for this standard is about <i>\$289.00 per trained worker</i> and <i>\$1,156.00 per untrained worker</i>. These are direct costs. The “opportunity cost” of missed billing would range between \$1,000.00 and \$3,000.00 per person, respectively.”</p> <p>The Department plans to develop a standardized training program for employers that can be placed on the Department’s website for easy access by local government employers, which should reduce the implementation and training costs for employers.</p>
<p>Description of the individuals, businesses or other entities likely to be affected by the regulation</p>	<p>Tree trimming employers are categorized under NAICS (North American Industry Classification System) code 561730, Landscaping Services</p>
<p>Agency’s best estimate of the number of such entities that will be affected. Please include an estimate of the number of small businesses affected. Small business means a business entity, including its affiliates, that (i) is independently owned and operated and (ii) employs fewer than 500 full-time employees or has gross annual sales of less than \$6 million.</p>	<p>According to the Virginia Employment Commission (VEC), there were 2,615 employers and 23,673 employees in NAICS 561730 in the Third Quarter of 2007. However, the actual number of employers affected by the proposed regulation should be considered to be significantly smaller. According to the audited circulation of Tree Care Industry (TCI) Magazine and the database for InfoUSA, the leading provider of business and consumer information products, the estimated size of the affected industry in Virginia is between 570 and 840 employers, and between 1,700 and 3,400 employees.</p>
<p>All projected costs of the regulation for affected individuals, businesses, or other entities. Please be specific. Be sure to include the projected reporting, recordkeeping, and other administrative costs required for compliance by small businesses.</p>	<p>According to an annual wage and benefit survey of its members conducted in October, 2007, the Tree Care Industry Association (TCIA) indicates that a trainee’s pay can range from \$10.50/hr to \$21.50/hr. A median hourly wage is about \$17/hr. One must consider that the “statutory cost” – the hourly cost of an employee once all taxes and benefits are considered – is about 1.7 times the hourly wage.</p> <p>The orientation of new hires is estimated to take from six to eight hours, and training on standard compliance would be incorporated into this training. However, since new employee orientation would be carried out regardless, the additional cost of training in this standard should be very minor. It is worth noting that neither of these costs is substantially higher than</p>

	<p>what a company should be spending prior to this proposed law, if the company was already training according to the Z133 Standard.</p> <p>The most significant cost associated with compliance is the "practical" or "field" training, typically a series of training events and corrections until employees are able to transfer new knowledge to safe, compliant behaviors. Our members' experience is that new employees trained properly from the beginning require much less oversight (for compliance) than seasoned employees who have been using older techniques and are more resistant to change.</p> <p>With all forms of training considered, our estimation for compliance is roughly <i>10 hours for a trained worker and 40 hours for an untrained worker.</i></p> <p>We assume that the cost of providing the training materials in any case would be negligible, since the standard and other training materials can be found in the public domain. Using the median pay rate of \$17.00 per hour and a statutory cost of 1.7, the cost of compliance for this standard is about <i>\$289.00 per trained worker and \$1,156.00 per untrained worker.</i> These are direct costs. The "opportunity cost" of missed billing would range between \$1,000.00 and \$3,000.00 per person, respectively."</p> <p>The Department plans to develop a standardized training program for employers that can be placed on the Department's website for easy access by employers, which should reduce the implementation and training costs for employers.</p>
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Alternatives

Please describe any viable alternatives to the proposal considered and the rationale used by the agency to select the least burdensome or intrusive alternative that meets the essential purpose of the action. Also, include discussion of less intrusive or less costly alternatives for small businesses, as defined in §2.2-4007.1 of the Code of Virginia, of achieving the purpose of the regulation.

Other than maintaining the current status quo of enforcing the Logging Standard when trees are felled and using a patchwork of other VOSH regulations to cover the hazards associated with tree trimming (see Regulatory Flexibility Analysis section below), there are no viable alternatives to the proposed regulation. There are no comprehensive national or state tree trimming regulations that could be used as a basis for a VOSH regulation.

The arborist industry has complained at times about application of the Logging Standard to their industry because they work in residential neighborhoods and commercial areas, not in a forest; and because they often use teams of workers in directional felling of trees (with the use of ropes) and "piecing out" of trees or cutting down trees in sections (loggers usually do not operate in

teams or piece out trees). They consider their work and the hazards they face to be fundamentally different from hazards faced by loggers.

The Tree Care Industry Association (TCIA) repeatedly petitioned federal OSHA and even obtained a bipartisan, bi-cameral letter of support from Congress to adopt a separate “arborist standard” based upon ANSI Z133 because the existing OSHA standards used to regulate this industry are insufficient and confusing to understand. The TCIA also contacted VOSH directly about a Tree Trimming regulation based on ANSI Z133.1. It is the opinion of the TCIA that logging and tree care are two separate professions, and while some of the equipment and methods used are similar, most equipment and methods used are quite different, and that an arborist standard would be “in the best interest of this industry.”

Regulatory flexibility analysis

Please describe the agency’s analysis of alternative regulatory methods, consistent with health, safety, environmental, and economic welfare, that will accomplish the objectives of applicable law while minimizing the adverse impact on small business. Alternative regulatory methods include, at a minimum: 1) the establishment of less stringent compliance or reporting requirements; 2) the establishment of less stringent schedules or deadlines for compliance or reporting requirements; 3) the consolidation or simplification of compliance or reporting requirements; 4) the establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and 5) the exemption of small businesses from all or any part of the requirements contained in the proposed regulation.

VOSH currently applies the Logging Standard, 1910.266, to arborists/tree trimming operations anytime a tree is “felled,” or cut down, however, the Logging Standard does not apply to tree trimming activities where the tree is not felled or cut down, so there is no specific regulation to address hazards associated with just trimming trees.

In instances where the Logging Standard does not apply, VOSH has had to use regulations of general application to address some hazards (e.g., 1910.95, Occupational Noise Exposure; 1910.132, Personal protective equipment; 1910.133, Eye and face protection; 1910.135, Head Protection; 1910.136, Foot protection; 1910.151, Medical services and first aid; 1910.67, Vehicle-mounted elevating and rotating work platforms; etc.), and the “general duty clause,” Va. Code §40.1-51.1(a), which provides that:

“It shall be the duty of every employer to furnish to each of his employees safe employment and a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees....”

As is evident from the wording of the statute, it does not address in anyway the issue of hazards associated with tree trimming operations. Instead, VOSH procedures and court case law would allow the VOSH Program to issue a general duty violation and base it on a national consensus standard addressing tree trimming hazards (such as the ANSI Z133.1-2006 standard), or some other reliable industry standard the tree trimmer knew of or should have known about. While preferable to no enforcement tool at all, the general duty clause does not provide either the regulated community, employees or the VOSH Program with substantive and consistent procedures and guidance on how to reduce or eliminate tree trimming hazards. Other problems with the use of the general duty clause include the inability to use it to enforce and consensus standard provisions which use “should” or “may” language, and the inability to cite other-than-

serious violations.

The arborist industry has complained at times about application of the Logging Standard to their industry because they work in residential neighborhoods and commercial areas, not in a forest; and because they often use teams of workers in directional felling of trees (with the use of ropes) and “piecing out” of trees or cutting down trees in sections (loggers usually do not operate in teams or piece out trees). It is the opinion of the TCIA that logging and tree care are two separate professions, and while some of the equipment and methods used are similar, most equipment and methods used are quite different, and that an arborist standard would be “in the best interest of this industry.”

Public comment

Please summarize all comments received during public comment period following the publication of the NOIRA, and provide the agency response.

Commenter	Comment	Agency response
<p>Cynthia Mills, CAE, CMC, President and CEO of the Tree Care Industry Association (TCIA)</p>	<p>“The Tree Care Industry Association (TCIA) enthusiastically supports the above-captioned proposal. We believe that substantive and consistent procedures and guidance on how to reduce or eliminate tree trimming hazards are long overdue.</p> <p>TCIA, formerly the National Arborist Association, is a 70-year-old trade association whose members are companies engaged in arboriculture (tree care), tree trimming and removal, utility vegetation management, landscape maintenance and related activities. We presently represent 69 companies headquartered in the Commonwealth, and at least one dozen other companies doing business there.</p> <p>As you may know, TCIA has repeatedly petitioned federal OSHA, and even obtained a bipartisan, bi-cameral letter of support from Congress, to adopt a separate “arborist standard” based upon ANSI Z133. We have done so because we believe that the existing patchwork of OSHA standards used to regulate our industry is insufficient and confusing to understand. We have also expressed our concerns directly to you regarding VOSH’s application of “Logging Standard” to tree care operations. While this standard may appear at first to be on point, the reality is that logging and tree care are two separate professions, and while some of the equipment and methods are similar, most equipment and methods used are quite different. Therefore, we feel that an</p>	<p>The VOSH Program welcomes the support and involvement of the TCIA in the promulgation of a regulation to address the unique work practices and hazards found in the tree trimming industry. While the VOSH Program has applied the Logging Standard to tree trimming activities any time a tree was “felled” as that term is defined in the Logging Standard, it agrees with the TCIA that the operations of the two industries are significantly different in certain areas and warrant separate regulatory approaches.</p> <p>VOSH is aware of the specific concerns raised about the Logging Standard (foot protection, eye protection, first aid kits, two tree length separation), use of a crane to lift employees into a tree (as a last resort), and fall protection in aerial lifts and these issues are addressed in the proposed regulatory text.</p> <p>The Department held a meeting on June 10, 2008, with interested parties from the tree trimming industry. The following individuals attended:</p> <p>Peter Gerstenberger, Senior Advisor for Safety, Compliance & Standards Tree Care Industry Association (TCIA) Bryan Giere, CTSP, Northern Virginia Tree Experts, Inc. Andrew T. Ross, CTSP, President, RTEC Treecare Sten Compe, Big "O" Tree & Lawn Service Inc. M. Scott Turner, CTSP, President, TrueTimber</p>

	<p>“Arborist Standard” is in the best interest for our industry.</p> <p>To begin this process, we would like to point out three main areas requiring clarification:</p> <p>1. We believe that ANSI Z133 provides more effective, more appropriate guidance on arborist tree felling activities than the Logging Standard. We have complained on behalf of the arborist industry about OSHA’s application of the Logging Standard to our members because it is a perfect example of a poorly-fitted standard, never intended for our industry, that provides less than effective protections for our workers. As we have asserted in the past, the scope of our work, the hazards we face and the measures we use to mitigate those hazards are fundamentally different from logging. Here are some key issues:</p> <ul style="list-style-type: none"> • 1910.266(d)(1)(v) requires the employer to assure that each employee who operates a chain saw wears foot protection that is constructed with cut-resistant material. In contrast, the Z-133 requires footwear appropriate for the job. The biggest conflict here is in the fact that the type of footwear designed for tree climbing is a more flexible shoe with different safety features. Conversely, boots designed for logging are heavier and balanced differently, and often lead to foot and ankle injuries while climbing. • Note to 1910.266(d)(1)(vii) says that the employee does not have to wear separate eye protection where face protection covering both the eyes and face is worn. By contrast, the Z133 Standard requires separate eye protection for all arborist activities, and full face protection only if warranted. It is rare for arborists to encounter a hazard mitigated by a face shield but common to face hazards requiring eye protection. The Logging Standard affords less protection to the arborist. • The Logging Standard’s first aid kit stocking requirements ((d)(2)(i) as well as Appendix A are inappropriate for the typical arborist applications. It is our belief that the first aid kit should be equipped to handle the types of injuries that are most 	<p>Tree Service, Inc. David G. Marren, Vice President of Regulatory Affairs, F. A. Bartlett Tree Expert Co. Peter Girardi, TrueTimber Tree Service, Inc. Thomas R. Scallorn, CSP, Virginia Department of Transportation [attended meeting] Kristina Villaire, City of Virginia Beach</p> <p>Representatives of TCIA related their support for the regulatory effort and Department staff related that this issue goes back to a 2000 meeting between Department staff and the TCIA’s predecessor organization, the National Arborist’s Association, where the possibility of a unique tree trimming regulation based on ANSI Z-133 was discussed. At that time the ANSI standard had a great deal of advisory language, such as “should” and “may”, which is not enforceable under OSHA case law. In several subsequent revisions, the TCIA and ANSI committee worked diligently to eliminate much of the advisory language, resulting in the 2006 version, which is serving as the basis for the proposed regulation.</p> <p>The group then proceeded to review text under consideration by the Department. The main issues discussed during the meeting are listed below:</p> <ul style="list-style-type: none"> * 1.3., Application – discussed issue of “site clearing” and how the regulation would apply/not apply, depending on whether a certified or qualified arborist was directly supervising activities on site. * 1.4., Responsibilities of the Employee – discussed issue of employee rights and responsibilities being currently listed in Va. Code §40.1-51.2. Also discussed changing this section to address a general orientation/training/retraining requirement for employees. * 3.2., Traffic Control Around the Jobsite – discussed substitution of the Virginia Department of Transportation’s (VDOT) “Work Area Protection Manual” for the U.S. Department of Transportation’s (DOT) Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD has a great deal of advisory language which makes it unenforceable much of the time. The group agreed that part of an eventual training program for the final regulation should provide information on the main differences between the VDOT manual and the MUTCD. * 3.3.2 and 3.3.5, Emergency Procedures and Readiness – discussed issue of first aid/CPR
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	<p>common in tree care.</p> <ul style="list-style-type: none"> • The two-tree-length separation between adjacent work areas required by 1910.266(6)(ii) is infeasible in many arborist situations, and in the dismantling process of a tree, it is often safer for workers to be within the distance prescribed by the Logging Standard to conduct rigging operations correctly. <p>2. We believe that ANSI Z133 provides more effective, more realistic guidance on arborist operations employing cranes than do all other extant regulations and standards. As you are aware, ANSI Z133.1-2006 contains provisions allowing the use of a crane to lift (hoist) a qualified arborist, using an arborist climbing line and arborist saddle, and secured to a designated anchor point on the boom line or crane. The standard goes on to lay out two pages of requirements that must be met by the overall crane operation before the climber can be hoisted.</p> <p>....</p> <p>However, our industry has attempted to use man-cages to enter trees under certain conditions, but at times the man-cage can actually place the tree worker in an extremely hazardous situation. Often, the lack of balance as well as the interference from the cables and metal structure while attempting to use a chain saw creates a situation that increases risk, even jeopardizing the lives of the workers. It is, in part, for these reasons that our industry’s safety professionals developed procedures for tying into a crane above the headache ball or on a clevis near the jib or boom tip with an arborist saddle and climbing line meeting ANSI Z133 requirements. As an industry we have been using cranes this way for almost 40 years.</p> <p>This issue has most notably been recognized by California OSHA in 2004 when it adopted an emergency amendment that subsequently became a permanent regulation, in their tree access standard, Title 8, Section 3427. Their original justification was: “[f]or the preservation of the public safety and the safety of the affected workforce, it is necessary to immediately adopt standards that would prescribe a safe alternative means and</p>	<p>and that the tree trimming industry would have to comply with the Board’s proposed regulation on Medical Services and First Aid, 16 VAC 25-95 if that regulation becomes final, and if it does not the current regulation in 1910.151 would apply.</p> <p>* 4.2., Working in Proximity to Electrical Hazards – discussed issue of line clearance tree trimming and application of the Overhead High Voltage Line Safety Act, Va. Code §§59.1-406 to -414. Participants commented on difficulties they have had with Dominion Virginia Power’s timeliness and responsiveness to requests from tree trimmers for temporary safety arrangements. Department staff said they would consider contacting power company representatives and look at the possibly of partnering in some way with the power companies on this issue. There was a concern expressed that some tree trimming companies would attempt to comply with the statute, experience significant delay or receive outright refusals to sleeve lines, and then the homeowner/property owner would contract with someone else who would trim the trees without making the proper safety arrangements or with untrained people, resulting in accidents.</p> <p>* 5.1.9., Safe Use of Vehicles and Mobile Equipment Use in Arboriculture – discussed issue of fall protection for employees when “riding or working outside or on top of units.” The Department inserted language requiring fall protection for employees performing maintenance or inspection on top of units 6 feet or more above a lower level, which is the requirement in construction.</p> <p>* 5.1.11, Safe Use of Vehicles and Mobile Equipment Use in Arboriculture – discussed issue of reverse signal operation of vehicles and that the tree trimming industry would have to comply with the Board’s proposed regulation on Reverse Signal Operations, 16 VAC 25-97, if that regulation becomes final, and if it does not, then with current regulations.</p> <p>* 5.3., Brush Chippers – discussed issue of what constituted “damage” to vehicles, tools, equipment, that would entail removal of the item from service and tagging until the item is repaired or discarded. Department staff agreed to add a definition for the term “damage” to the regulation.</p> <p>* 5.7., Log Loaders, Knucklebooms, Cranes and Related Hoists – discussed issues related to the use of a crane to lift tree trimmers into a tree, as a last resort if other methods for trimming would create a greater hazard to employee safety. Department staff added language to the proposed regulation based on</p>
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	<p>method to access trees.” Amendments to were proposed and accepted to permit a qualified tree worker to enter a tree suspended by the closed safety type hook of a crane when a tree cannot be safely accessed by conventional methods permitted in existing standards.</p> <p>3. We believe that ANSI Z133 provides necessary latitude in which fall protection to use in an aerial lift, in consideration of all hazards faced by the operator.</p> <p>ANSI Z133.1-2006 contains provisions addressing proper use of personal fall arrest systems while working from an aerial lift, permitting the use of either a body belt and lanyard or fullbody harness/fall arrest lanyard at the employer’s/employee’s discretion. As the NOIRA points out, a full body harness and energy absorbing lanyard are normally required (or at least preferred in a general industry application) while working from aerial lifts.</p> <p>As an industry, we have struggled with this issue. On the one hand, a significant number of our membership believes that the full body harness and shock absorbing lanyard should be worn when working from an aerial lift. On the other hand, a significant number of our membership believes that there are circumstances where a body belt and lanyard provides greater overall protection, such as working directly over power lines. Both sides present valid points of view, and these viewpoints should be heard by VOSH before a decision is made.</p> <p>In our experience, the only quantifiable fall protection issue arising in aerial lifts is failure to use any form of fall protection – which should be prosecuted. Between 1984 and 2002, there were 34 OSHA-recorded fatalities in Tree Trimming (SIC 0783) involving aerial lift operators and falls. The details of these accidents illustrate where the greatest problems lie:</p> <ul style="list-style-type: none"> • 23 of 34 fatalities were caused by catastrophic mechanical failures of some part of the aerial lift that slammed the victim to the ground from considerable height. Fall protection, or lack of it, was not a factor in these fatalities. • 5 of 34 fatalities were caused by a tree or 	<p>1926.550(g), which addresses use of personnel baskets on cranes in the construction industry. It also reviewed several other provisions from 1926.550(g) with the group to see if they were appropriate to add to enhance safety (1926.550(g)(3)(i)(B) [added]; (g)(3)(i)(D) [not added]; (g)(3)(i)(F) [not added]; (g)(5)(i) [added with changes]; (g)(6)(v) [added with changes]). The group agreed that the ANSI 5.7.9.11 and .12 be deleted (these provisions would have allowed the tree trimmer to be tied off to the crane while it was under load).</p> <ul style="list-style-type: none"> * 5.9., Equipment Mounted Winches – discussed issue of use of synthetic lines as well as steel cables on winches. Much of the industry is moving to synthetic lines for some uses as a way of reducing injury from steel cables breaking. * 8.1.1, Ropes and Arborist Climbing Equipment - the group discussed the issue of adding a section on tree risk assessment, based on the NAA Pocket Guide for Identifying Hazard Trees. The TCIA agreed to contact Dr. Eric Wiseman of Virginia Tech, who could serve as an expert consultant on the issue. * 8.1.3, Ropes and Arborist Climbing Equipment – discussed adding a definition for the term “split-tail system”, which was not previously defined. * 8.1.8., Ropes and Arborist Climbing Equipment – discussed issue of allowable minimum rope diameter – changed from ½ to 7/16 (11 mm). * 8.1..22, Ropes and Arborist Climbing Equipment – discussed adding a definition for the terms “false crotch” and “false crotch redirect”, which were not previously defined. * 8.3., Cabling – discussed adding additional safety procedures for removing/replacing cabling systems. Industry representatives agreed to provide suggested language. * 8.4.17., Rigging - discussed adding a definition for the term “load binder”, which was not previously defined. * Department staff asked industry personnel to provide information on numbers of employers/employees impacted by the regulation, estimates of average wages and average training time/costs. * Industry personnel requested that in any training materials eventually developed for the final regulation that the Department provide information on typical hazards and applicable standards in tree industry work shops.
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	<p>limb striking the aerial lift boom, again causing failure of the aerial lift. Again, fall protection was not a factor.</p> <ul style="list-style-type: none"> • 6 of 34 fatalities were caused by <i>unsecured</i> falls from the aerial lift, and probably would have been prevented by the use of <i>any</i> means of fall protection. To further complicate this issue, the existing OSHA and VOSH standards seem to refer to outdated information with regards to the load ratings and distances for which fall arrest equipment should be rated. We recommend further discussions with manufacturers and industry professionals before any regulation is promulgated. <p>....</p> <p>On behalf of our members and the thousands of workers this proposal potentially affects, we thank you for the opportunity to comment and look forward to working with VOSH for the adoption of an effective arborist standard.”</p>	
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Family impact

Please assess the impact of the proposed regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one’s spouse, and one’s children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.

This proposed regulation has no potential impact on the institution of the family or family stability.

Detail of changes

Please detail all changes that are being proposed and the consequences of the proposed changes. Detail all new provisions and/or all changes to existing sections.

If the proposed regulation is intended to replace an emergency regulation, please list separately (1) all changes between the pre-emergency regulation and the proposed regulation, and (2) only changes made since the publication of the emergency regulation.

For changes to existing regulations, use this chart:

Current section	Proposed new section	Current requirement	Proposed change and rationale
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number	number, if applicable		
	16 VAC 25-73		

16 VAC 25-73

Tree Trimming Operations

A. General

1. Scope

This regulation contains arboriculture safety requirements for pruning, repairing, maintaining, and removing trees; cutting brush; and for using equipment in such operations. (Note: Terms specific to the safe practice of arboriculture appear in boldface type at first use and are defined in Appendix A, the glossary.)

2. Purpose

The purpose of this regulation is to provide safety criteria for arborists and other workers engaged in arboricultural operations.

3. Application

This regulation is intended to apply to all employers engaged in the business, trade, or performance of arboriculture, including employers engaged in tree pruning, repairing, maintaining; removing trees; cutting brush; or performing pest or soil management who hire one or more persons to perform such work. This regulation may require situational modifications in response to personnel emergencies and is not intended to limit the options available to emergency responders. This regulation does not apply to logging operations covered by 16 VAC 25-90-1910.266.

This regulation does not apply to tree removal activities where the primary objective is land clearing in preparation for construction, real estate development, or other related activities, unless directly supervised by a qualified arborist. Such activities are covered by 16 VAC 25-90-1910.266.

B. Orientation and Training

1. Prior to permitting an employee to engage in any arboricultural activity covered by this regulation, the employer shall ensure that each employee receives orientation and training on the requirements of this regulation.

2. Refresher training on applicable provisions of this regulation shall be provided by the employer for any employee who has:
 - a. Been observed to violate the requirements of this regulation;
 - b. Been involved in an accident or near miss accident; or
 - c. Received an evaluation that reveals the employee is not working in a safe manner in accordance with the requirements of this regulation.

C. General Safety Requirements

1. General
 - a. Machinery, vehicles, tools, materials and equipment shall conform to the requirements of this regulation. 16 VAC 25-60-120 is hereby incorporated by reference.
 - b. Employers shall instruct their employees in the proper use, inspection, and maintenance of tools and equipment, including

ropes and lines, and shall require that appropriate working practices be followed.

c. A qualified arborist shall determine whether direct supervision is needed on a jobsite.

d. 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.

2. Traffic Control Around the Jobsite

a. High-visibility safety apparel and headgear, when required, shall conform to ANSI-ISEA 107-2004 and the Virginia Department of Transportation's (VDOT) Virginia Work Area Protection Manual.

b. Effective means for controlling pedestrian and vehicular traffic shall be instituted on every jobsite where necessary, in accordance with the VDOT's Virginia Work Area Protection Manual and applicable state and local laws and regulations.

c. Temporary traffic-control devices used in arboricultural operations shall conform to the VDOT Virginia Work Area Protection Manual and applicable federal and state regulations.

3. Emergency Procedures and Readiness

- a. 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.
 - b. A first-aid kit, adequately stocked and maintained in accordance with 16 VAC 25-95, 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.
 - c. Instruction shall be provided in the identification, preventive measures, and first-aid treatment of common poisonous plants (poison ivy, poison oak, and poison sumac), stinging and biting insects, and other pests indigenous to the area in which work is to be performed.
 - d. 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 (Appendix F).
 - e. Cardiopulmonary resuscitation (CPR) and first-aid training shall be provided in accordance with 16 VAC 25-95.
4. Personal Protective Equipment (PPE)
 - a. Personal protective equipment (PPE), as outlined in this section, shall be required when there is a reasonable probability of injury or illness that can be prevented by such protection, and when required by 16 VAC 25-90-1910.132. Training shall be provided

in the use, care, maintenance, fit, and life of personal protective equipment.

- b. Workers engaged in arboricultural operations shall wear head protection (helmets) that conforms to ANSI Z89.1, and in accordance with 16 VAC 25-90-1910.135. Class E helmets shall be worn when working in proximity to electrical conductors, in accordance with ANSI Z89.1. Workers shall not place reliance on the dielectric capabilities of such helmets.
- c. Face protection shall comply with 16 VAC 25-90-1910.133 as well as with ANSI Z87.1.
- d. Clothing and footwear appropriate to the known job hazards shall be approved by the employer and worn by the employee in accordance with 16 VAC 25-90-1910.132.
- e. Respiratory protection shall comply with 16 VAC 25-90-134 as well as with ANSI Z88.2.
- f. Hearing protection provided by the employer shall be worn when it is not practical to decrease or isolate noise levels that exceed acceptable standards and in accordance with 16 VAC 25-90-1910.95.
- g. Eye protection shall comply with 16 VAC 25-90-1910.133 as well as ANSI Z87.1 and shall be worn when engaged in arboricultural operations.
- h. Chain-saw-resistant leg protection shall be worn while operating a chain saw during ground operations.

5. Fire Protection

- a. Equipment shall be refueled only after the engine has stopped.
Spilled fuel shall be removed from equipment before restarting.
- b. Equipment shall not be operated within 10 feet (3.05 m) of
refueling operations or areas in which refueling has recently taken
place.
- c. Flammable liquids shall be stored, handled, and dispensed from
approved containers.
- d. Smoking shall be prohibited when handling or working around
flammable liquids.
- e. Clothing contaminated by flammable liquid shall be changed as
soon as possible.
- f. Open flame and other sources of ignition shall be avoided.

D. Electrical Hazards

1. General

- a. All overhead and underground electrical conductors and all
communication wires and cables shall be considered energized
with potentially fatal voltages.
- b. The employer shall certify in writing 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.
- c. Arborists and other workers shall be instructed that::
(1) electrical shock will occur when a person, by either direct
contact or indirect contact with an energized electrical

conductor, energized tree limb, tool, equipment, or other object, provides a path for the flow of electricity to a grounded object or to the ground itself. Simultaneous contact with two energized conductors phase to phase will also cause electric shock that may result in serious or fatal injury.

(2) electrical shock may occur as a result of ground fault when a person stands near a grounded object (for example, if an uninsulated aerial device comes into contact with a conductor with outriggers down).

(3) in the event of a downed energized electrical conductor or energized grounded object, there exists the hazard of step potential.

d. If the minimum approach distance for a qualified line-clearance arborist (shown in Table 1) or for a qualified arborist (shown in Table 2) cannot be maintained during arboricultural operations, the electrical system owner/operator shall be advised and an electrical hazard abatement plan implemented before any work is performed in proximity to energized electrical conductors.

2. Working in Proximity to Electrical Hazards

a. The items contained in § D.1. shall always be included in the review of this section. Sections 59.1-406 to -414, Overhead High Voltage Line Safety Act (Act), are hereby incorporated by reference, and apply as specified in the Act anytime the voltage of overhead high voltage lines exceeds 600 volts as defined in the

Act. The Act does not apply anytime line clearance activities are performed by the employees of the owner or operator of the electrical or communication systems, or independent contractors engaged on behalf of the owner or operator of the system to perform the work.

- b. 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.
- c. Only qualified line-clearance arborists or qualified line-clearance arborist trainees shall be assigned to work where an electrical hazard exists. Qualified line-clearance arborist trainees shall be under the direct supervision of qualified line-clearance arborists. A qualified line-clearance arborist trainee shall not serve as a ground observer for another qualified line-clearance arborist trainee who is engaged in line clearing operations aloft, unless a qualified arborist is also present at the work site.
- d. A second qualified line-clearance arborist or line-clearance arborist trainee shall be within visual or normal (that is unassisted) voice communication during line-clearing operations aloft when an arborist must approach closer than 10 feet (3.05 m) to any energized electrical conductor in excess of 750 volts (primary conductor) or when:
- (1) branches or limbs closer than 10 feet (3.05 m) to any energized electrical conductor in excess of 750 volts (primary conductor) are being removed, which cannot first

be cut (with a nonconductive pole pruner/pole saw) to
sufficiently clear electrical conductors, so as to avoid
contact; and/or

(2) roping is required to remove branches or limbs from such
electrical conductors.

Table 1. Minimum approach distances from energized conductors for qualified line-clearance arborists and qualified line-clearance arborist trainees.						
Nominal voltage in kilovolts (kV) phase to phase	Includes 1910.269 elevation factor, sea level to 5,000 ft*		Includes 1910.269 elevation factor, 5,000–10,000 ft*		Includes 1910.269 elevation factor, 10,001–14,000*	
	ft-in	m	ft-in	m	ft-in	m
0.051 to 0.3	Avoid contact		Avoid contact		Avoid contact	
0.301 to 0.75	1-01	0.33	1-03	0.38	1-04	0.41
0.751 to 15.0	2-05	0.7	2-09	0.81	3-00	0.88
15.1 to 36.0	3-00	0.91	3-05	1.04	3-09	1
36.1 to 46.0	3-04	1.01	3-10	1.16	4-02	1.09
46.1 to 72.5	4-02	1.26	4-09	1.44	5-02	1.3
72.6 to 121.0	4-06	1.36	5-02	1.55	5-07	1.68
138.0 to 145.0	5-02	1.58	5-11	1.8	6-05	1.96
161.0 to 169.0	6-00	1.8	6-10	2.06	7-05	2.23
230.0 to 242.0	7-11	2.39	9-00	2.73	9-09	2.95
345.0 to 362.0	13-02	3.99	15-00	4.56	16-03	4.94
500.0 to 550.0	19-00	5.78	21-09	6.6	23-07	7.16
765.0 to 800.0	27-04	8.31	31-03	9.5	33-10	10.29

*Exceeds phase to ground; elevation factor per 29 CFR 1910.269.
 Note: At time of publication, the minimum approach distances in this table for voltages between 301 and 1,000 volts exceed those specified by 29 CFR 1910.269, in anticipation of OSHA adopting these distances during the life of ANSI Z133.1-2006.

Table 2. Minimum approach distances to energized conductors for persons other than qualified line-clearance arborists and qualified Line-clearance arborist trainees		
Nominal voltage in kilovolts (kV) phase to phase*	Distance ft-in	m
0.0 to 1.0	10-00	3.05
1.1 to 15.0	10-00	3.05
15.1 to 36.0	10-00	3.05
36.1 to 50.0	10-00	3.05
50.1 to 72.5	10-09	3.28
72.6 to 121.0	12-04	3.76
138.0 to 145.0	13-02	4
161.0 to 169.0	14-00	4.24
230.0 to 242.0	16-05	4.97
345.0 to 362.0	20-05	6.17
500.0 to 550.0	26-08	8.05
785.0 to 800.0	35-00	10.55

*Exceeds phase to ground per 29 CFR 1910.333.

e. Qualified line-clearance arborists and line-clearance arborist trainees shall maintain minimum approach distances from energized electrical conductors in accordance with Table 1.

f. All other arborists and other workers shall maintain a minimum approach distance from energized electrical conductors in accordance with Table 2.

- g. Branches hanging on an energized electrical conductor shall be removed using nonconductive equipment.
- h. The tie-in position shall be above the work area and located in such a way that a slip would swing the arborist away from any energized electrical conductor or other identified hazard.
- i. While climbing, the arborist shall climb on the side of the tree that is away from energized electrical conductors while maintaining the required distances shown in Table 1 or 2, as applicable.
- j. Footwear, including lineman's overshoes or those with electrical-resistant soles, shall not be considered as providing any measure of safety from electrical hazards.
- k. Rubber gloves, with or without leather or other protective covering, shall not be considered as providing any measure of safety from electrical hazards.
- l. A rope that is wet, that is contaminated to the extent that its insulating capacity is impaired, or that is otherwise not to be considered insulated for the voltage involved shall not be used near exposed energy lines.
- m. Ladders, platforms, and aerial devices, including insulated aerial devices, shall be subject to minimum approach distances in accordance with Table 1 or 2, as applicable.
- n. Aerial devices with attached equipment (such as chippers) brought into contact with energized electrical conductors shall be

considered energized. Contact by people and/or equipment shall be avoided.

o. Emergency response to an electric contact shall be performed in accordance with § C.3., Emergency Procedures and Readiness.

3. Storm Work and Emergency Conditions: Line Clearance

a. The items contained in § D.1. shall always be included in the review of this section.

b. Line clearance shall not be performed during adverse weather conditions such as thunderstorms, high winds, and snow and ice storms.

c. Qualified line-clearance arborists and qualified line-clearance arborist trainees performing line clearance after a storm or under similar conditions shall be trained in the special hazards associated with this type of work.

d. Line-clearance operations shall be suspended when adverse weather conditions or emergency conditions develop involving energized electrical conductors. Electrical system owners/operators shall be notified immediately.

E. Safe Use of Vehicles and Mobile Equipment Used in Arboriculture

1. General

a. Prior to daily use of any vehicles and mobile equipment (units), visual walk-around inspections and operational checks shall be made in accordance with manufacturers' and owners' instructions (see 16 VAC 25-60-120) and applicable federal, state, and local requirements.

- b. Units shall be equipped and maintained with manufacturers' safety devices, instructions, warnings, and safeguards. Arborists and other workers shall follow instructions provided by manufacturers.
- c. Manufacturers' preventive maintenance inspections and parts replacement procedures shall be followed.
- d. Manufacturers' instructions shall be followed in detecting hydraulic leaks. No part of the body shall be used to locate or stop hydraulic leaks.
- e. Units shall be operated or maintained only by authorized and qualified personnel in accordance with company policies and federal, state, or local laws.
- f. Material and equipment carried on vehicles shall be properly stored and secured in compliance with the design of the unit in order to prevent the movement of material or equipment.
- g. Step surfaces and platforms on mobile equipment shall be skid resistant.
- h. Safety seat belts, when provided by the manufacturer, shall be worn while a unit is being operated.
- i. Riding or working outside or on top of units shall not be permitted unless the units are designed for that purpose or the operator is performing maintenance or inspection. Fall protection shall be provided for employees performing maintenance or inspection on top of units 6 feet or more above a lower level.
- j. Hoisting or lifting equipment on vehicles shall be used within rated capacities as stated by the manufacturers' specifications.

- k. Units with obscured rear vision, particularly those with towed equipment, shall be backed up in accordance with 16 VAC 25-97.
- l. When units are left unattended, keys shall be removed from ignition, the wheels chocked, and, if applicable, the parking brake applied.
- m. Units shall be turned off, keys removed from the ignition, and rotating parts at rest prior to making repairs or adjustments, except where manufacturers' procedures require otherwise. Defects or malfunctions affecting the safe operation of equipment shall be corrected before such units are placed into use.
- n. Personal protective equipment (for example, eye, head, hand, and ear protection) shall be worn in accordance with § C.4., Personal Protective Equipment.
- o. When towing, safety chains shall be crossed under the tongue of the unit being towed and connected to the towing vehicle.
- p. The unit's exhaust system shall not present a fire hazard.
- q. Towed units that detach from another unit (for example, a motorized vehicle) shall be chocked or otherwise secured in place.
- r. Units operated off-road shall be operated in the proper gear and at the proper speed relative to the operating environment and the manufacturers' instructions and guidelines.

2. Aerial Devices

- a. The items contained in § E.1. shall always be included in the review of this section. 16 VAC 25-90-1910.67 is hereby incorporated by reference. Damaged aerial devices and vehicles

shall be removed from service and tagged until repaired or discarded.

- b. Aerial devices shall be provided with an approved point of attachment on which to secure a full-body harness with an energy-absorbing lanyard, which shall be worn when aloft.
- c. Booms, buckets, or any other part of the aerial device shall not be allowed to make contact or violate minimum approach distances with energized electrical conductors, poles, or similar conductive objects. See table 2, or §§59.1-406 to -414, Overhead High Voltage Line Safety Act, as applicable.
- d. Aerial devices or aerial ladders shall not be used as cranes or hoists to lift or lower materials or tree parts, unless they were specifically designed by the manufacturer to do so (see 16 VAC 25-60-120).
- e. Wheel chocks shall be set before using an aerial device unless the device has no wheels on the ground or is designed for use without chocks.
- f. Units equipped with outriggers or a stabilizing system shall be operated in a manner consistent with manufacturers' requirements.
- g. The operator shall ensure adequate clearance exists and give warning to all employees in the work area prior to lowering outriggers. Pads shall be placed under outrigger feet when they are needed to ensure stable footing.
- h. When operating aerial devices, the operator shall look in the direction the bucket is traveling and be aware of the location of the booms in relation to all other objects and hazards.

- i. Clearances from passing vehicles shall be maintained, or traffic control shall be provided when booms or buckets are operated over roads in accordance with VDOT's Virginia Work Area Protection Manual.
- j. One-person buckets shall not have more than one person in them during operations.
- k. Hydraulic/pneumatic tools shall be disconnected when they are being serviced or adjusted, except where manufacturers' procedures require otherwise.
- l. To avoid flying particles or whipping hydraulic/pneumatic hoses, pressure shall be released before connections are broken, except where quick-acting connectors are used. Hydraulic/pneumatic hoses shall never be kinked in order to cut off pressure.
- m. No part of the body shall be used to locate or stop hydraulic leaks.
- n. Hoses affecting dielectric characteristics of equipment shall meet manufacturers' requirements.
- o. The flash point of hydraulic fluid shall meet the minimum set by the manufacturer.
- p. Combined loads shall not exceed rated lift capacities. Load ratings shall be conspicuously and permanently posted on aerial devices in accordance with ANSI A92.2.
- q. Electric cables/cords used with electric saws or lights, or other conductive material shall not be run from the vehicle to the bucket when arborists are working in proximity to energized electrical conductors.

- r. Aerial devices shall not be moved with an arborist on an elevated platform (for example, a bucket) except when equipment is specifically designed for such operation.
- s. Holes shall not be drilled in buckets or liners.
- t. During aerial device operations, arborists and other workers who are not qualified line-clearance arborists shall maintain a minimum approach distance from energized electrical conductors in accordance with Table 2. Only qualified line-clearance arborists or qualified line-clearance arborist trainees using an insulated aerial device may operate in accordance with minimum approach distances provided in Table 1.
- u. Arborists and other workers shall be instructed that insulated aerial buckets do not protect them from other electric paths to the ground, such as paths through trees, guy wires, or from one phase wire to the second phase wire, any one of which can be fatal.
- v. All underground hazards shall be located prior to operating aerial lift devices off-road. These hazards could include natural gas tanks, underground oil tanks, and septic systems.

3. Brush Chippers

- a. The items contained in § E.1. shall always be included in the review of this section. Damaged brush chippers shall be removed from service and tagged until repaired or discarded.
- b. Access panels (for example, guards) for maintenance and adjustment, including discharge chute and cutter housing, shall be closed and secured prior to starting the engine of brush chippers.

These access panels shall not be opened or unsecured until the engine and all moving parts have come to a complete stop (see Appendix C, General Safety Procedures That Apply to All Tree Work).

- c. Rotary drum or disc brush chippers not equipped with a mechanical infeed system shall be equipped with an infeed hopper not less than 85 inches (2.15 m) measured from the blades or knives to ground level over the center line of the hopper. Side members of the infeed hopper shall have sufficient height so as to prevent workers from contacting the blades or knives during operations.
- d. Rotary drum or disc brush chippers not equipped with a mechanical infeed system shall have a flexible anti-kickback device installed in the infeed hopper to reduce the risk of injury from flying chips and debris.
- e. Chippers equipped with a mechanical infeed system shall have a quick-stop and reversing device on the infeed system. The activating mechanism for the quick-stop and reversing device shall be located across the top, along each side, and close to the feed end of the infeed hopper within easy reach of the worker.
- f. Vision, hearing, and other appropriate personal protective equipment shall be worn when in the immediate area of a brush chipper in accordance with § C.4., Personal Protective Equipment.

- g. Arborists, mechanics, and other workers shall not, under any circumstances, reach into the infeed hopper when the cutter disc, rotary drum, or feed rollers are moving.
- h. When trailer chippers are detached from the vehicles, they shall be chocked or otherwise secured in place.
- i. When in a towing position, chipper safety chains shall be crossed under the tongue of the chipper and properly affixed to the towing vehicle.
- j. See § H.6., Brush Removal and Chipping, for additional requirements.

4. Sprayers and Related Equipment

- a. The items contained in § E.1. shall always be included in the review of this section. Damaged sprayers and related equipment shall be removed from service and tagged until repaired or discarded.
- b. Walking and working surfaces of all sprayers and related equipment shall be covered with skid-resistant material.
- c. Equipment on which the applicator/operator stands while the vehicle is in motion shall be equipped with guardrails around the working area. Guardrails shall be constructed in accordance with ANSI A1264.1.
- d. The applicator/operator shall make a visual inspection of hoses, fittings, exposed plumbing, tanks, covers, and related equipment prior to its use each workday.

- e. The applicator/operator shall not allow hoses or other parts of the equipment to create a tripping hazard for coworkers or the public.
- f. The applicator/operator shall have a firm grip on the spray gun/excavation tool when pulling the trigger.
- g. The operator of high-pressure excavation equipment shall wear a face shield in addition to eye protection.
- h. Related Equipment:
 - (1) The applicator/operator shall be aware of underground utility locations when drilling holes in the ground for fertilizer or pesticide applications.
 - (2) The equipment shall have splash guards, and the applicator shall wear eye protection when injecting liquid fertilizer or pesticides into the ground.
 - (3) The applicator shall wear eye protection and follow label instructions when injecting liquids into trees.

5. Stump Cutters

- a. The items contained in § E.1. shall always be included in the review of this section. Damaged stump cutters shall be removed from service and tagged until repaired or discarded.
- b. Stump cutters shall be equipped with enclosures or guards that reduce the risk of injury during operation. Enclosures or guards shall be kept in place when stump cutters are operative.
- c. Arborists and other workers in the immediate stump-cutting work zone shall wear vision, hearing, and other personal protective

equipment in accordance with § C.4., Personal Protective Equipment.

- d. When in a towing position, stump-cutter safety chains shall be crossed under the tongue of the stump cutter and properly affixed to the towing vehicle.
- e. Towable stump cutters or stump-cutter trailers, when detached from the vehicle, shall be chocked or otherwise secured in place.
- f. The operator shall be aware of underground utility locations prior to performing work.

6. Vehicles

- a. The items contained in § E.1. shall always be included in the review of this section. (See 16 VAC 25-60-120). Damaged vehicles shall be removed from service and tagged until repaired or discarded.
- b. A steel bulkhead or equivalent protective devices shall be provided to protect workers from load shifts in vehicles carrying logs or other material.
- c. Load securing procedures shall be followed to prevent accidental shifting or discharge of logs or other materials from the vehicle during transport.
- d. Logs or other material shall not overhang the sides; obscure taillights, brake lights, or vision; or exceed height limits per state and local requirements for bridges, overpasses, utility lines, or other overhead hazards.

e. To avoid the hazard of spontaneous combustion or the generation of undesirable odors, wood chips shall not be left in vehicles for extended periods.

7. Log Loaders, Knucklebooms, Cranes, and Related Hoists

a. The items contained in § E.1. shall always be included in the review of this section. Damaged log loaders, knuckle booms, cranes and related hoists shall be removed from service and tagged until repaired or discarded.

b. Log loaders, cranes, and related hoisting equipment shall be inspected in accordance with applicable regulations as well as manufacturers' instructions and guidelines. Chokers, slings, and other means of lifting, lowering, or rigging equipment shall be inspected before each use. An inspection procedure checklist shall be available to the crew.

c. Operators of hoisting equipment shall be trained and shall maintain a minimum approach distance from energized conductors in accordance with Table 1 or 2, or §§59.1-406 to -414, Overhead High Voltage Line Safety Act, as applicable. A spotter shall be used when work is being performed in proximity to electrical conductors. Personnel assigned to work in proximity to the tree removal shall be trained and follow guidelines for electrical hazards (§ D., Electrical Hazards).

d. The crane operator shall be familiar with the potential hazards encountered and operational techniques used in tree work.

- e. Cranes with telescoping booms shall be equipped with an anti-two block device. A boom angle indicator and a device to indicate the boom's extended length shall be clearly visible to the operator at all times. A load rating chart with clearly legible letters and figures shall be provided with each crane and securely fixed at a location easily visible to the operator.
- f. Operators of hoisting equipment shall remain at the controls while a load is lifted, suspended, or lowered.
- g. Tree sections shall be rigged to minimize load shifting. Controlled load lowering shall be employed. Shock-loading shall be avoided, and free fall is prohibited. A green log weight chart (Appendix E) shall be available to the crew. All workers shall be kept clear of loads about to be lifted and of suspended loads.
- h. Riding the load line of a crane while it is under load tension shall be prohibited.
- i. The use of a crane to hoist a qualified arborist into position is prohibited, except when the use of conventional means of reaching the work area, such as, but not limited to, an aerial lift, would be more hazardous or is not physically possible because of worksite conditions. If the above exception applies, a qualified arborist may be hoisted into position utilizing a crane if the crane manufacturer's specifications and limitations do not prohibit such use, and any fall protection requirements of the crane manufacturer are complied with, and the arborist is tied in with an arborist climbing line and arborist saddle and secured to a designated

anchor point on the boom line or crane. The following procedures shall be followed when an arborist is to be lifted by a crane:

- (1) The qualified crane operator, the signal person, the person responsible for the work to be performed and the arborist to be lifted shall meet prior to the work to review the procedures to be followed. A job briefing shall be done before any work begins, in accordance with § C.1.d.
- (2) The arborist climbing line shall be secured to the crane in such a way that it does not interfere with the function of any damage-prevention or warning device on the crane and so that no part of the crane compromises the climbing line or any component of the climbing system.
- (3) The crane operator shall test the adequacy of footing prior to any lifting, and shall conduct a trial lift immediately before lifting the arborist into position. The crane operator shall determine that all systems, controls and safety devices are activated and functioning properly; that no interferences exist; and that all configurations necessary to reach the intended work location will allow the operator to remain under the 50 percent limit of the hoist's rated capacity. The crane shall be uniformly level and located on firm footing. If necessary, blocking shall be used so that the support system does not exceed its load-bearing capabilities.

Cranes equipped with outriggers shall have them all fully

extended and properly set, as applicable, before lifting and lowering operations begin and/or before the qualified arborist is lifted.

(4) Lifting and supporting shall be done under controlled conditions and under the direction of a qualified arborist or an appointed signal person. Lifting and supporting operations shall not be performed during adverse weather conditions such as thunderstorms, high winds, and snow and ice storms.

(5) The load-line hoist drum shall have a system or other device on the power train, other than the load hoist brake, that regulates the lowering speed of the hoist mechanism. Load lines shall be capable of supporting, without failure, at least seven times the maximum intended load, except that where rotation resistant rope is used, the lines shall be capable of supporting without failure, at least ten times the maximum intended load. The required design factor is achieved by taking the current safety factor of 3.5 and applying 50 percent de-rating of the crane capacity.

(6) Communication between the crane operator and the arborist being lifted shall be maintained either directly or through the appointed signal person. This communication shall either be visual, using the accepted hand signals, or audible, using voice or radio. Radio communication shall be used to control blind picks. The crew members shall

know and follow hand signals for standard crane operations
(Appendix G).

(7) The crane operator shall remain at the controls when the
qualified arborist is attached to the crane and during lifting
and lowering operations.

(8) The crane boom and load line shall be moved in a slow,
controlled, cautious manner when the arborist is attached.
Lifting or lowering speed shall not exceed 100 feet/minute
(0.5 m/sec), and any sudden movements shall be avoided.
The crane shall be operated so that lowering is power
controlled.

(9) The crane carrier shall not travel at any time while the
qualified arborist is attached. An accurate determination of
the load radius to be used during lifting shall be made
before the qualified arborist is hoisted.

(10) The qualified arborist shall be detached from the crane any
time it comes under load tension.

8. Specialized Units

a. The items contained in § E.1. shall always be included in the
review of this section.

b. Off-road and tracked vehicles shall be operated at the proper speed
and in the proper gear relative to the operating environment and
the manufacturer's instructions and guidelines.

c. Deadman controls on towing equipment for brush hogs and similar
implements shall be used and maintained in good working

condition. If the deadman control is malfunctioning or not operational, the equipment shall be removed from service and tagged until it has been repaired or discarded. When deadman controls were not provided by the manufacturer, the worker shall disengage the power source to the rotary or cutter head before dismounting.

9. Equipment-Mounted Winches

- a. The items contained in § E.1. shall always be included in the review of this section. Damaged equipment mounted winches shall be removed from service and tagged until repaired or discarded.
- b. Operators shall wear the appropriate personal protective equipment during winch operations, including eye and head protection.
- c. The winch cable/synthetic line shall be inspected daily for broken or worn strands, bird caging, and major kinks, and other defects. Damaged cables shall be removed from service and tagged until repaired or discarded.
- d. Cable hooks and attachment points shall be inspected for damage. Damaged hooks or attachment assemblies shall be removed from service and tagged until repaired or discarded.
- e. All mounting bolts and hardware shall be inspected for loose or missing components. The winch shall not be used until complete repairs are made to damaged or missing bolts and hardware.

- f. Operators shall be aware of the dangers of load or cable breakage and ensure that all personnel remain clear of the recoil area in the event of load or cable breakage.
- g. All winch operators shall be properly trained and be aware of the inherent dangers associated with winch operations.
- h. Operators shall be aware of the winch cable at all times during extension and ensure that it does not become a hazard to personnel or machinery.
- i. Winch systems and cables shall be used only as intended and instructed by the manufacturer.
- j. The winch shall never be used with personnel, including the operator, within the span of the winch cable and the winch.
- k. Pinch point hazards develop during winching operations; therefore, all operators involved in the winching operation shall constantly be aware of such hazards and stand clear of these areas.
- l. All loads shall be pulled in such a manner as to avoid angles that may result in tipping, cause the vehicle to become unstable, or result in unintended movement of the vehicle.
- m. Pulling loads from the side requires special equipment and techniques. Therefore, loads shall be pulled in line with the winch unless the winch is properly equipped with a fair lead and the operator is trained to pull loads at an angle.
- n. The operator shall ensure that the vehicle supporting the winch is secured to avoid unintended movement.
- o. The operator shall ensure that all rigging points comply with

§ H.4., Rigging.

- p. To ensure precise communication, an effective means of communication shall be established and used with all workers involved in the winching operations (see § H.4.n.).

F. Portable Power Hand Tools

1. General

- a. The purpose of this section is to provide guidelines for arborists and other workers pertaining to the safe use and care of portable power hand tools. Damaged portable power tools shall be removed from service and tagged until repaired or discarded.
- b. Manufacturers' operating and safety instructions shall be followed (see 16 VAC 25-60-120).
- c. Before starting or otherwise using any portable power tools, a communication system shall be established in accordance with the requirements in § H.2.a.

2. Portable Electric Power Tools

- a. The items contained in § F.1. shall always be included in the review of this section. Damaged portable electric power tools shall be removed from service and tagged until repaired or discarded.
- b. Corded electric power tools shall not be used in trees or aerial devices near energized electrical conductors where there is a possibility of power tools or supply cords contacting the conductor.
- c. All corded portable electric power tools shall be:

- (1) equipped with three-wire cords having the ground wire permanently connected to the tool frame and a means for grounding the other end; or
- (2) double insulated and permanently labeled as “double insulated”; or
- (3) connected to power supplies by means of an isolating transformer or other isolated power supply.

d. Extension cords shall be maintained in safe condition. Exposed metal sockets shall not be used. Worn or frayed extension cords shall be removed from service and tagged until repaired or discarded.

e. Arborists and other workers shall:

- (1) prevent cords from becoming entangled, damaged, or cut by blades and bits;
- (2) not lay extension cords in water; and
- (3) support electric power tools and supply cords by a tool lanyard or separate line, when used aloft.

3. Chain Saws

- a. The items contained in § F.1. shall always be included in the review of this section. Damaged chain saws shall be removed from service and tagged until repaired or discarded.
- b. Chain saws shall not be operated unless the manufacturer’s safety devices are in proper working order. Chain-saw safety devices shall not be removed or modified.

- c. When an arborist or other worker is working in a tree other than from an aerial device, chain saws weighing more than 15 pounds (6.8 kg) service weight shall be made safe against falling (i.e., supported by a separate line or tool lanyard).
- d. Secure footing shall be maintained when starting the chain saw.
- e. When starting a chain saw, the operator shall hold the saw firmly in place on the ground or otherwise support the saw in a manner that minimizes movement of the saw when pulling the starter handle. The chain saw shall be started with the chain brake engaged, on saws so equipped. Drop-starting a chain saw is prohibited.
- f. Chain-saw engines shall be started and operated only when other arborists and workers are clear of the swing radius of the chain saw.
- g. When operating a chain saw, the arborist or other worker shall hold the saw firmly with both hands, keeping the thumb and fingers wrapped around the handle.
- h. Arborists shall use a second point of attachment (for example, lanyard or doublecrotched climbing line) when operating a chain saw in a tree, unless the employer demonstrates that a greater hazard is posed by using a second point of attachment while operating a chain saw in that particular situation. Using both ends of a two-in-one lanyard shall not be considered two points of attachment when using a chain saw.

- i. Chain-saw mufflers and spark arresters (if the latter are provided) shall be maintained in good condition.
 - j. The chain brake shall be engaged, or the engine shut off, before setting a chain saw down.
 - k. When a chain saw is being carried more than two steps, the chain brake shall be engaged or the engine shut off. The chain saw shall be carried in a manner that will prevent operator contact with the cutting chain and the muffler.
 - l. The chain-saw operator shall be certain of footing before starting to cut. The chain saw shall not be used in a position or at a distance that could cause the operator to become off-balance, have insecure footing, or relinquish a firm grip on the saw.
4. Powered Pole Tools and Backpack Power Units
- a. The items contained in § F.1. shall always be included in the review of this section. Damaged powered pole tools and backpack power units shall be removed from service and tagged until repaired or discarded.
 - b. Only workers operating the equipment shall be within 10 feet (3.05 m) of the cutting head of a brush saw during operations.
 - c. Power units shall be equipped with a readily accessible, quick shutoff switch.
 - d. Operators shall observe the position of all other workers in the vicinity while the equipment is running.

- e. Engines shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or engine, except where manufacturers' procedures require otherwise.
- f. Powered pole tools with poles made of metal or other conductive material shall not be used in operations where electrical hazards exist.

G. Hand Tools and Ladders

1. General

- a. Correct hand tools and equipment shall be selected for the job.
- b. Hand tools and equipment that have been made unsafe by damage or defect, including tools with loose or cracked heads or cracked, splintered, or weakened handles, shall be removed from service and tagged until repaired or discarded.
- c. Workers shall maintain a safe working distance from other workers when using hand tools and equipment.
- d. When climbing into a tree, arborists shall not carry hand tools and equipment in their hands unless the tools are used to assist them in climbing. Tools other than ropes or throwlines shall not be thrown into a tree or between workers aloft.
- e. Arborist climbing lines or handlines shall be used for raising and lowering hand tools and equipment. Arborists shall raise or lower hand tools and equipment in a manner such that the cutting edge will not contact the arborist climbing line or handline.
- f. Hand tools and equipment shall be properly stored or placed in plain sight out of the immediate work area when not in use.

2. Cant Hooks, Cant Dogs, Peaveys, and Tongs

- a. The items contained in § G.1. shall always be included in the review of this section. Damaged cant hooks, cant dogs, peaveys and tongs shall be removed from service and tagged until repaired or discarded.
- b. Cant hooks shall be firmly set before applying force.
- c. Points of hooks shall be at least 2 inches (5 cm) long and kept sharp.
- d. Arborists and other workers shall always stand uphill from rolling logs, and all workers shall be warned and in the clear before logs are moved.

3. Wedges, Chisels, and Gouges

- a. The items contained in § G.1. shall always be included in the review of this section.
- b. Wedges, chisels, and gouges shall be inspected for cracks and flaws before use. Tools with damaged heads shall be removed from service and tagged until repaired or discarded.
- c. Wedges and chisels shall be properly pointed and tempered.
- d. Eye protection shall be used during impact operations.
- e. Only wood, plastic, or soft-metal wedges shall be used while operating chain saws.
- f. Wood-handled chisels shall be protected with a ferrule on the striking end.
- g. Wood, rubber, or high-impact plastic mauls, sledges, or hammers shall be used when striking wood-handled chisels or gouges.

4. Chopping Tools

- a. The items contained in § G.1. shall always be included in the review of this section. Damaged chopping tools shall be removed from service and tagged until repaired or discarded.
- b. Chopping tools shall not be used while working aloft.
- c. Chopping tools shall not be used as wedges or used to drive metal wedges.
- d. Chopping tools shall be swung away from the feet, legs, and body, using the minimum force practical for function and control.
- e. When swinging tools such as grub hoes, mattocks, and axes, a secure grip, firm footing, and clearance of workers and overhead hazards shall be maintained.

5. Ladders

- a. The items contained in § G.1. shall always be included in the review of this section.
- b. Ladders made of metal or other conductive material shall not be used where electrical hazards exist. Only wooden ladders (constructed in accordance with ANSI A14.1) or nonconductive ladders made of synthetic material equal to or exceeding the strength of wooden ladders shall be used. Portable wooden ladders shall be used in accordance with 16 VAC 25-90-1910.25.
- c. Metal ladders used where no electrical hazard exists shall conform to ANSI A14.2 , and be used in accordance with 16 VAC 25-90-1910.26.

- d. All ladders shall be inspected before use and removed from service if found defective, and tagged until repaired or discarded.
- e. Cleats, metal points, skid-resistant feet, lashing, or other effective means of securing the ladder shall be used.
- f. Ladders shall not be used as bridges or inclined planes to load or handle logs or other material.
- g. Ladders shall be supported while in storage to prevent sagging. Except when on mobile equipment, ladders shall be stored under suitable cover, protected from the weather, and kept in a dry location away from excessive heat.
- h. The third, or hinged, leg of a tripod/orchard ladder shall be braced or fastened when on hard or slick surfaces.
- i. All ladders shall be used in accordance to the manufacturers' specifications and limitations and shall not be altered in a way that contradicts those specifications and limitations.

H. Work Procedures

1. Ropes and Arborist Climbing Equipment

- a. A visual hazard assessment, including a root collar inspection, shall be performed prior to climbing, entering, or performing any work in a tree, and an ongoing hazard assessment shall be conducted as operations progress while the arborist is in the tree. If the hazard assessment reveals a serious hazard to the climber or ground personnel, work shall immediately stop and personnel shall be removed from the hazardous area until a work plan is developed

to safety remove the hazard/tree. The following items, at a minimum shall be inspected:

- (1) trunk and root hazards including, but not limited to, cracks, cavities, wood decay/rot, cut roots, mushrooms;
- (2) lower stem hazards including, but not limited to, loose bark, open cavities, cracks, mushrooms, conks and depressions or swelling in the stem;
- (3) limb hazards including, but not limited to, watersprouts, hangers, cankers, dead branches, lightning damage and weak crotches; and
- (4) storm damage hazards including, but not limited to, cracked stems and crotches, broken limbs supported by cables, points of pressure and tension on limbs or small trees underneath larger fallen trees.

b. 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 § D.2.4.

c. Climbing lines used in a split-tail system and split-tails shall be terminated with an eye splice or a knot that interfaces appropriately with the connecting link that it is attached to. The termination knot selected shall remain secure under normal loading and unloading. When using a

carabiner without a captive eye, the knot or eye splice shall cinch in place to prevent accidental opening and/or side-loading of the carabiner.

- d. Arborists shall inspect climbing lines, worklines, lanyards, and other climbing equipment for damage, cuts, abrasion, and/or deterioration before each use and shall remove them from service if signs of excessive wear or damage are found. The items removed from service shall be tagged until repaired or discarded.
- e. Arborist saddles and lanyards used for work positioning shall be identified by the manufacturer as suitable for tree climbing.
- f. Arborist saddles and lanyards used for work positioning shall not be altered in a manner that would compromise the integrity of the equipment.
- g. Hardware used in the manufacture of arborist saddles shall meet the hardware material, strength, and testing requirements outlined in ANSI 359.1.
- h. Arborist climbing lines shall have a minimum diameter of 7/16 (11 mm) and be constructed from a synthetic fiber, with a minimum breaking strength of 5,400 pounds (24.02 kilonewtons [kN]) when new. Maximum working elongation shall not exceed 7 percent at a load of 540 pounds (2.402 kN). Arborist climbing lines shall be identified by the manufacturer as suitable for tree climbing.

- i. All components of a climbing system (e.g., ropes, pulleys, etc.) shall meet the manufacturer's design, specifications and limitations. Components from different climbing systems shall not be combined without prior approval of the manufacturers.
- j. Prusik loops, split-tails, and work-positioning lanyards used in a climbing system shall meet the minimum strength standards for arborist climbing lines.
- k. Snap hooks (rope snaps) used in climbing shall be self-closing and self-locking, with a minimum tensile strength of 5,000 pounds (22.24 kN).
- l. Carabiners used in climbing shall be self-closing and self-locking, with a minimum tensile strength of 5,000 pounds (22.24 kN). Carabiners shall be designed to release the load by requiring at least two consecutive, deliberate actions to prepare the gate for opening.
- m. Splicing shall be done in accordance with cordage manufacturers' specifications.
- n. All load-bearing components of the climbing system shall meet the minimum standards for arborist climbing equipment.
- o. Equipment used to secure an arborist in the tree or from an aerial lift shall not be used for anything other than its intended purpose. The arborist climbing line may be used to raise and lower tools.
- p. Rope ends shall be finished in a manner to prevent raveling.

- q. Ropes and climbing equipment shall be stored and transported in such a manner to prevent damage through contact with sharp tools, cutting edges, gas, oil, or chemicals.
- r. Arborist climbing lines shall never be left in trees unattended.
- s. Arborists shall have available a climbing line and at least one other means of being secured while working aloft; for example, an arborist climbing line and a work-positioning lanyard.
- t. The arborist shall be secured while ascending the tree. The arborist shall be tied in once the work begins and shall be tied in until the work is completed and he or she has returned to the ground. The arborist shall be secured when repositioning the climbing line.
- u. While ascending a ladder to gain access to a tree, the arborist shall not work from or leave the ladder until he or she is tied in or otherwise secured.
- v. A false crotch and/or false crotch redirect may be used at the discretion of the arborist in lieu of a natural crotch.
- w. The tie-in position shall be such that the arborist will not be subjected to an uncontrolled pendulum swing in the event of a slip.
- x. When a climber is working at heights greater than one-half the length of the arborist climbing line, a figure-8 knot shall be tied in the end of the arborist climbing line to prevent pulling the rope through the climbing hitch.

2. Pruning and Trimming

- a. Voice communications among arborists aloft and among arborists and other workers on the ground shall be established before cutting and dropping limbs. The communication method shall be clearly understood and used by all workers during all operations. The command “stand clear” from aloft and the response “all clear”, “Underneath”, or “No” from the ground are terms that may be used for this purpose. Pre-arranged, two-way hand signals may also be used when verbal communication is not possible because of distance or surrounding noise levels. Arborists and other workers returning to the work area shall be acknowledged by arborists aloft.
- b. Pole pruners and pole saws, when hung, shall be securely positioned to prevent dislodgment. Pole pruners or pole saws shall not be hung on electrical conductors or left in a tree unattended. Pole saws and pole pruners shall be hung so that sharp edges are away from the arborist and shall be removed when the arborist leaves the tree.
- c. Scabbards or sheaths shall be used to carry handsaws when not in use. Folding saws, when not in use, shall be closed and hooked to the arborist saddle.
- d. Pole tools used in line-clearance operations shall be constructed with fiberglass reinforced plastic (FRP) or wooden poles meeting the requirements of 16 VAC 25-90-1910.269.

- e. A separate workline shall be attached to limbs that cannot be dropped safely or controlled by hand. Arborist climbing lines and worklines shall not be secured to the same crotch.
- f. Dry conditions and dead palm fronds present an extreme fire hazard. When dry conditions exist, arborists and other workers shall not smoke while working in or near dead palm fronds. All chain saws used under such conditions shall have mufflers and spark arresters in good working condition.
- g. Palm frond skirts that have three years or more of growth shall be removed from the top down. Arborists performing this work shall be supported by an arborist climbing line and a false crotch. Arborists shall never attempt to remove skirts of three years or more by positioning themselves below work areas while being supported by a lanyard.
- h. Cut branches shall not be left in trees upon completion of work.

3. Cabling

- a. Arborists and other workers on the ground shall not stand under the work area of a tree when a cabling system is being installed.
- b. Tools used for cabling, bark tracing, and cavity work shall be carried in a bag, on a belt designed to hold such tools, or attached to a tool lanyard.
- c. Arborists installing cabling systems in trees shall be positioned off to one side in order to avoid injury in case of cable system failure that could occur when a block and tackle or a hand winch is released.

- d. When removing a cable from a tree, a block and tackle or come-along system shall be installed before removing the existing cable.
- e. When installing a replacement cable, the replacement cable shall be fully installed before removing the outdated cable.

4. Rigging

- a. 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 that does not expose workers to the hazards of a failure.
- b. The number of connecting links used for connecting components of a rigging system shall be minimized when possible. Connecting links shall interface properly and be in compliance with manufacturers' specifications and limitations (reference 16 VAC 26-60-120).
- c. The qualified arborist shall ensure that load ratings shown on the rigging equipment or provided by the manufacturer for all ropes, connecting links, and rigging equipment are observed in all rigging operations. Rigging equipment shall be chosen for the specific task based on working-load limits and design specifications.
- d. All equipment used for rigging operations shall be in good working condition. Equipment that has been damaged or overloaded shall

be removed from service. Items removed from service shall be tagged until repaired or discarded.

- e. To avoid confusion between rigging equipment and climbing equipment, the equipment shall be clearly marked to indicate their different purposes.
- f. Rigging points shall be assessed for their structural integrity by a qualified arborist. The rigging plan and the tree shall be considered relative to the forces being applied to any part of the tree, including branch attachments and anchoring roots, before a rigging point is chosen and established.
- g. Climbers shall choose tie-in points that will provide proper protection while allowing for a separation between the rigging system and the climbing system. Running rigging lines shall not be allowed to come into contact with any part of the climbing system.
- h. Arborists performing rigging operations shall be educated to understand and trained to estimate the potential forces at any point in the rigging system being used. The system components shall comply with working-load limits relative to the operation and the maximum potential forces.
- i. Careful consideration shall be given to the potential forces resulting from the specific influences of rope angles as well as the number of lines and/or line parts that will act on any rigging point.

- j. Prior to the start of removal/rigging operations, a communication system shall be established in accordance with the requirements in § H.2.a.
- k. A work zone shall be established prior to the start of rigging operations. Workers not directly involved in the rigging operation shall stay out of the pre-established work zone until it has been communicated by a qualified arborist or qualified arborist trainee directly involved in the rigging operation that it is safe to enter the work zone. Workers shall be positioned and their duties organized so that the actions of one worker will not create a hazard for any other worker.
- l. Only qualified arborists or qualified arborist trainees directly involved in the operation shall be permitted in the work zone when a load is being suspended by the rigging system. All workers shall be kept clear of suspended loads.
- m. Taglines or other means may be used to help control and handle suspended loads.
- n. Arborists working aloft shall position themselves so as to be above or to the side of the piece being rigged and out of the path of movement of the piece when it has been cut. Climbers and their climbing systems shall be positioned outside of the rigging system itself when a cut is being made or a load is being moved or lowered. Climbers shall have an escape plan prepared.
- o. The spars, limbs, or leaders being worked on and the spars being used for tie-in and/or rigging points shall be assessed for structural

integrity and potential reaction forces that could cause a spar to split when it is cut.

- p. Steps shall be taken to prevent spars from splitting or tearing during the rigging operation, and climbers shall take steps to avoid trapping, pinning, or entangling themselves in the system should the tree split or the rigging fail. Load binders are one possible means of preventing splitting.

5. Tree Removal

- a. Before beginning any tree removal operation, the chain-saw operator and/or crew leader shall carefully consider all relevant factors pertaining to the tree and site and shall take appropriate actions to ensure a safe removal operation. The following factors shall be considered:

- (1) the area surrounding the tree to be removed, including nearby trees;
- (2) species and shape of the tree;
- (3) lean of the tree;
- (4) loose limbs, chunks, or other overhead material;
- (5) wind force and direction;
- (6) decayed or weak spots throughout the tree (be aware of additional hazards if these conditions exist in the hinge area);
- (7) location and means to protect other persons, property, and electrical conductors;

- (8) size and terrain characteristics or limitations of the work area; and
- (9) evidence of bees or wildlife habitation in the tree.
- b. Work plans for removal operations shall be communicated to all workers in a job briefing before commencing work.
- c. Workers not directly involved in the removal operation shall be clear of the work area, beyond the length of the tree, unless a team of workers is necessary to remove a particular tree.
- d. A planned escape route for all workers shall be prepared before cutting any standing tree or trunk. The preferred escape route is 45 degrees on either side of a line drawn opposite the intended direction of the fall. Obstructions shall be cleared along the escape path. The chain-saw operator shall use this path for egress once the cut has been completed.
- e. When it is necessary to shorten or remove branches before removing the tree, the arborist shall determine whether the tree can withstand the strain of the lowering procedures. If not, other means of removing the tree shall be considered and used.
- f. The crew leader shall determine the number of workers necessary for tree removal operations.
- g. The crew leader shall develop a work plan so that operations do not conflict with each other, thereby creating a hazard.
- h. Climbing spurs shall have gaffs of a type and length compatible for the tree being climbed.

- i. Wedges, block and tackle, rope, wire cable (except where an electrical hazard exists), or other appropriate devices shall be used when there is a danger that the tree or trees being removed may fall in the wrong direction or damage property. All limbs shall be removed to a height and width sufficient to allow the tree to fall clear of any wires and other objects in the vicinity.
 - j. Tackle blocks and pulleys and their connecting links shall be inspected immediately before use and removed from service if they are found to be defective.
 - k. Workers returning to the work area shall not enter until the chain-saw operator has acknowledged that it is safe to do so.
 - l. When a pull line is being used, workers involved in removing a tree or trunk shall be clear by a minimum of one tree length.
 - m. All workers other than the individual engaged in manual land-clearing operations shall be at least two tree lengths away from the tree or trunk being removed. This requirement does not apply in the presence of site restrictions, such as waterways or cliffs. Other arborists and workers shall be beyond the trees' striking range and at a distance as close to twice the tree's height as possible.
- NOTE: This regulation does not apply to tree removal activities where the primary objective is land clearing in preparation for construction, real estate development, or other related activities, unless directly supervised by a certified arborist. Such activities are covered by 16 VAC 25-90-1910.266.

- n. Notches shall be used on all trees and trunks greater than 5 inches (12.7 cm) in diameter at breast height.
- o. Notches and back cuts shall be made at a height that enables the chain-saw operator to safely begin the cut, control the tree or trunk, and have freedom of movement for escape:
- (1) The notch cut used shall be a conventional notch, an open-face notch, or a Humboldt notch.
 - (2) Notches shall be 45 degrees or greater and large enough to guide the fall of the tree or trunk to prevent splitting.
 - (3) Notch depth shall not exceed one-third the diameter of the tree.
 - (4) The back cut shall not penetrate into the predetermined hinge area.
- p. With a conventional notch or Humboldt notch, the back cut shall be 1 to 2 inches (2.5 to 5 cm) above the apex of the notch to provide an adequate platform to prevent kickback of the tree or trunk. With an open-face notch (greater than 70 degrees), the back cut shall be at the same level as the apex of the notch.
- q. The two cuts that form the notch shall not cross at the point where they meet.
- r. Before making the back cut, there shall be a command such as “stand clear” from the arborist operating the chain saw and a response such as “all clear” from the workers supporting the removal operation. Pre-arranged, two-way hand signals may also be used in accordance with § H.2.a. Only designated persons shall

give such signals. All workers in the vicinity shall be out of range when the tree or trunk falls. Visual contact shall be maintained with the tree or trunk until it is on the ground.

- s. When the back cut has been completed, the chain-saw operator shall immediately move a safe distance away from the tree or trunk using the planned escape route.
- t. Workers shall not approach mechanical tree removal or mechanical re-clearing operations, such as with a rotary or flail mower, until the operator has acknowledged that it is safe to do so.

6. Brush Removal and Chipping

- a. Traffic control around the jobsite shall be established prior to the start of chipping operations along roads and highways (see § C.2., Traffic Control Around the Jobsite).
- b. Brush and logs shall not be allowed to create hazards in the work areas.
- c. To prevent an entanglement hazard, loose clothing, climbing equipment, body belts, harnesses, lanyards, or gauntlet-type gloves (for example, long-cuffed lineman's or welder's gloves) shall not be worn while operating chippers.
- d. Personal protective equipment shall be worn when in the immediate area of chipping operations in accordance with § C.4., Personal Protective Equipment, of this regulation.
- e. Training shall be provided in the proper operation, feeding, starting, and shutdown procedures for the chipper being used.

- f. Maintenance shall be performed only by those persons authorized by the employer and trained to perform such operations.
- g. Brush and logs shall be fed into chippers, butt or cut end first, from the side of the feed table center line, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor or feed rollers. Chippers shall be fed in accordance with the manufacturer's instructions.
- h. The brush chipper discharge chute or cutter housing cover shall not be raised or removed while any part of the chipper is turning or moving. Chippers shall not be used unless a discharge chute of sufficient length or design is provided that prevents personal contact with the blades (see Appendix C, General Safety Procedures That Apply to All Tree Work).
- i. Foreign material, such as stones, nails, sweepings, and rakings, shall not be fed into chippers.
- j. Small branches shall be fed into chippers with longer branches or by being pushed with a long stick.
- k. Hands or other parts of the body shall not be placed into the infeed hopper. Leaning into or pushing material into infeed hoppers with feet is prohibited.
- l. While material is being fed into the chipper infeed hopper chute, pinch points continually develop within the material being chipped and between the material and machine. The operator shall be aware of this situation and respond accordingly.

- m. When feeding a chipper during roadside operations, the operator shall do so in a manner that prevents him or her from stepping into traffic or being pushed into traffic by the material that is being fed into the chipper.
- n. When using a winch in chipper operations, the operator shall ensure that the winch cable is properly stored before initiating chipper operations.
- o. Refer to § E.3., Brush Chippers, for additional information.

7. Limbing and Bucking

- a. Work plans for limbing and bucking operations shall be communicated to all workers in a job briefing before work begins.
- b. When more than one worker is limbing or bucking a tree, each shall be positioned and their duties organized so that the actions of one worker will not create a hazard for any other worker.
- c. Chain saws shall be operated away from the vicinity of the legs and feet. Natural barriers, such as limbs between the saw and the body, shall be employed where possible, while ensuring proper balance. While operating a chain saw, the preferred working position is on the uphill side of the work.
- d. The worker shall make sure of firm footing before and during limbing and bucking.
The worker shall not stand on loose chunks or logs that will roll when the log being bucked is sawed off.

- e. Trees, limbs, or saplings under tension shall be considered hazardous. Appropriate cutting techniques and precautions shall be followed.
- f. Wedges shall be used as necessary to prevent binding of the guide bar or chain when bucking trunks of trees.
- g. Cant hooks or peaveys shall be used as an aid in rolling large or irregular logs to complete bucking.
- h. If mechanized equipment is to be used, the equipment operator shall establish an effective means of communication with other workers (see §§ H.4.j. and H.2.a.).
- i. Workers shall not approach mechanized equipment operations until the equipment operator has acknowledged that it is safe to do so.

8. Pesticide Application

- a. The applicator shall follow label instructions in regard to pesticide applications.
- b. The applicator shall follow pesticide label instructions in regard to laundering his or her clothing.
- c. The applicator shall comply with the manufacturer's instructions with regard to showering or bathing at the end of each workday.
- d. The employer shall provide a clean water source at the worksite, which can be used for emergency personal decontamination. Precautions shall be taken to prevent contamination of the clean water source. Drinking water and decontamination water shall be kept in separate containers.

- e. The applicator shall not direct a solid spray column into contact with electrical conductors.

Appendix A

Definitions

Aerial device: Any one of the following types of vehicle-mounted apparatus used to elevate personnel to jobsites above ground:

- extensible boom platform
- aerial ladder
- articulating boom platform
- vertical tower
- a combination of any of the above, as defined in ANSI A92.2

Anti-two block device: A device consisting of a hollow weight suspended from the boom nose or jib of log loaders, cranes, or related hoists by a chain. The weight hangs with hoist cable running through its center. An electromechanical switch mounted on the boom nose or jib is connected to the chain via a retractable steel cable. When contact is made with the suspended weight by the hook block or any other lifting device nearing the nose or jib, the anti-two block switch circuit is deactivated, and hoist up or telescope out is prevented.

apex: The point at which two saw cuts meet to form a notch.

Applicator: A qualified person engaged in the application of materials such as, but not limited to, pesticides, growth regulators, and fertilizers.

Approved: Acceptable to the federal, state, or local jurisdiction having enforcement authority.

Arboriculture: The art, science, technology, and business of utility, commercial, and municipal tree care.

Arborist: An individual engaged in the profession of arboriculture.

Arborist climbing line: A line designated to support the climber while aloft in a tree or attached to a crane, constructed according to specifications outlined in § H.1.h.

Arborist saddle: An arrangement of straps, fittings, and buckles or other elements in the form of a waist belt with a low attachment element or elements and connecting support encircling the legs, suitably arranged to support the body in a sitting position.

Ascender: A mechanical device used for climbing rope.

Authorized: Designated by the entity that has care, custody, and control of the unit.

Back cut: The cut made in a tree limb or trunk on the side opposite the intended direction of fall.

Belay: Roping technique, managed by the ground person, to safeguard the arborist while climbing.

Brush hog: A heavy-duty rotary mower, normally pulled by a farm-type tractor, used for cutting and mulching brush.

Bucket: A basket-type platform approximately 4 feet (1.22 m) high, which is attached to the end of the upper boom on an aerial device, providing a work platform for working aloft.

bucking: The act of sawing trees, limbs, or both, into smaller sections once they are on the ground.

Cant hook: A long-handled lever fixed with a blunt metal end to handle logs; includes a swinging, metal hook opposing the blunt end to create leverage.

Carabiner: A connector generally composed of a trapezoidal or oval-shaped body with a closed gate or similar arrangement that may be opened to receive an object and, when released, automatically closes to retain the object.

Chopping tool: A wooden-, fiberglass-, or steel-handled tool with a sharp, single- or double-edged steel head or blade mounted to it that is used to cut or split wood (for example, an ax or machete).

Climbing/friction hitch: A hitch used for securing a tree climber to the climbing line, permitting controlled ascent, descent, and work positioning. Examples of climbing hitches include, but are not limited to, the tautline hitch, Blake's hitch, and the Prusik hitch/knot.

Conventional notch: A directional felling cut into the side of a tree, facing the intended direction of fall and consisting of a horizontal face cut and an angle cut above it, creating a notch of approximately 45 degrees (see drawing).

Crew leader: The qualified arborist designated as the individual in charge of a specific job or group of workers.

Crotch: (n.) Branch union; the angle formed by two branches in the tree. (v.) To place a line through a branch union.

Damaged: A defect, impairment or injury to machinery, vehicle, tool, material or equipment that would meet the manufacturer's criteria for removal from service, or in the absence of such criteria, would materially effect the safe operation or safe use of the item during tree trimming operations.

DBH: Acronym for diameter at breast height; diameter of a tree measured at 4.5 feet (1.3 m) above ground.

Deadman control: A safety switch, electrical or mechanical, that deactivates the equipment's function when released by the operator.

Dielectric: Nonconductive of electrical current.

Direct contact: A direct contact is made when any part of the body touches or contacts an energized electrical conductor.

Direct supervision: Direct supervision occurs when a qualified arborist or a qualified arborist supervisor is physically present on the jobsite.

Drop-starting: The act of starting a chain saw by pushing the saw away from the body with one hand while simultaneously pulling on the starter cord handle with the other.

Electrical conductor: Any overhead or underground electrical device capable of carrying an electric current, including communications wires and cables, power lines, and other such fixtures or apparatus.

Electrical hazard: An object or situation that poses risk of injury or death due to direct or indirect contact with an electrical conductor. Where unguarded, energized electrical conductors are present, specific minimum approach distances based on the arborist's or worker's level of training, as set forth in this regulation, shall be followed.

Electrical system owner/operator: An organization that operates or controls the transmission and/or distribution of electric power through electrical conductors.

Electric supply: Conductors used to transmit electric energy and their necessary supporting or containing structures. Signal lines of more than 400 volts are always supply lines, and those of less than 400 volts are considered as supply lines if so run and operated throughout.

Energy (shock) absorber: A component of a climbing system whose primary function is to dissipate energy and limit deceleration forces that the system imposes on the body during fall arrest.

Fall-arrest lanyard: A rope or strap designed to be used with a full-body harness to limit maximum arresting force on a climber to 1,800 pounds (8 kN) in a fall.

false crotch: A device installed in a tree to set ropes during climbing or rigging because there is not a suitable natural crotch available, or to protect an available crotch, and/or to reduce wear on ropes.

False crotch for rigging: A pulley, block, sling, lashing, or metal ring affixed to a tree's leader or limb, through which a load line is passed, to lower or raise limbs or equipment.

False crotch redirect: Consists of the use of a false crotch in conjunction with either a natural crotch or a second false crotch in instances where the arborist is working away from the trunk of the tree and could otherwise be subject to an uncontrolled pendulum swing in the event of a slip.

Footlock: To climb up a suspended rope by pulling with the hands and arms and pushing upward with the feet. The loose end of the rope is wrapped under the middle and over the top of one foot and is locked in place with pressure from the other foot.

Friction point: The point at which the rope surface of the climber's hitch rubs against the climbing line.

Good working condition: A term describing a piece of equipment that has no mechanical defects, has all guards in place, and is operated as intended by the manufacturer.

Ground fault: Any undesirable current path from a current-carrying conductor to ground.

Guarded: Covered, fenced, enclosed, or otherwise protected by suitable covers or casings, barrier rails or screens, mats, or platforms that have been designed by the electrical system owner/operator to minimize the possibility of dangerous approach or accidental contact by persons or objects under normal conditions. Also see *unguarded*.

Handline: A length of rope designated as a tool to leverage, lift, and hold tools, equipment, wood, or other objects; the proper rope strength is specified for each particular use.

High-pressure excavation: The removal or displacement of soil using pressurized air or water.

Humboldt notch: A directional felling cut into the side of a tree, facing the intended direction of fall and consisting of a horizontal face cut and an angled cut below it, creating a notch of approximately 45 degrees (see drawing). A Humboldt cut is usually reserved for larger trees on steep slopes.

Indirect contact: Indirect contact is made when any part of the body touches any conductive object, including tools, tree branches, trucks, equipment, or other objects, that is in contact with an energized electrical conductor. Such contact can also be made as the result of communication wires and cables, fences, or guy wires being accidentally energized.

Job briefing: The communication of at least the following subjects for arboricultural operations: hazards associated with the job, work procedures involved, special precautions, electrical hazards, job assignments, and personal protective equipment.

Kilovolt, kV (Tables 1 and 2): The term for 1,000 volts, abbreviated as kV. Higher voltages are generally given as kilovolts. Example: 12.5 kV (12,500 volts) and 19.9 kV (19,900 volts).

Kilonewton, kN: The measurement of force, abbreviated as kN. Equal to 224.8 pounds. Example: 24.02 kilonewtons equals 5,400 pounds.

Ladder: A two-, three-, or four-legged structure that utilizes vertical side legs with cross sections uniformly placed between the side legs to be used as steps; available in wood, aluminum, or fiberglass; used to ascend to and descend from a height. Also see *tripod/orchard ladder*.

Lanyard: A component of a climbing system consisting of a flexible line of rope, wire rope, or a strap that generally has a connector at each end for connecting the body support to a fall arrester, energy absorber, anchorage connector, or anchorage.

Leg protection: Personal protective equipment constructed with cut-resistant material, such as ballistic nylon, intended to reduce the risk of injury to the legs during chain-saw operations.

Line clearance: The pruning, trimming, repairing, maintaining, removing, treating, or clearing of trees or the cutting of brush (vegetation management) that is within 10 feet (3.05 m) of electric supply lines and equipment; vegetation management work performed by qualified line-clearance arborists or qualified line-clearance arborist trainees for the construction or maintenance of electric supply lines and/or the electric utility right-of-way corridor. Line clearance activities are performed by the employees of the owner or operator of the electrical or communication systems, or independent contractors engaged on behalf of the owner or operator of the system to perform the work.

Load binder: The use of a synthetic strap with a ratchet mechanism or a properly secured rope or chain to encircle a tree trunk or limb as a means of preventing splitting.

manual land clearing: The removal of trees, shrubs, and vines using chain saws or other cutting tools where there are no structures or objects that need to be avoided and pull lines are not used to pull or drop a tree and/or trunk to the ground.

Maul: A heavy-handled hammer, sometimes made with a single edge; used to drive wedges or split wood.

Minimum approach distance: Safe working distances from overhead electrical conductors as defined in Tables 1 and 2 of this regulation.

Open-face notch: A directional felling cut into the side of the tree, facing the intended direction of fall and consisting of two cuts creating a notch greater than 70 degrees (see drawing).

Outrigger: Built-in device used to stabilize cranes, aerial devices, and similar equipment.

phase: Any current-carrying conductor that has an electric potential other than ground (ground is assumed to be 0 volts).

Phase to ground (Tables 1 and 2): The electric potential (voltage) between a conductor and ground.

Phase to phase: The electrical potential (voltage) between two conductors, each having its own electric potential relative to ground.

Primary conductor: Any conductor, including aluminum, copper, or aluminum conductor steel reinforced (ACSR), that is bare, covered, or insulated, with a nominal voltage above 750 volts.

Proximity: An area within 10 feet (3.05 m) of energized overhead electrical conductors rated 50 kV phase to phase or less. For overhead electrical conductors rated more than 50 kV phase to phase, the distance is increased 4/10 inch (10 mm) for each additional kV.

Prusik loop: An endless loop of rope used to fashion a Prusik knot. The endless loop may be spliced or knotted with, at minimum, a double fisherman's knot.

Prusik knot: A sliding friction knot, as in a work-positioning lanyard.

Qualified arborist: An individual who, by possession of a recognized degree, certification, or professional standing, or through related training and on-the-job experience, is familiar with the equipment and hazards involved in arboricultural operations and who has demonstrated ability in the performance of the special techniques involved.

Qualified arborist trainee: An individual undergoing on-the-job training under the direct supervision of a qualified arborist. In the course of such training, the trainee becomes familiar with the hazards and equipment involved in arboricultural operations and demonstrates ability in the performance of the special techniques involved.

Qualified crane operator: An individual who, by reason of a recognized credential or professional standing, or through related training and on-the-job experience, is familiar with the equipment and hazards involved with arboriculture crane operations and who has demonstrated competence in operating a crane and performing the special techniques involved.

Qualified line-clearance arborist: An individual who, through related training and on-the-job experience, is familiar with the equipment and hazards in line clearance and has demonstrated the ability to perform the special techniques involved. This individual may or may not currently be employed by a line-clearance contractor.

Qualified line-clearance arborist trainee: An individual undergoing line-clearance training under the direct supervision of a qualified line-clearance arborist. In the course of such training, the trainee becomes familiar with the equipment and hazards in line clearance and demonstrates ability in the performance of the special techniques involved.

Qualified personnel: An individual who, by reason of training and experience, has demonstrated the ability to safely perform assigned duties and, where required, is properly licensed in accordance with federal, state, or local laws and regulations.

Quick-acting connector: Hose connectors in a hydraulic or pneumatic system designed to allow rapid connection or disconnection without leakage when the system is pressurized.

Saddle, arborist: See arborist saddle.

Secured (object): Made firm or tight; fastened. Example: The load is secured to the truck.

Secured (person): When an arborist is safeguarded from unintended movement by utilizing a climbing system that is attached to the arborist and connected to a tree or other stable support. Examples of being secured include, but are not limited to, (a) being tied in, (b) using a work-positioning lanyard, (c) being on belay, and (d) ascending the arborist climbing line using the footlock technique while utilizing a Prusik loop or ascenders.

Shall: As used in this regulation, denotes a mandatory requirement.

Should: As used in this regulation, denotes an advisory recommendation.

Snap hook: Commonly called a self-locking or double-locking rope snap. The locking type (required by this regulation for climbing) has a self-closing, self-locking gate that remains closed and locked until intentionally opened by the user for connection or disconnection. A captive eye is an integral part of a snap hook but is independent of the hook and gate portion.

Split tail system and split tail: Refers to a system in which the climbing line is tied to the saddle, preferably indirectly with an ANSI-compliant carabiner or locking rope snap, without leaving a tail beyond the termination. The climbing/friction hitch is then tied onto the climbing line with a separate short section of climbing line called a split tail. The split tail is separately connected to a designated anchor point on the saddle.

Spotter: A person within voice and visual communication of the driver and located in a position to view the area in which the vehicle (unit) is backing to help ensure that the backing operation is, and will remain, safe.

Step potential: The voltage between the feet of a person standing near an energized grounded object. It is equal to the difference in voltage, given by the voltage distribution curve, between two points at different distances from the electrode. A person could be at risk of injury during a fault simply by standing near the grounding point.

Tackle blocks and pulleys: Equipment used in most tree situations to take a strain rather than move a load. Critical components of the system are the appropriate ropes, blocks, and, especially, the lock or connecting link.

Termination knot: Any knot suitable for rope termination; includes, but is not limited to, double fisherman's loop (scaffold hitch), anchor hitch, and buntline hitch.

Tied in: The term that describes an arborist whose climbing line has been run through a natural or false crotch attached to an arborist's saddle and completed with a climbing hitch or mechanical device, permitting controlled movement and work positioning.

tool lanyard: Short line or strap used to secure a tool while working aloft.

Tripod/orchard ladder: A three-legged ladder that utilizes the third leg to form a tripod to stabilize itself among orchard trees and/or shrubs. It is recommended for use on turf for better stability and to avoid slippage of the legs. Not recommended for use on hard surfaces.

unguarded: Not guarded from approach or contact with electrical conductors.

Volt: A unit of electric potential difference between two points. Lower-voltage systems are generally expressed in terms of volts; for example, 120 volts or 240 volts.

Wedge: A piece of material with two sides meeting at an angle; used to raise or split objects by applying a driving force, such as with a hammer.

Wheel chock: Wedge-shaped block manufactured or employer approved to prevent unintentional movement of vehicle. Wheel chocks are placed in front of or in back of a vehicle's tires or tracks. If necessary, the chocks can be placed both in front and in back of the tires or tracks.

Worker: An individual involved in an arboricultural operation, such as ground operations, equipment operations, and removal operations.

Working load: Limiting load values derived from the minimum breaking strength of a cord or rope divided by the design factor. For example, given a minimum breaking strength of 10,000 pounds (44.48 kN) and a design factor of 10: $10,000/10 = 1,000$ (working load, in pounds)

Or, given a minimum breaking strength of 10,000 pounds (44.48 kN) and a design factor of 5: $10,000/5 = 2,000$ (working load, in pounds)

Working-load limit: The working load that must not be exceeded for a particular application as established by a regulatory or standards-setting agency (see *working load* under Additional Terms, below).

Workline: Rope used for lifting, lowering, or guiding limbs or equipment, or both, into or out of the tree.

Work-positioning system: An arborist climbing system designed to be used under tension to support the arborist or other worker on an elevated vertical surface, such as a tree limb, and allow him or her to work with both hands free.

Appendix B

(Informative)

Recommended Guidelines for Standard Performance and Safety Training for Qualified Line-Clearance Arborists/Qualified Line-Clearance Arborist Trainees and Qualified Arborists/Qualified Arborist Trainees

NOTE: The content of this training outline is generic and may be customized to achieve equivalent levels of safe practice by substituting or, where deemed appropriate to the circumstances, omitting portions of this outline. Use or nonuse

of training aids that may be available shall not be evidence of noncompliance with this regulation.

1. General Requirements

Specific training in the area of individual expertise and work required of a qualified line-clearance arborist or qualified arborist shall be provided by the employer and documentation of training retained on file for the duration of employment.

a. Introduction and employer/employee responsibilities.

b. Employee orientation, to include

(1) job description appropriate to job assignment (qualified line-clearance arborist or qualified arborist)

(2) introduction to immediate supervisor and crew members

(3) familiarization with appropriate personal protective clothing and equipment and its proper use and maintenance

(4) familiarization with equipment

(5) introduction to company policies, procedures, and safe work practices

(6) safe work practices as related to job assignments

(7) written acknowledgment by employee that he or she has participated in such training

c. Line-clearance or tree care pruning techniques appropriate to job assignments, as follows:

- (1) Provide education and training in accordance with prevailing national standards for utility pruning. Refer to recommended resources in Appendix D for further information.
- (2) Provide education and training in accordance with prevailing local, state, or regional standards for utility pruning, as well as those specified by utility contracts.
- (3) Provide tree knowledge for line-clearance or tree care techniques appropriate to job assignments.
- (4) Provide education and training relative to predominant tree species within geographic area, such as identification, growth habits, structure, and wood strength.
- (5) Provide education and training for recognition and evaluation of potentially hazardous conditions related to tree structure. Refer to recommended resources in Appendix D.

2. General Safety

a. VOSH regulations

Familiarize employees with the requirements of VOSH regulations as applicable to employee job assignments. Refer to recommended resources in Appendix D.

b. American National Standards

Familiarize employees with the requirements in ANSI Z133.1 as applicable to employee job assignments. Refer to additional recommended standards in Appendix D.

c. Public Safety and Traffic Control

Provide education and training in the use of public safety and traffic control devices as applicable under federal, state, or local regulations.

d. Electrical Hazards

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

e. Emergency Conditions

Provide education and training in the proper procedures for safely performing work in emergency conditions applicable to employee job assignments.

f. 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.

3. Personal Safety

a. Personal Protective Equipment

Provide personal protective equipment as required for applicable job assignments, and instruct employees in its proper use, fit, life, and maintenance.

b. Emergency Response Procedures

Furnish employees with appropriate information and training necessary to expedite a response to a worksite emergency, such as

first aid, CPR, and aerial rescue (see Appendix F, Aerial Rescue Flowchart).

c. Prevention of Back and Other Injuries

Provide education and training in the techniques required to avoid back and other injuries applicable to job assignments.

d. Identification and Avoidance of Animals and Poison Plants

Provide education and training in the identification of and the need to avoid contact with poison plants and instructions for treating insect stings/bites and snake bites.

4. Equipment Safety

a. Mobile Equipment and Aerial Lifts

Provide education and training in the inspection, operation, and maintenance of all vehicles and equipment, such as aerial lifts, brush chippers, stump grinders, log loaders, tree cranes, mowing equipment, and pesticide application equipment. All equipment shall comply with applicable federal and state regulations, local ordinances, and manufacturers' operating instructions (see 16 VAC 25-60-120). Such training shall be appropriate to employee job assignments.

b. Aerial Equipment and Electrical Hazards

Provide education and training so that affected employees understand the required and recommended procedures for operating aerial devices in proximity to electrical hazards. Such training shall be appropriate to employee job assignments.

c. Chain Saw, Power Tool, and Hand Tool Use and Safety

Provide education and training in the safe use of chain saws, power tools, and hand tools in accordance with manufacturers' instructions. Such training shall be appropriate to employee job assignments.

d. Climbing Equipment Use and Safety

Provide education and training in the inspection, maintenance, and storage of climbing equipment such as ropes, saddles, personal lanyards, rope snaps, carabiners, and related equipment. Such training shall be appropriate to employee job assignments.

5. Operational Safety

a. Climbing Techniques

Provide education and training in climbing techniques as appropriate to employee job assignments.

b. Rigging and Tree Removal

(1) Provide education and training appropriate to employee job assignments, such as knots and ropes, rigging techniques, tree strength and weight characteristics, and potential electrical hazards.

(2) Provide education and training in the identification and removal of hazard trees. Such training shall be appropriate to employee job assignments.

c. Hazard Communications

Provide education and training necessary to comply with federal and state regulations appropriate to employee job assignments.

d. Pesticide Use

Provide education and training necessary to comply with federal and state regulations appropriate to employee job assignments.

Appendix C

(Informative)

General Safety Procedures That Apply to All Tree Work

1. Lifting

Before lifting any weight, workers shall:

- a. be sure there is a clear path available if the weight is to be carried from one place to another;
- b. decide exactly how the object should be grasped to avoid sharp edges, splinters, splinters, or other factors that might cause injury;
- c. make a preliminary lift to be sure the load can be safely handled;
- d. place feet solidly on the walking surface;
- e. crouch as close to the load as possible, with legs bent at an angle of about 90 degrees;
- f. lift with the legs, not the back, keeping the weight as close to the body as possible;
and
- g. use additional workers or material-handling equipment when necessary.

2. Control of Hazardous Energy

When a worker, hereafter referred to as the “authorized person,” is doing mechanical work, precautions must taken to prevent injury caused by moving or

elevated parts, or the release of stored energy, such as hydraulic pressure. Failure to do so could result in a serious, potentially maiming, or fatal injury. The authorized person performing maintenance/repair shall comply with the employer's procedures. The specific Control of Hazardous Energy requirements established by VOSH may be obtained by consulting 16 VAC 25-90-1910.147.

a. The following is a sample procedure.

Sequence for Securing Equipment (Sample):

- (1) The authorized person shall notify the crew and/or affected employees that maintenance or repair is to be done and that such equipment must be shut down and secured.
- (2) The authorized person shall refer to the manufacturer's manual for proper procedures (as needed).
- (3) If equipment is in an operational mode, it shall be shut down by normal procedures.
- (4) Rotating parts, such as chipper blades, shall be stopped before maintenance or repair. Keyed ignition systems must be in working order.
- (5) Keys shall be removed and pocketed by the foreman or mechanic. When there is no keyed ignition system, the battery cables or spark plug wires shall be disconnected.
- (6) The power takeoff shall be disengaged before beginning service or repair tasks, such as hose replacement. All hydraulic tools shall be disconnected before equipment is adjusted or serviced.
- (7) An employee shall never attempt to stop a hydraulic leak with his or her body.

- (8) Materials or parts that must be raised or disconnected and suspended shall be properly secured, such as with an appropriate sling or jackstand. Flywheels, such as chipper cutter heads, are to be blocked to prevent pinch points.
- (9) Before proceeding with maintenance or repair, the authorized person shall ensure that equipment is isolated and will not operate.
- (10) Any piece of equipment being serviced or repaired shall not be started, energized, or used by any other worker not under the direction of the authorized person.
- (11) When the engine must be running for tuning or adjustment, special care must be given to moving parts.

b. Restoring Equipment to Service (Sample)

When maintenance or repair is complete and equipment is ready to return to normal operation, the following steps shall be taken by the authorized person to restore the equipment to service:

- (1) To prevent accidental contact with moving or electrical components when the equipment is engaged, check for loose parts or tools that may have been left in the immediate area.
- (2) Ensure that all guards are in place and employees are in the clear.
- (3) Confirm that controls are in neutral.
- (4) Reconnect key, cable, or plug wires.
- (5) Notify affected employees that equipment is ready to return to service.

(Informative)

Additional Resources

1. Applicable American National Standards

Fall protection systems for construction and demolition operations (A10.32-2004)

Gasoline-powered chain saws (B175.1-2000)

High-visibility safety apparel and head wear (107-2004)

Mast-climbing work platforms (A92.9-1993)

Occupational and educational eye and face protection devices (Z87.1-2003)

Personal fall arrest systems, subsystems, and components (Z359.1-1992 [R1999])

Portable metal ladders (A14.2-2002)

Portable reinforced plastic ladders (A14.5-1992)

Portable wood ladders (A14.1-2000)

Protective headgear for industrial workers (Z89.1-2003)

Respiratory protection (Z88.2-1991)

Tree care operations—tree, shrub, and other woody plant maintenance (A300)

Vehicle-mounted elevating and rotating aerial devices (A92.2-2002)

Workplace floor and wall openings, stairs, and railing systems (A1264.1-1995

[R2002])

2. Cordage Institute Rope Standards

The Cordage Institute, www.ropecord.com

3. Applicable VOSH and U.S. Department of Labor/Federal Labor/Federal Motor

Carrier Safety Administration Regulations

Electric Power Generation, Transmission, and Distribution, 16 VAC 25-90-

1910.269

General Industry, 16 VAC 25-90-1910

Hazard Communication, 16 VAC 25-90-1910.1200

Medical Services and First Aid, 16 VAC 25-95 [PROPOSED REGULATION]

Occupational Noise Exposure, 16 VAC 25-90-1910.95

Personal Protective Equipment , 16 VAC 25-90-1910.132 to -136

Electrical - Safety-Related Work Practices, 16 VAC 25-90-1910.331 to -335

Telecommunication, 16 VAC 25-90-1910.268

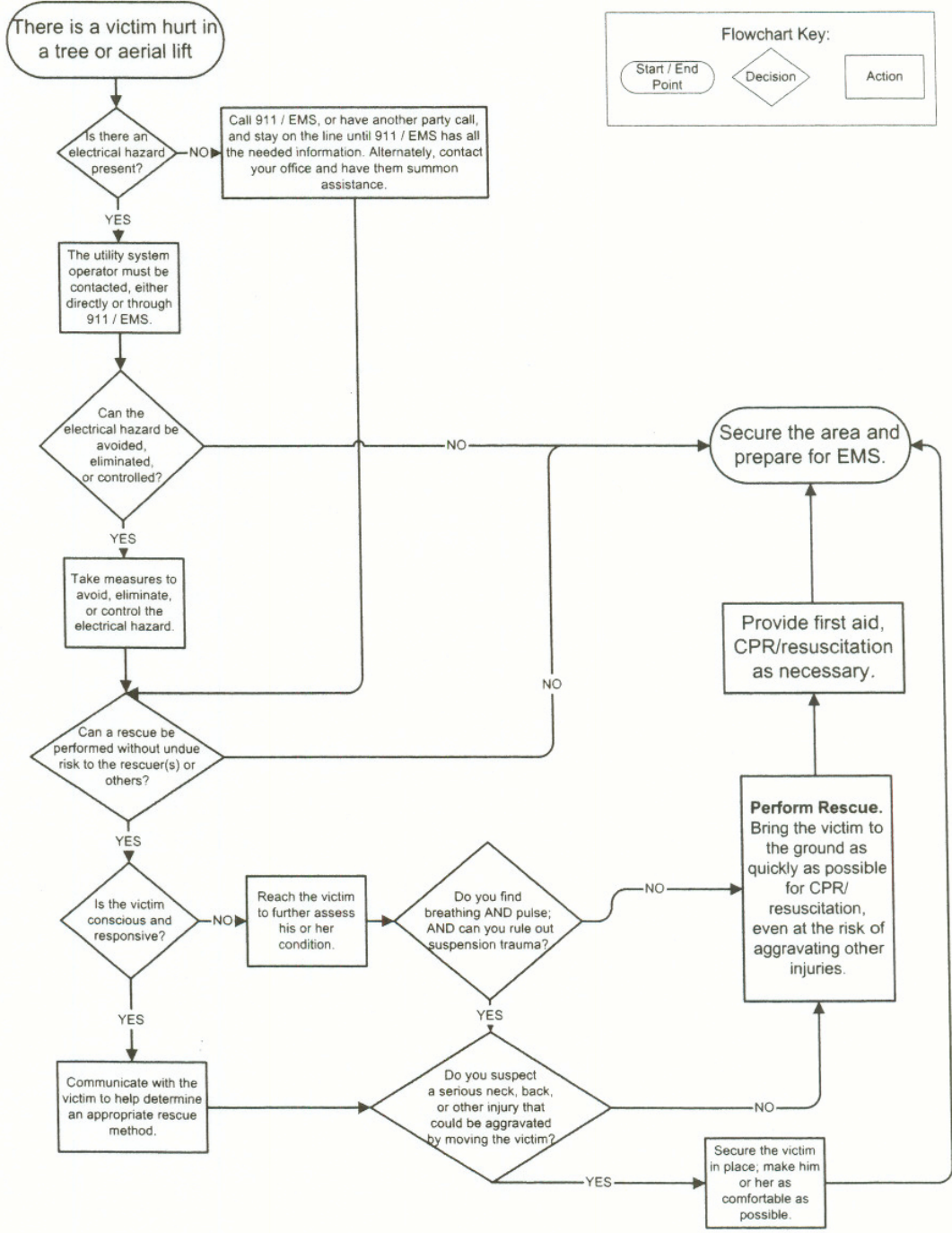
Transportation (49 CFR, Subchapter B, Federal Motor Carrier Safety
Regulations)

Appendix E (Informative)
Weight of Green Logs

Species	Weight, lb per ft ³	Weight of a 1-ft section, based on average diameter							
		10"	12"	14"	16"	18"	20"	22"	24"
Alder, red	46	25	36	49	64	81	100	121	144
Ash, green	47	25	37	50	66	83	102	124	148
Ash, Oregon	48	26	38	51	67	85	104	126	150
Ash, white	48	26	38	51	67	85	104	126	150
Aspen, quaking	43	23	34	46	60	76	94	114	135
Baldcypress	51	28	40	54	71	90	111	135	160
Basswood	42	23	33	45	59	74	92	111	132
Beech	54	29	42	58	75	95	118	142	169
Birch, paper	50	27	39	53	70	88	109	132	157
Cedar, incense	45	25	35	48	63	79	98	119	141
Cedar, western red	28	15	22	30	39	49	61	74	88
Cherry, black	45	25	35	48	63	79	98	119	141
Chinaberry	50	27	39	53	70	88	109	132	157
Cottonwood	49	27	38	52	68	86	107	129	154
Elm, American	54	29	42	58	75	95	118	142	169
Fir, Douglas-	39	21	30	41	55	69	85	103	122
Fir, noble	29	16	23	31	41	51	63	77	91
Fir, white	47	25	37	50	66	83	102	124	148
Gum, black	45	25	35	48	63	79	98	119	141
Gum, red (<i>Eucalyptus</i>)	50	27	39	53	70	88	109	132	157
Hackberry	50	27	39	53	70	88	109	132	157
Hemlock, eastern	49	27	38	52	68	86	107	129	154
Hemlock, western	41	22	32	43	57	72	89	108	129
Hickory, shagbark	64	35	50	68	89	113	140	169	201
Horsechestnut	41	22	32	43	57	72	89	108	129
Larch	51	28	40	54	71	90	111	135	160
Locust, black	58	32	45	62	81	102	126	153	182
Locust, honey	61	33	48	65	85	108	133	161	192
Maple, red	50	27	39	53	70	88	109	132	157
Maple, silver	45	25	35	48	63	79	98	119	141
Maple, sugar	56	31	44	60	78	99	122	148	176
Oak, California black	66	36	51	70	92	116	144	174	207
Oak, English	52	28	41	55	72	92	113	137	163
Oak, live	76	41	60	81	106	134	166	200	238
Oak, pin	64	35	50	68	89	113	140	169	201
Oak, post	63	34	49	67	88	111	137	166	198
Oak, red	63	34	49	67	88	111	137	166	198
Oak, scarlet	64	35	50	68	89	113	140	169	201
Oak, white	62	34	48	66	86	109	135	163	194
Pecan	61	33	48	65	85	108	133	161	192
Persimmon	63	34	49	67	88	111	137	166	198

Species	Weight, lb per ft ³	Weight of a 1-ft section, based on average diameter							
		10"	12"	14"	16"	18"	20"	22"	24"
Pine, eastern white	36	20	28	38	50	64	78	95	113
Pine, loblolly	53	29	41	56	74	93	116	140	166
Pine, lodgepole	39	21	30	41	55	69	85	103	122
Pine, longleaf	55	30	43	58	77	97	120	145	173
Pine, ponderosa	46	25	36	49	64	81	100	121	144
Pine, slash	58	32	45	62	81	102	126	153	182
Pine, sugar	52	28	41	55	72	92	113	137	163
Pine, western white	36	20	28	38	50	64	78	95	113
Poplar, yellow	38	21	30	40	53	67	83	99	119
Redwood, coast	50	27	39	53	70	88	109	132	157
Spruce, red	34	19	27	36	47	60	74	90	106
Spruce, Sitka	32	17	25	34	45	56	70	84	100
Sweetgum	55	30	43	58	77	97	120	145	173
Sycamore	52	28	41	55	72	92	113	137	163
Walnut, black	58	32	45	62	81	102	126	153	182
Willow	32	17	25	34	45	56	70	84	100

Aerial Rescue Flowchart
 Appendix F
 (Informative)

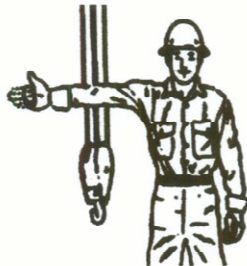


Appendix G (Informative)
Hand Signal Chart for Crane Operations

From DOE-STD-1090-2004



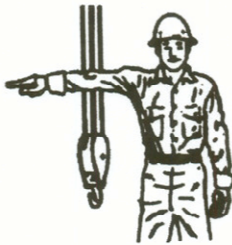
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless above the hand giving the motion signal. (Hoist slowly shown as example.)



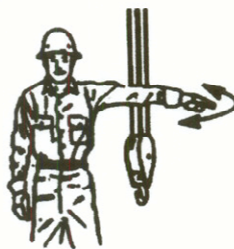
RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



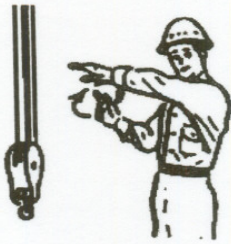
SWING. Extend arm, point with finger in direction of swing of boom.



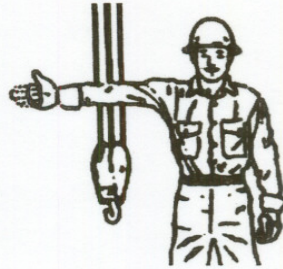
STOP. Extend arm, palm down; move arm back and forth horizontally.



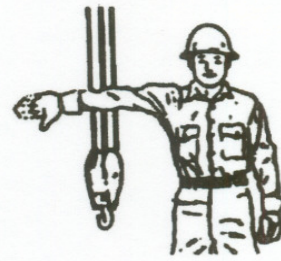
EMERGENCY STOP. Both arms extended, palms down, move arms back and forth



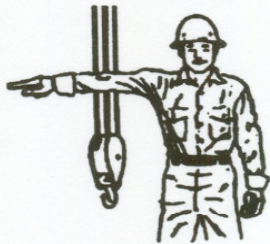
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless above the hand giving the motion signal. (Hoist slowly shown as example.)



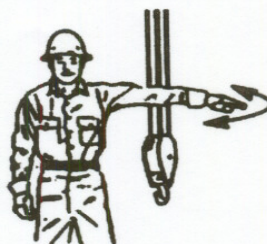
RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



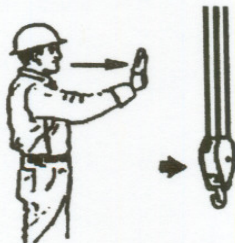
SWING. Extend arm, point with finger in direction of swing of boom.



STOP. Extend arm, palm down; move arm back and forth horizontally.



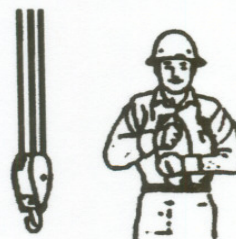
EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.



TRAVEL. Extend arm forward, hand open and slightly raised; make pushing motion in direction of travel.



DOG EVERYTHING. Clasp hands in front of body.



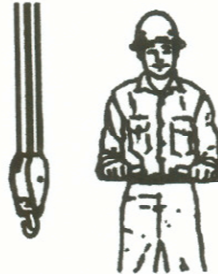
TRAVEL (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward (for land cranes only).



TRAVEL. (One Side Track). Lock the track on side indicated by raised fist. Travel opposite track indicated by circular motion of other fist, rotated vertically in front of body (for land cranes only).



EXTEND BOOM. (Telescoping Booms). Hold both fists in front of body, thumbs pointing outward.



RETRACT BOOM (Telescoping Booms). Hold both fists in front of body, thumbs pointing toward each other.



EXTEND BOOM (Telescoping Boom). One-hand signal. Hold one fist in front of chest, thumb tapping chest.



RETRACT BOOM (Telescoping Boom). One-hand signal. Hold one fist in front of chest, thumb pointing outward and heel of fist tapping chest.